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SPACE CASE:
SOME PRINCIPLES AND THEIR IMPLICATIONS
CONCERNING LINEAR ORDER IN NATURAL LANGUAGE

Lon Diehl

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0. Introduction

Because of limitations of space, this paper is fragmentary, i.e., this extraction omits pages of important material. Because of limitations of time, this work is still preliminary.

Of the omitted material, some was originally introductory and some appended. The introductory material proceeded from a critique of Fillmore case grammar to adoption of a set of "deep case" relations corresponding essentially to Gruber's thematic relations and then to a critique of Anderson's 1971 work on localistic case grammar. This material led the way to where we begin here.

The appended material was pages of wholesale extraction from the literature on language acquisition (mostly anthologies, for the sake of the lay reader) and cognitive development (with heavy concentration on the work of Jean Piaget and his associates in Geneva).

I hope that in spite of these omissions, the reader will be able to follow and will find profit in this attempt to penetrate through some deep regularities of ordering in linguistic representations (deep and shallow trees and strings) to the cognitive principles which seem to underlie them.

It should be noted that because of the above-mentioned omissions together with the time and space limitation which imposed them, we begin numbering the examples with (31).

1. A Second Look at Localistic Case: The Egodeictic Space Hierarchy

We will now consider a revision of case grammar which will, it is hoped, (1) incorporate all the valid insights and claims of the case system proposals discussed above, (2) exclude any false generalizations, (3) make a wide range of "new" predictions about natural languages, and (4) be clearly falsifiable at a wide number of points. The framework is localistic in that all "case categories" are held to be defined in terms of "deep" function (IT, AT, FM, TO, or nom, loc, abl, all) in conjunction with an egodeictically ordered hierarchy of "spaces" through which the deep relations are projected.

The core of our localistic approach is the widely noted set of relations abbreviated as IT and AT (or, in the case of transitional verbs, IT, FM, and TO). This set of relations is cited, exemplified, and argued as basic in Gruber (1965) and Anderson (1971). Note that while Fillmore's Objective case is "neutral" but not necessarily present as one of the case relations of every verb, Gruber's IT and Anderson's nom are assumed to be neutral and obligatory elements of each clause (Gruber 1965:28-29; Anderson 1971:37). The assumption of an obligatory IT in every clause together with the principle of "one instance of a case relation per simple clause"² will impose superordination analyses upon phenomena associated with transitivity; from a re-examination of transitivity the strict semantic clause structure assumed here (Verb, IT, (AT)) will lead to a hierarchical pattern of superordinate structures.

The Source-like nature of the Agentive or ergative case relation can be seen both in its semantic force and in its syntactic behavior. Gruber (1965:171-194) recognizes and demonstrates this behavior of Agt NP's, but fails to incorporate the agentive FROM-NP into his otherwise integrated theme-source-goal framework because of its apparently uniquely superordinate status.

We intend to show here that there are considerable possibilities for deeper analysis. However, a formal representation of this will not be attempted.

We shall be content to settle with analyzing the Agent subject as being generated from a from-prepositional phrase. (1965:189)

Thus Gruber's formalization has theme NP's, location NP's, goal NP's and source NP's one subset of which represents the superordinate Agent NP.

In Anderson's work, the Agentive case relation (erg) is reanalyzed as superordinate as a necessary consequence of his reanalyzing it as an underlying ablative (his 'locational' FM case relation):

Erg and abl are 'sources' -- abl commonly spatial (or temporal); erg causal with causatives, and in general 'the source of the action'. (1971:174)

I propose that we provide for the erg/abl relation and for the restriction on the co-occurrence of erg and locative cases by, in the first place, adopting the superordination account of causatives, and secondly, regarding erg as being equal to abl in the absence of loc. (1971:175)

At this point I wish to digress to a suggested analysis for various kinds of verbs and their respective collections of NP relations. This digression will introduce and illustrate a proposed extension of superordination solutions.

Assuming every clause to have at least an IT and no more than one AT (or FM-T0 pair) suggests the following:

CLAUSES OF STATE OR LOCATION (static position): the verb names and predicates a relation between IT and AT:

(31) (position) My brother is in Colorado.
IT AT

(32) (possession) That book is mine.
IT AT

(33) (time) The fight was at eight o'clock.
IT AT

(34) (circumstance) We were in debt.
IT AT

(35) (class membership) He is a linguist.
IT AT

CLAUSES OF PROCESS OR MOVEMENT (i.e., event, transition, position switch): the verb (directional as opposed to locational) names and predicates a relationship between IT and a pathway specified by FM and T0;

(36) We drove from Crystal Lake to Grand Forks.
IT FM T0

(37) Sam sank from ecstatic excitement to deep depression.
IT FM T0

(38) Hansel changed from librarian to lumberjack.
IT FM T0

(39) The picnic went from noon till after dark.
IT FM T0

ACT CLAUSES (transition of a state, process, an event from volition to fact, from "in the Agent" to "in the world" or to "in existence"): the

verb names and specifies a relationship between an animate (or at least typically interpreted as capable of intention) FM and an event IT:

(40) He rolled the marble from the doorway to the far wall.
 FM IT FM IT TO

(41) Willie sold the books (from himself) to me.
 FM IT FM TO

(42) I bought the books from Willie (for myself).
 FM IT FM TO

EXPERIENCE CLAUSES (transition of a state, process, an event from "out there" (in the world) to "in here" (consciousness as possession of assimilated data)): the verb names and predicates the relationship between IT (typically an event) and TO (a being capable of assimilating IT into consciousness):

(43) A shocking realization hit him.
 IT TO

(44) Why did that have to happen to me?
 IT TO

(45) Barry learned that his car had been towed away.
 IT IT TO

(Note that sentence (45) has a stative (non-transitional) counterpart:

(46) Barry knew that his car had been towed away.
 IT IT TO

Facts such as this will bear on later discussion.)

I propose that there is a non-arbitrary basis for characterizing both the parallel and the contrast between "transitive" and "spatial" movement. What I consider to be the ultimate failure of Anderson's case system lies in his lack of any principled basis for characterizing the various "kinds" of location and directionality. Fillmore's system, a one-dimensional list, fails even to capture the parallel. Anderson's superordinate analysis for the abl case relation associated with causative verbs (cf. Gruber's Agent-as-FROM-NP) is suggestive of the following observations:

The non-transitive cases of motion or transition show a certain conceptual symmetry:

Gruber's	SOURCE	THEME	GOAL	(LOCATION)
Fillmore's	SOURCE	OBJECTIVE	GOAL	(PLACE)
Anderson's	ablative	nominative	allative	(locative)
	(FM)	(IT)	(TO)	((AT))

However, in the case of transitive clauses there is apparently only:

Gruber's	SOURCE	(THEME)	---	(Agent + Event)
Fillmore's	AGENTIVE	---	---	(= erg + nom)
Anderson's	ablative	nominative	---	
	(FM)	(IT)	---	

We see here deep but apparently limited parallelism between the "spatial" and "transitive" clause type case relations. I suggest that we keep in mind not just the ACT clauses but the above so-called EXPERIENCE clauses. In these clauses also there is potential if not obligatory embedding, i.e., the Experiencer NP is a superordinate TO-NP.

According to this analysis, there are at least two deep case relations ("localistic") which must be allowed as superordinate: a SOURCE (typically human in the sense of being regarded as capable of volition in the fullest sense) of events (which themselves are complete clauses) and a GOAL (interpreted as capable of psychological experience) of events to be assimilated. A glance at (45) and (46) shows that the contrast of stative versus transitional verbs corresponds precisely to the contrast of the relationships AT versus TO on this superordinate level. This level of superordinate NP's is markedly occupied by objects interpreted as human (or at least animate) beings.

Anderson, having apparently lost or ignored the superordinate status of the TO NP in these clauses, leaves them collapsed in his locative case as an instance of abstract location, a subcase called "dative" (dat):

I have suggested that the case-inflexion ('dative')...marks the variant of the locative which is found with such 'affective' verbs (and is typically animate). This suggestion would seem to accord with the apparent origin of the dative in Indo-European--as reconstructed in e.g. Kurylowicz, 1964:190-5 ('The dative is genetically nothing less than an offshoot of the loc used with personal nouns') --and the frequent occurrence of the same inflexion or preposition for both 'dative' and 'spatial' locatives. I shall try to show below with respect to certain other constructions...that the distribution of the 'dative' inflexion (in e.g. many Indo-European languages) is not entirely haphazard--i.e., that the 'dative' is to a considerable extent a predictable variant of the locative.... (Notice too that the fact that the animate subject in clauses with such verbs is derived (in English and other languages) from an underlying locative (sometimes marked by a 'dative' inflexion) contributed to speculations on the 'passive' nature of the transitive verb.)² (1971:103)

It is helpful to note at this point that for Anderson loc includes dat and that loc (and therefore dat) includes both loc (cf. AT) and all (TO). Throughout the remainder of our discussion we will distinguish all from loc.³

Noting that Anderson's parallel between transitive and directional clauses as diagrammed earlier in this discussion (his 1971:173) does not represent directly (if at all) that each set of case relationships (each clause) requires a nom (IT); and further wishing to incorporate the dative (TO) complement to the ergative (FM) relation on the superordinate level of case relations, I propose the following revision:

abl	nom	all	nom	loc
erg		dat		dat
abl	nom	all	nom	loc
FM	IT	TO	IT	AT

Gruber (1965:60-61) points out that Source-and-Goal have a certain homogeneity: their parameters do not mix, e.g., possessional and positional motion cannot be combined in one FM-TO pair. Location among human beings ("Human place" or possessional location) corresponds deeply and directly to the dative locative case relationship, and indeed is not always easy to distinguish from 'spatial' locatives (Fillmore 1968:61-61; Gruber 1965: 41-47; Kimball 1972; Lyons 1968:298-302, 388-399; Anderson 1971:100-118, esp. 107-118). Another phenomenon, a nearly commonplace observation, is the apparently 'genitive' or possessive morphology associated with the ergative case in those languages called "ergative languages", and in other languages as well, especially in so-called SOV languages (Fillmore 1968:14; Anderson 1971:52). A partial explanation of this phenomenon will be attempted later in this discussion, particularly with respect to its distribution among languages.

Without duplicating the evidence already widely available in the literature, I have tried to show that there is a sphere or realm of location/motion which shows uniform behavior with respect to the case relations (IT and AT, FM-TO) and yet is unique in the sense that position in this realm may be the position predicated of objects (IT = simple NP) or may be predicated of events, processes, or states (IT = S or sentential NP). Position (or location or distribution) in this sphere, discussed thus far in terms of ergativity, dative-ness, possession, giving, acquisition, etc., is seen as location with respect to positions defined or interpreted to be (human) BEINGS, or persons. This realm of "community" or "social universe" I shall call SOCIAL SPACE (SOC). Its distinct identity at this point in our exploration rests upon the necessity of its superordinate status in some of the clause types we have examined. Its unity as a space is assumed at this point on the basis of its regular distribution and behavior of case relations.

Having introduced SOC, I will introduce more spaces, relate them, show their roles in this matter of case grammar revision, try to justify their postulation on linguistic grounds, explore certain empirical and theoretical consequences, and suggest grounds for motivating this case grammar revision which are quite external to and independent of linguistics.

Turning from SOC, we will next consider location (position, distribution) in the more concretely spatial realms of Place and Time. Ignoring the tautologous nature of "introducing" Place and Time as spaces in a "localistic" case system, we note the linguistic (cognitive?) parallel between location of an entity in a position and possession of an entity by its position of occurrence in a given space, pointed out in Anderson 1971:100-118; Kimball 1972, 1974; Lyons 1968:388-399). As noted in Kimball 1974, possession by a spatial position is in some cases alienable, while possession by a temporal position is inalienable. This difference between the two spaces represents one possible class of evidence for their being separate spaces in the linguistic sense. The parallel (i.e., in handling by natural languages) between spatial and temporal position is manifestly obvious (Anderson 1971:12; Lyons 1968:298, 301) in general; in particular, their intimate relationship is seen in their complementary use with a FM-TO pair associated with the verbs of motion discussed earlier: the one allowable pair could apply either to Place or Time. In these clauses of physical motion, movement through Space implies movement (progression) through Time; however, progression through time does not imply movement from one place to another. Another difference in the behavior of the two spaces is reflected in the asymmetrical distribution of spatial and temporal locatives with respect to "first-order" and "second-order" nominals (cf. objects vs. events) (Lyons 1968:346-349).

Location in three-dimensional spatial positions will be called location in SPATIAL SPACE (SPA). Temporal location will be called location in TEMPORAL SPACE (TEM); FM/SPA is the starting point, and TO/SPA the stopping point; in temporal space, FM/TEM is the time of inception, and TO/TEM is the time of cessation. Note that the apparent dilemma of Source and Goal in Space and Time disappears when we see that motion through SPA implies motion through TEM and that the motion is in a sense a single pathway through four dimensions (three defining SPA and the other TEM), with a single FM point designated in terms of four dimensions and a single TO point designated in terms of the same four dimensions.

We have introduced and roughly defined three spaces, SOC, SPA, and TEM. There remains one more space to be introduced: LOGICAL SPACE (LOG). Kimball 1972 points out and to some extent demonstrates "a manifest regularity" between temporal and logical relations. On observation concerning the parallels and distinctions holding among the spaces is that of successive inclusion, to be discussed later. At this point we will say that the typical objects or entities related and/or located in SPA are physical objects (i.e., quality conjunctions), the objects related and/or located in TEM are "events", the objects related in LOG are propositions.

Position in a given space (perhaps even reference to a space) implies a center; though this will be discussed in clearer detail later, I would like to call to our attention the inherent (pre-displacement) center of each of the spaces mentioned as being the same as the center of deixis in each of its realms:

"me"	SOC
"here"	SPA
"now"	TEM
"in this case"	LOG

That absolute and exclusive reference in terms only of the absolute center (EGO) is equivalent to non-existence of (or at least zero differentiation among) these spaces will be of interest later. Note for now that EGO is the primitive center of each of these spaces in the sense that EGO is the conjunction of the centers of these four spaces.

A final exemplary paradigm might help focus the four spaces introduced: "location" in one space is often easily paraphrased in terms of others:

- (47) Whoever has a left hand has a left arm.
- (48) Where(ver) there's a person with a left hand, there's a person with a left arm.
- (49) When(ever) there's a person with a left hand, there's a person with a left arm.
- (50) If there's a person with a left hand, there's a person with a left arm.
- (51) Who(ever) shuts his ear to the cry of the poor,
He will also cry himself and not be answered.
- (52) Where(ver) ears are shut to the cry of the poor,
there will be one's own unanswered cries.
- (53) When(ever) ears are shut to the cry of the poor,
then one's own cries will be unanswered.
- (54) If one shuts his ear to the cry of the poor,
then he too will cry unanswered.

(51)-(54) are rough paraphrases of Proverbs 21:13; in (51) two events are related and located as act and experience in SOC; in (52) the two events are related in terms of SPAtial distribution; in (53) the location is TEMporal; and in (54) their relationship is LOGical.

The relationship, it should be noted, between entity and position holds within each space. The space-specific referents involved may in fact be only relatively different in their being interpreted as "thing" and "place". For example, the same tree is IT in (55) and AT in (56); the same board meeting is IT in (57) and AT in (58):

(55) The tree is in our back yard.
IT AT

(56) There is a squirrel living in the tree.
IT AT /SPA

(57) The board meeting was held last night.
IT AT

(58) Some coffee was drunk during the board meeting.
IT AT /TEM

The difference between a given IT and AT seems in many cases to correspond to a sort of distributional inclusion with respect to the salient space, but we will not try to address the question.

I have introduced four spaces, SOC, SPA, TEM, and LOG; I have tried to suggest that the integrity and distinctiveness of each can be demonstrated in terms of available linguistic facts, and, has to some extent already been demonstrated in the literature referred to. The next step is to show that they are, in some nontrivial sense ordered among themselves.

Although SOC and SPA are mutually distinctive in many cases, there are also cases in which in some languages (e.g. English, Khmer) in which a same syntactic sentence may be ambiguous as to whether a given verb is predicating transition in SOC or in SPA or perhaps in both:

... it may be observed that possessives and locatives are not always clearly distinguishable in three-place constructions. It would be impossible, and it is perhaps unnecessary, to say whether Bring me the book is 'possessive' or locative (whether me is the 'indirect object' or 'directional'): we have already drawn attention to the fact that the same case or preposition is used in many languages for both the 'indirect object' and 'motion to' Once again, we notice the similarity (and perhaps the ultimate identity) of locatives and possessives. (Lyons 1968:399)

The significance of such observations is that, while there are six logically possible conjunctions of spaces (in terms of pairings of single spaces, i.e. SOC-SPA, SOC-TEM, SOC-LOG, SPA-TEM, SPA-LOG, TEM-LOG), there is evidence that only three of the six space intersections (and/or contiguities) are of such linguistic standing as to be observed, recognized, and discussed in, e.g. the previously mentioned work of Anderson, Fillmore, Kimball, Lyons. The three space contiguities (intersections, areas of interference or blend) which do show linguistic salience (semantic and/or

morphological) are the three which in the above list are underlined: SOC-SPA, SPA-TEM, and TEM-LOG.

Areas of neutralization of semantic contrast and identity of morphological representation which serve to "connect" SOC and SPA are widely cited (e.g. Anderson 1971:100-118; Lyons 1968:300-302, 391-399); it is only speculation on my part that connects this fact with the fact that one's own body is located in (exists in, is possessed by) both a personal "self" (SOC) and physical position (SPA), i.e. is both (inalienably) a "possession" linguistically and, of course, a physical object. Extension of this conjunction of "possession" and spatial extension leads to territoriality, domain (social, political, economic) beyond the body.

The area of contiguity or intersection connecting SPA and TEM, illustrated in their inseparability with respect to the behavior of Source and Goal with verbs of motion (Fillmore 1971a; also see Kimball 1974), is associated with conceptions of "objective reality", physical existence, or "concrete existence".

Discussing certain properties of logical space, Kimball (1974:8-9) makes the following observations:

There is a manifest regularity between the relations expressed by a word in its temporal and logical uses. Namely, if a word W says that event E_1 occurs earlier than E_2 in time, then in its logical use a statement $P_1 \ W \ P_2$ means that P_1 is a condition of P_2 . Where $E_1 \ W \ E_2$ says that E_1 is temporally prior, $P_1 \ W \ P_2$ says that P_1 is logically prior.

Many cases of temporal words being used to express logical relations come to mind. The "follow" of "follow from" as in "The truth of this follows from the truth of that" is clearly the temporal "follow". Why the ablative "from" appears here in the logical use needs to be explained; its occurrence, however, should shed some light on how the language treats logical relations. Second, the "then" of "if-then" is homophonous with the temporal "then", and, at the same level of generality, is clearly the same word. For "then" we see most simply illustrated the maxim stated in the paragraph above the relation between the logical and temporal notions expressed by a word.

One can make the following observation concerning the nature of logical space. Whereas, as with temporal space, relations between propositions in logical space are asymmetrical, irreflexive and transitive; but logical space is not connected. That is, for any two events, it is the case that one precedes the other. However, for any two propositions it need not be the case that one follows from the other. Furthermore, while "earlier than" in time is anti-symmetrical, in the sense that if E_1 precedes E_2 , then it's not the case that E_2 precedes E_1 ; logical priority is not so. That is "if p , then q " and "if q , then p " can be true simultaneously.

We have already seen some examples ((47)-(54)) of mutual paraphrasability among all four spaces. Obviously, then, possibility (or even ease) of paraphrase between temporal and logical expressions cannot serve as a criterion for pairing or joining TEM and LOG in any unique way. However, as Kimball's quoted paragraphs show, there are word in English which have both temporal and logical uses but are restricted to only those two spaces. Just as ou in French applies to both and only SPA and TEM, so are there words (e.g. "follow", "then") which have both and only temporal and logical uses not only in English, but through other languages as well (e.g. German wenn, Mandarin 就 jiù as 'immovable adverb', Kachin yang, etc.). Words pairing logical relations uniquely to those of any one of the other spaces (e.g. "therefore" in English: LOG and SPA) are not only much fewer in number than those having temporal and/or logical uses, but seem to yield to analysis as special cases (e.g. "therefore" expressing "facing" properties in TEM and LOG (but not in SPA!)).

We will now summarize the space contiguities:

SOC + SPA, SPA + TEM, TEM + LOG

or equivalently:

LOG + TEM, TEM + SPA, SPA + SOC

Note that two of the spaces, SPA and TEM, exhibit two contiguities each, while the other two, SOC and LOG, have only one each. Collapsing the (already suggestively arranged) sequences given above, we get:

SOC + SPA + TEM + LOG (or LOG + TEM + SPA + SOC).

These two (equivalent) orders are two of the twenty-four possible linearizations; taking full reversals to be equivalent, the order given above amounts to one of the twelve logically possible orderings.

This order, far from random or accidental, embodies a continuum or progression of a very interesting kind. For now limiting ourselves to two "semantic" parameters, we see that the above ordering of the four spaces reflects not just a collection of morpho-syntactic generalizations, but embodies a progression of conceptually egodeictic remoteness. With respect to animateness, the objects and positions of SOC represent the ultimate in capacity for volition, consciousness of cognitive processes, etc., as interpreted linguistically; the entities and/or positions of SPA are less consistently regarded as animate in the fullest sense just referred to, but may be attributed some of these qualities (e.g. the progression: humans, animals, living things, objects) most of the time or all of these qualities part of the time (e.g. in pronominal reference, linguistic gender, "she's beautiful", of a ship, etc.); I know of very little attribution of such qualities to TEMporal objects and/or positions other than as the result of deliberate attempts to be poetic; and finally I know of no specific or general attribution of animateness qualities to abstract relations or logical propositions as such (LOG). Thus, in terms of the thinking and linguistic behavior of persons, the SOC+SPA+TEM+LOG

order represents a progression or hierarchy of remoteness from or dissimilarity to EGO. It is in this sense that the spaces are egodeictically ordered, i.e., ordered with reference to the primitive center EGO. What is meant by the use of this terminology is that not only does egodeixis have significance within each space, but, I will attempt to show, egodeixis holds among the spaces as well, i.e., orders them. The other parameter which may serve to demonstrate some of this hierarchy of remoteness inherent in this interspatial order is the concrete-abstract continuum. The intimate vividness of relations in SOC represents the high point of (cognitively interpreted) concreteness or definition: the intensity and seeming clarity of the reality or existence of one's own acts, experiences, and personal possessions needs no elaboration; recognition of SPAtial positions and especially the physical objects in them is also accompanied by some (cognitive sense of) immediacy, potential if not actual; TEMporal objects (e.g. events, processes), however, seem much more vague or remote, perhaps thought of as entities in what seems to be mostly metaphorical, in some extended or "derived" way. The abstract entities (e.g. propositions) and relations of LOG are, of course, the most abstract.

2. The Nucleus: Inside and Outside

Our discussion so far has been an introduction to two key elements of a case grammar revision: (1) the strict localistic assumption that one set of relations holds in all realms (e.g. both in transitive and spatial-transition clauses):

IT (theme), AT (location, position), and, in the case of motional (transitional, transitive, nonstative) verbs, a pathway defined by a FM-TO (source-goal) pair.

Assuming the requirement that each clause have one and only one theme (IT), that a simple clause have no more than one instance of a given case relation, forces solutions which involve analysis of certain clauses as systematically complex, formalizable in terms of superordinate configurations. The single set of case relations is assumed to be projected through a (2) sequence of spaces which correspond to the hierarchy seen in superordinate configurations of "complex" clauses. The ordering of the spaces is seen to correspond also to an egodeictic hierarchy of remoteness, i.e., egodeixis is pertinent both intraspatially and interspatially.

What we have so far, then, is the case relations and the (ordered) spaces through which the relations are projected. In contrast to Fillmore's one-dimensional list and Anderson's superordinate causative and otherwise unitary single level of deep case relations, we might diagram the conjunctions of our relations and spaces as shown in (59).

(59)

<u>spaces</u>	<u>case relations</u>					
	transitional clauses			non-transitional clauses		
(core)	IT	FM	TO	IT	AT	
SOC	IT	FM	TO	IT	AT	
SPA	IT	FM	TO	IT	AT	
TEM	IT	FM	TO	IT	AT	
LOG	IT	FM	TO	IT	AT	

Some rough equivalents can be pointed out between various of these relation-space conjunctions and the case relations of Fillmore and Anderson. Fillmore's Agentive and Anderson's ergative are equivalent to FM/SOC in case the IT is sentential, i.e., FM/SOC represents the human sources of events (acts); in case the act is in some sense being given not to the world at large but to some specific person, we have TO/SOC as Fillmore's Benefactive. When both FM/SOC and TO/SOC are specified individuals and the IT is not sentential, we have a mere (?) transfer of possession, suggestive of Fillmore's Source and Goal and Anderson's ablative and (dative) locative. When a sentential IT moves from an unspecified FM to TO/SOC, we have Fillmore's Experiencer and, presumably, Anderson's dative locative.

While the equivalences among the relations in SPA and TEM and the Source-and-Goal-of-Place-or-Time and Anderson's "spatial" abl-all are fairly obvious, the projection of our case relations through LOG seems to have no correlate in Fillmore's and Anderson's systems.⁴

Some further explication may be helpful. The various syntactic shapes which IT can take I assume to be equivalent for the purposes of relational function; for example:

- (60) IT may be manifested as any of the following:
- a) "complex NP": (the thing (which) S)
that
 - b) "headless relative": (what S)
 - c) simple NP: (that thing)
 - d) pronoun: (it)

Examples are given respectively in (61.a-d):

- (61) a) The thing that she really wanted was the ring.
b) What she really wanted was the ring.
c) That thing was the ring.
d) It was the ring.

Corresponding syntactic manifestations of arguments when in the AT relation are:

- (62) a) "complex PP", i.e. preposition + "complex NP"
b) "subordinate clause", i.e. "headless relative"
c) simple PP, i.e. preposition + simple NP
d) "adverb"

Examples for each space follow:

(63) AT/SOC

- a) Give the pen to the person that smiles first.
b) Give the pen to who(ever) smiles first.
c) Give the pen to that person (to him).
d) Give him the pen.

(64) AT/SPA

- a) We swam at the place where the water's deep.
b) We swam where the water's deep.
c) We swam at that place.
d) We swam there.

(65) AT/TEM

- a) We left at the time when it first got dark.
b) We left when it first got dark.
c) We left at that time.
d) We left then.

(66) AT/LOG

- a) She'll be angry in the event that that happens.
- b) She'll be angry if that happens.
- c) She'll be angry in that event.
- d) She'll be angry then.

The reader may have been puzzled at seeing "(core)" preceding the spaces in (59). The phenomena associated with this are the same as are responsible for treating the parts of (60) as respectively equivalent to those of (62). What is at issue here, though, is not the underlying similarities (e.g. adverb = pronoun) but the systematic difference.

PP NP

Perhaps the best approach to the topic is provided by M.A.K. Halliday (1970):

The three main types of transitivity role -- process, participant, circumstance -- correspond, by and large, to the three major word (or word group) classes found in most languages: verb, noun, adverb. In English, typically, processes are expressed by verbal groups, participants by nominal groups and circumstances by adverbial groups -- the last often in the form of prepositional phrases. (1970:149)

Corresponding to the three "transitivity roles" of participant, process, and circumstance and their respective general syntactic correlates of noun (or NP), verb (or Aux + V), and adverb (or PP) are the three information types as relevant to discourse structure (Joe Grimes 1974: discussion in seminar on discourse structure at SIL/North Dakota), role information, event information, and setting information. This leads back to the "categorical" interpretation of the parts of speech:

For Jespersen, nouns were categories of the first degree; verbs (including 'adjectives') were categories of the second degree; and adverbs categories of the third degree. This notion of what we are calling 'degree' is defined in terms of the combinatorial properties of the categories in question. Each category is modified, in the most typical simple structures, by a category of 'higher' degree. Nouns are modified by verbs (including 'adjectives'), which are therefore adnominal categories; verbs are modified by adverbs, which are modified by adverbs, which are therefore ad-adnominal categories; and adverbs are modified by other adverbs. No more than three degrees are required for the classification of the parts of speech (in any language referred to by either Jespersen or Hjelmslev), since there is no major category whose function it is to modify categories of the third degree. (Lyons 1968:327-328)

In his discussion of grammatical functions, Lyons (1968) starts off with comments on "nuclear" and "extra-nuclear" constituents of sentences:

It is a fundamental principle of traditional grammar, and also of much modern syntactic theory, that every simple, declarative sentence consists of two obligatory major constituents, a subject and a predicate; and that it may contain, in addition, one or more adjuncts. Adjuncts (of place, time, manner, reason, etc...) are optional, or structurally dispensable, constituents of the sentences: they may be removed without affecting the remainder of the sentence.

... We will say that the subject and predicate together form the nucleus of the sentence. The subject and the predicate are therefore nuclear, and adjuncts extranuclear, constituents. (1968:334)

Speaking of sentence-level adjuncts and their relationship to predicative complements, Lyons continues:

The predicative complement is syntactically required, in order to 'complete' the structure of the predicate (hence the term 'complement'). More particularly, the term 'complement' is used of such 'adverbial' expressions as in Central Park or on Sunday in sentences like The parade was in Central Park or The demonstration was on Sunday. The temporal and locative phrases in these two sentences are obviously not adjuncts (since *The parade was and *The demonstration was are syntactically incomplete). The difference between an adjunct and a complement is, in principle, quite clear: the former is an optional (extranuclear) constituent, and the latter is an obligatory (nuclear) constituent of the sentence.

In practice, the distinction between sentence-adjuncts and predicative complements is often far from clear. As we have just seen, the same class of words or phrases may occur as a locative or temporal adjunct in one set of sentences and as a complement (of the copula) in the other. This fact alone would be of small consequence. But consider now a sentence like The demonstration occurred on Sunday. In traditional accounts of English grammar, occur is regarded as an intransitive verb (which, by definition, combines with a nominal to form a sentence-nucleus, and requires no complement). This (unlike *The demonstration was) is a complete sentence, and therefore that on Sunday is an adjunct. On the other hand, the semantic relationship between The demonstration was on Sunday and The demonstration occurred on Sunday would tend to suggest that was and occurred are elements of the same type, and therefore that on Sunday is a predicative complement in both instances.

The difference between things which appear to be adjuncts and things which appear to be predicative complements seems to be a difference in the scope of predication of the "main verb"; in one case, predication does not include the AT (e.g., locative or temporal expressions); in the other

case, the relationship between the complex (sentential) IT and AT is what is being predicated. In fact, in some languages (e.g., English) the two different scopes may be expressed by variations in stress placement without the explicit verb:

(67) The boys swam Monday afternoon (that's what happened).

(68) The boys swam Monday afternoon (that's when).

The conception of what is nuclear and what is extranuclear depends then on the scope of predication (independently of the presence of a verb on the surface). This difference between the predication-internal and predication-external status of AT-expressions is noted by Halliday:

The circumstantial functions seem less central to the process than do the participant functions; this is related to their inability to take on the role of subject. But this peripheral status is not a feature of all circumstantial elements, which can be subdivided into an 'inner' and 'outer' type. Within the function 'place', in

(9i) he was throwing stones at the bridge

(9ii) he was throwing stones on the bridge

at the bridge (the 'inner' type) seems more central to the process than on the bridge: we can say what was he throwing stones at? and not (in this sense) what was he doing at the bridge? (on the other hand, we can say what was he doing on the bridge? and not what was he throwing stones on?)

However, the sense of 'inner' and 'outer' is contributed to by various factors not all of which coincide. For example, in (10) the place element is obligatory in (i) but optional in (ii):

(10i) he put all his jewels in the wash

(10ii) he lost all his jewels in the wash

In (11), there is a difference of clause type; (i) is a relational clause (see VII below) whereas (ii) is an action clause (Fillmore, from whom (11) is taken, gives this as an instance of dependency between functions: the place element is 'outer' if an actor is present and 'inner' otherwise):

(11i) John keeps his car in the garage

(11ii) John washes his car in the garage (1970:149-150)

As is pointed out above, Fillmore (1968:25-26) associates the "outer" and "inner" status of locative expressions with the presence and absence of an Agentive expression. That this dependency relation does not hold can be seen in (69), where (a) is inner, (b) is outer, (c) has both, all without any Agentive expression (explicit or implicit):

- (69) a. The raft floated on top of the water.
b. The raft floated in the pool.
c. In the pool, the raft floated on top of the water.

Discussing the expression of location, Gruber (1965:53-55) tests for "outerness" of phrases by using syntactic criteria such as order switching and preposing:

The locative use of prepositions is possible with verbs of motion, however, along with the expression of goal. ... the appearance of locative prepositions with Motional verbs must not be generated in construction with the verb on the prelexical level. That this is so can be seen by the preferred order of locative expressions and expressions of goal. The locative expression occurs outside the verb-goal complex...

The prepositional phrase generated in construction with the verb cannot be preposed.

--- note that for the verb of motion which incorporates a locative expression, we have no possibility for an expression of goal....

In the same way that assuming the restriction of one instance of a given case relation per clause leads to the analysis of certain clauses as complex and leads to superordinate structures in cases such as causativity and psychological experience (i.e., the postulation of SOC for erg and dat), we see syntactic motivation for postulating SPA as superordinate on the basis of sentences represented by the above examples.

Each of the spaces postulated so far can be supported as a necessarily "outer" (superordinate) realm as well as a (potential) inner category of movement or location. This syntactic motivation for the postulation of all the spaces (except SOC, which was shown earlier in Anderson's work) is demonstrated below (preposing will show that we are not confusing argument-internal modification with "two instances"): (Note that sentences starred here are starred only in the sense which excludes pauses)

(70) SPA

- a) We stopped at a motel at Eau Claire.
b) *We stopped at Eau Claire at a motel.
c) At Eau Claire we stopped at a motel.
d) *At a motel we stopped at Eau Claire.

- (76) Unless he changes his mind, Joe's gonna hide Carla's purse
if he can get it away from her on the playground during
 (AT/LOG)
 recess.

Although the above sentences are cumbersome, they do show that it is possible to have in the same sentence all spaces represented as "outer" spaces without regard to the contents of the nuclear or "inner" core proposition or core relation being predicated. This inner core is what is denoted by the terms "nucleus" or "core" in the remainder of this paper. This core proposition may state relations in terms of any one of the spaces without affecting the freedom of specification of location in the space; the result will simply be that of "inner" and "outer" locations with respect to the scope of predication, i.e., the relation, state, process, event, proposition predicated within (or as) the core itself is of course merely an IT (cf. sentential NP) which itself is associated with an AT either with or without lexicalized predication at that level. The absence or presence of lexicalized predication at these higher levels corresponds to the difference between "sentence adverbs" of place, time, etc., and their corresponding locative and temporal "predicative complements". This language-specific and apparently highly variable (within a given language) aspect of "scope of predication" will be carried further later in the paper. Returning to the earlier comments on categorical degree, information type, transitivity functions, we can now say that the core, depending on the verb, may typically include in its scope:

(77) I	II	III _i
role	event	setting _i
participant	process	circumstance _i
("nominals")	("verbals")	("adverbials") _i

where the subscript *i* (inner) serves to remind that only one AT (or, of course, FM-TO pair) relation may be represented. It should be stated again that in the framework proposed here that datives and ergatives are interpreted as adverbial and not as participant roles in the sense apparently intended by Lyons, Grimes, or Lyons. The external status of human participants will be discussed at several points later. In short, then, the core consists potentially of a typically non-sentential IT, an AT of some sort, the verb defining and predicating the relationship, and in many languages (i.e., non-ergative languages) an incorporation (optional) of SOC together with its content.

3. Trees: Constituency or Dependency?

It has been noted that constituency representations as such fail to characterize relationships among co-constituents and especially the "'relational' character of cases -- the fact that they indicate the functions in the clause which their respective NPs contract." (Anderson 1971:28) The relatedness of case and NP is also without direct representation. It is only arbitrary choice of terms that allows us to think that constituency representations (as basic rules) characterize the "essential, language-independent, relationship between N and NP and between V and VP" (Lyons 1968:331):

As far as the formalization of phrase-structure grammars is concerned, it is a matter of 'accidental' coincidence that linguists will include in their grammars of different languages rules which always expand NP into a string of symbols containing N and rules which always expand VP into a string of symbols containing V. In other words, phrase-structure grammars fail to formalize the fact that NP and VP are not merely mnemonically-convenient symbols, but stand for sentence-constituents which are necessarily nominal and verbal, respectively, because they have N and V as an obligatory constituent. (Lyons 1968:331)

Fillmore's alternative to constituency rules as discussed above is the introduction of NP together with some co-constituent (e.g. preposition) as a constituent of case, i.e., with case as a dominating node (Fillmore 1968:32-33). Although this does in some sense with its dominating case node capture the relational nature of case, it introduced confusion of categorical and functional labels as constituency nodes. The use of a nonterminal case node not only induced confusion of categorical and relational labels in what remains essentially a constituency tree, but requires the further case-sensitive terminal co-constituent with NP.

In this paper I shall assume dependency representation instead of strict constituency representation; this will allow a fairly direct representation of the relational nature of the verb:

Pre-terminal categories have been eliminated, and in place of the constituency relationship, the categories are 'hierarchized' with respect to dependency. Loc and nom are dependent on V (which thus governs them); and they each have dependent on them (i.e., they govern) a N. Thus, the case elements can be interpreted quite naturally as expressing the relation contracted between their dependent Ns and the governing V (which replaces the C1 ["clause", cf. S:LGD]) of the constituency grammar), and they are nevertheless terminal categories. The governing (and 'hyper-relational') position of V within the clause can be justified in various ways, including in particular that as such it will be assigned the clause subcategorization rules -- which allow for the various combinations of cases, among other things -- and it would be necessary anyway to subcategorize verbs with regard to the cases they co-occur with ... In this way, too, the essentially relational (notional) role of

V is contrasted with the basically 'thing'-referential N¹ (which governs in underlying representations only by recursion).

¹Cf.: 'nouns are primary, in the sense that they are linked referentially with "things" (in the 'nuclear' instances)' (Lyons, 1966 :230). It is possible to accomodate this 'referential primacy' of nouns without acceding to Lyons' subsequent argument concerning the purely surface centrality of the verb. Within the dependency framework outlined here, verbs (or 'predicators') and nouns are 'basic' with regard to different aspects of the semantic representation. Verbs are central relationally: they govern the case functions contracted by nouns. Nouns are primary referentially (and perhaps selectionally -- but Seuren, 1969: 3.2.2); they terminate (non-recursive) dependency trees. (Anderson 1971: 30-31)

One of the many consequences of eliminating non-terminal categories is that negation at any node corresponds to a unique scope of negation (cf. the scope of negation of S and the scope V or VP in constituency trees).

Dependency representations will be seen to allow a clear-cut representational (formal) distinction between categorical and relational nodes in the following sense: case relation labels are the only "nodes" which can never branch. Further, case relation labels can never be terminal in the sense that they never occur except between V and N; in effect, then, the case relation "nodes" are branch labels. The S node in a constituency tree corresponds roughly to the scope of a V node in a dependency tree; constituent NP has a scope corresponding to that of the scope of a N node in a dependency tree, i.e., the node together with all that depends.

Because underlying structures are assumed to have the properties of dependency representations, they will be represented as such without reference to whatever problems may exist in reference any apparent "need" for constituency representation at or near the surface in derivations; my assumption here is that constituency representation is derivable (automatically) as output of the principles of linearization as they apply to dependencies. This will be discussed in some detail when we discuss ordering. (The pertinent literature which was used for the above paragraphs should be mentioned now: Anderson 1971:27-31; Chomsky 1965:63-74, 106-107; Fillmore 1968:87-88, 1971a; Lyons 1968:230-231, 234-235, 330-333)

The sentences below will be used to illustrate in a rough way the contrast between constituency and dependency trees:

(78) a. static location clause (= (31)):
My brother is in Colorado

b. movement clause (non-ergative version of (40)):
The marble rolled from the doorway to the far wall.

c. act (ergative) clause (=40):

He rolled the marble from the doorway to the far wall.

d. experience clause (=45):

Barry learned that his car had been towed away.

(79) PHRASE STRUCTURE

a.

b.

c.

d.

(80) DEPENDENCY (/surface structure)

As far as possible, we will exclude discussion of anything strictly internal to NP. This follows from the purpose and scope of this paper. Also, it is a sneaky accomodation to the assumption (e.g., as expressed in Frantz 1974) that predicates relate indices, as opposed to the linguistic specifications making up NP's as arguments. I will not argue for this now; my limited exposure to the issue consists of verbal comments by Joe Grimes on the separate handling in terms of discourse structure of "reference" and "identification" (SIL/University of North Dakota, 1974). However, we will continue to use the terms V and N rather than switch to predicate and argument (index) exclusively.

The value of dependency representation will become quite clear when we relate phenomena and make predictions concerning (word and/or affix) order in natural languages with respect to a principle captured in part by dependency representation of underlying structures, the principle of linkage iconicity.

4. IT and AT as In and Out

Space order as diagramed in (59) is misrepresented in two ways. First, the "stack" is upside down, in that the progression of superordination from the core is SOC+SPA+TEM+LOG and not the other way around or any other permutation of the four. Second, and perhaps even less obviously significant, the space stack (even if "turned right side up") fails to characterize the fully egodeictic nature of the hierarchy involved. The significance of this will become clear in following pages; the preparatory stop for the moment is to change our representation of the space hierarchy to one which more directly shows its essentially nonlinear nature: the spaces are not ordered up, down, left, or right; their ordering is inward/outward. When we make predictions concerning particle, word, phrase, and case orders in natural languages, and again when we attempt to show the way to motivation of the space hierarchy on the basis of facts of cognitive development entirely apart from linguistics-internal considerations, the crucial importance of the difference between (59) and (81) will be clear:

The strict localistic framework adopted here restricts the domain of a simple verb to the relations IT and AT (AT being realized as a pathway defined in terms of FM and/or TO when the verb is transitional). The two elements IT and AT can be linearized in only two ways, of course: IT+AT and AT+IT. We shall assume that the choice of ordering will be consistent throughout superordination, i.e. "up through" the spaces, in underlying structures. This assumption will find strong support in the restricted nature and the empirical success of the predictions which it makes possible. Given this assumption, then, our consideration is limited to the superordination patterns of (82) and (83):

(82) IT-AT:

(83) AT-IT:

If there are only two possible patterns of superordination available for characterizing all natural languages, then it follows that any given natural language has either an IT-AT or an AT-IT embedding structure. In other words, we are assuming that every language is at root either an AT-IT language or an IT-AT language, all the way out through the spaces. On the basis of the characterization of a given natural language as either AT-IT (AI) or IT-AT (IA), a set of predictions of wide scope and generality is made possible. For example, the characterization makes possible predictions concerning the order of sentence adverbials with respect to each other and with respect to the "nuclear" clause, the relative order of main and complex clauses in complex sentences. In short, from knowing whether a language is AI or IA one can make predictions concerning case-order as case has been defined here (relation-space conjunction). Such predictions will be made more specific after some intervening preparation when we spell out the principle of egodeictic iconicity.

5. Three Principles

The foregoing preparation gives us some basis now for showing that the apparatus suggested for revising certain aspects of case grammar systems has interesting implications elsewhere. A wide range of generalizations concerning the order of elements in strings will be characterized in terms of/by three principles. Some of the generalizations are well known and recognized in the literature as not too controversial. In the case of such generalizations our principles will give a unified account of diverse phenomena. Other generalizations will be regarded as predictions the empirical testing of which remains forthcoming.

For each postulated principle (intervening variable), we will try to define a set of linguistic phenomena to which it gives characterization (or about which it embodies predictions) (dependent variables) and the independent variables which are pertinent.

The three "principles" (I don't know what else to call them) are egodeictic iconicity, linkage iconicity, and temporal iconicity. The first, egodeictic iconicity, has to do with the space hierarchy as diagrammed in (81) and the dichotomized superordination patterns of (82) and (83). The assumption that a language will be either an AI language or an IA language together with the assumption that (81) correctly characterizes a language-independent hierarchy of the four spaces external to the nucleus allows us to make predictions of two kinds. First, the hierarchy of remoteness characterizes a universally underlying "natural" ordering relationship which holds among all extranuclear elements, such as simple sentence adverbs, simple prepositional phrases, subordinate clauses, and "complex PP" (listed in (62) and illustrated in (63)-(66)), associated with a single verb in surface structure. In AT-IT languages, conditional expressions precede time expressions; time expressions, in turn, precede place expressions; expressions of locations precede dative or ergative expressions (certain exceptions to the SOC-last prediction for ordering will be shown to be systematic and will at least partially be characterized in discussion of temporal iconicity). In IT-AT languages such as English, the syntactically "unmarked" order for such expressions is: dative and ergative expressions precede expressions of spatial location; place expressions precede temporal expressions; temporal expressions precede conditionals. One difference between IA and AI language sets is that IA languages show freedom in preposing of certain AT-expressions, while AI languages show a high rigidity in the corresponding post-posing. The preposing allowable in IT-AT languages such as English and Vietnamese shows systematicity in two interesting ways: 1) if one of several AT/space_n expressions is preposed, it must be that of the "outermost" space; 2) if more than one AT-expression be preposed in the same sentence then the preposed expressions will be ordered as though in an AI language i.e., "inward" rather than "outward".

While egodeictic iconicity characterizes certain facts concerning the ordering relations which hold 1) among extra-nuclear AT-expressions (adverbs, simple PP's, subordinate clauses of condition, time, place, etc. and "complex PP's") and 2) between such elements and the nuclear clause

(core), the principle of linkage iconicity characterizes the order of the verb with respect to the remainder of the string in the underlying representation of a sentence.

It has been argued (McCawley 1970) that every language is either predicate-initial or predicate-final in underlying structures. Since then both predicate-initial (bach 1972) and predicate-final (Ross 1973; see also Koutsoudas and Sanders 1974) orders have been proposed as universal. As far as I know, no one has seriously posited NP-V-NP as a universal order for underlying representations of natural-language sentences.

The dependency representations in (80.b-d) illustrate the (perhaps offensively) simple and straightforward notion of linkage iconicity: the case-relation non-nodes occupy a position (set of positions) between the relator-predicator (verb) and each associated "related" (i.e., argument, index, NP), with the exception of whichever NP happens to have been selected as sentential subject; typically for English, IT-expressions do not show prepositional case marking. The case-relation marking, underlying equivalent to a branch label, is assumed in effect to "remain attached" to the argument (index, NP) the predicate (verb), or to both (e.g. as in topicalization processes in Philippine languages such as Maranao, Kalagan). The case-relation marking, whether manifested as marking on NP or V or both, is assumed to come from and remain between the two related (i.e. case-related) terms (V, NP); this is part of what is meant by linkage iconicity. In that case-relation marking may manifest itself as a combination of inflection, word order, pre- or post-positions, etc., the relevance of this principle must not be obscured by confusion of case-relation manifestation with "NP-internal" relations which may be manifested in some languages with the same manifestation type (e.g. prepositions in English) as case relations or in other languages (e.g. Chinese) by a clearly separate type. Note in the following examples how the use of prepositions for both "deep case" and argument-internal relations in English corresponds to potentially (I claim underlying) and, in Chinese, actually disparate status:

- (84) a. I'll walk into the study
b. wǒ zǒu dào shūfáng -lǐ
I walk to study -in(side)
c. wǒ zǒu dào shūfáng -de lǐmiàn
I walk to study 's inside

The underlined morphs in each case represent the case relation T0.

This separation of case and NP-internal relations, evidenced in (80.a) by not giving the in of in Colorado representation as marking AT-ness, can of course be seen clearly in many cases in English. Notice that the -lǐ of (84.b) is a postposition, while its "unabbreviated" counterpart in (84.c), limian, is a full noun modified by the noun shufang. We see a roughly equivalent mechanism in the English sentence in (85):

(85) a. I walk to the front (side) of the desk.

b. wǒ zǒu dào zhuōzi -de qiánmian
I walk to desk 's front(side)

This is not the place to go into detail, but there is an interesting area of intuitive support for the "neutral" or at least "not-primarily-adnominal" status of case relations as characterized in our dependency representations and by the principle of linkage iconicity; the underlined dào together with the other few "case" prepositions (also called "co-verbs") of Mandarin is analyzed by some as part of the preceding verb which then takes the following NP as direct object, by others as a true preposition belonging to the following NP, making it in effect a PP.

The third principle, temporal iconicity, is too simple and straightforward to require much discussion until we observe its interaction with the other two. The idea behind the label "temporal iconicity" is that sequence in linguistic representation is assumed to reflect sequence in cognitive experiences. On the gross level of narrative discourse, the sequence of events corresponds of course to the sequence of events referenced. Any deviation is interpreted either as incompetence or error on the part of the encoder (e.g. "Oh, I forgot to tell you that before he did that he had...") or as a special literary effect (e.g. the flashback). On a lower level we have the widely noted phenomenon of "serial verbs" in strings. On still another level we have the phenomenon documented as Greenberg's first universal:

1. In declarative sentences with nominal subject and object, the dominant order is almost always one in which the subject precedes the object. (1963)

Assuming the nominal subject here referred to to typically be the Agent and the nominal object to be the Patient in clauses the verb of which is causative, we have the basis of transitivity" of process: the temporal sequence of state-chains (events) linked by causality. Until we are ready to look at temporal iconicity in terms of interaction with the other two principles, we shall settle for the following observation by Greenberg:

The order of elements in language parallels that in physical experience or the order of knowledge. In the instance of conditionals, although the truth relations involved are timeless, logicians have always symbolized in the order implying, implied exactly as in spoken language. If modus ponens is used in proof, then we have a pragmatic example which follows the order of reasoning. No one thinks to write a proof backwards. (1966:331)

From the three principles introduced in the preceding pages it is claimed that certain universals of word (or phrase) order in underlying representations derive:

- a. egodeictic iconicity (EI): order of extranuclear elements both among themselves and with respect to the nucleus or core;
- b. linkage iconicity (LI): order of the verb or predicate with respect to its associated arguments;
- c. temporal iconicity (TI): order of nuclear elements (i.e., core-internal arguments, non-adverbial nominals) among themselves.

From certain interactions among the above principles it is speculated that mapping of deep case relation to surface case form can be shown to be systematically derived, together with subject-choice hierarchy phenomena.

6. Principles and Predictions

FIVE MAJOR FACTORS DETERMINING THE ORDER OF ELEMENTS AND SUBSTRINGS IN LINGUISTIC REPRESENTATION:

- I. EGODEICTIC ICONICITY: Order outward (e.g. from head of construction in syntax or from base in morphology) reflects sequence of acquisition which itself reflects sequence in cognitive development.
- II. TEMPORAL ICONICITY: Sequence in linguistic representation reflects sequence in nonlinguistic cognitive experience.
- III. LINKAGE ICONICITY: An element relating or "linking" two terms is shown in strings to do so by its being ordered between the two terms, linking them in notation trees as well as in surface strings.
- IV. DISCOURSE STRUCTURE: The degree to which a given natural language shows free variation in word order is nothing more or less than its degree of sensitivity to either topical structure or information structure or both.
- V. MODEL STRINGS: Those facts of word order which are truly arbitrary and can be derived only from model strings can be derived in a fairly straightforward manner from the answers to a sequence of at most four questions.

APPLICATION OF THE PRINCIPLES TO WORD ORDER:

- I. EGODEICTIC ICONICITY (EI) makes predictions about (or dictates) the order of material both inside and outside the (extended) nucleus:
 - A. NUCLEAR INTEGRITY (EI_{NUC}) dictates that the innermost IT (e.g. the direct object or patient NP) always be contiguous to its verb in basic order. (cf. the weak VP phenomenon in nonergative languages).

- B. THE SPACE HIERARCHY (EI_{SH}) dictates that, in languages where there is an only order (or even an order widely agreed upon as "unmarked") of extranuclear elements (things adverbial), the order of expressions will correspond to SOC+SPA+TEM+LOG in IA languages and to LOG+TEM+SPA+SOC in AI languages.
- C. SPACE ORDER CONSISTENCY ($EI_{CONSORD}$) dictates that a given language may be underlyingly IA or AI but not a mixture of one with respect to some spaces and the other with respect to other spaces; that is the case relations must be projected consistently out through the space hierarchy "leftward" or "rightward".
- II. TEMPORAL ICONICITY dictates the order of material both inside and outside the nucleus:
- A. FROM BEFORE TO (TI_{FT}) dictates that, internal to a space, expressions of source (FM) must precede expressions of goal (TO).
- B. ERGATIVE BEFORE DATIVE (TI_{SI}) is in one sense a special case of TI_{FT} : speaking in terms of locational distribution, the dative (TO/SOC) is properly included in the "in the world" or "NOT IN FM/SOC" which strictly speaking is the TO/SOC of the ergative FM/SOC; likewise the ergative (or agentive) FM/SOC is properly included in the "in the world" or "NOT IN TO/SOC" corresponding to the dative TO/SOC. Thus ergative expressions (S) are ordered before dative expressions (I) by temporal iconicity.
- C. ACTOR BEFORE PATIENT (AGENT BEFORE OBJECT) (TI_{SO}) dictates that the causally linked Agentive (Actor) and Object be ordered to preserve their order of involvement (via the event (or event chain)) which links them.
- III. LINKAGE ICONICITY (LI) makes predictions concerning material within and without the nucleus:
- A. NOUN-VERB-NOUN (LI_{NVN}) predicts that a predicate which relates two terms will show up between them in surface structures, dictating so in deep (logical) structures.
- B. PATHWAY FILLING (LI_{FIT} or $LI_{FM+IT+TO}$) places a theme (IT) on its pathway between source (FM) and goal (TO), predicting in effect SOI or IOS to be favored over OSI, OIS, SIO, or ISO.
- IV. DISCOURSE STRUCTURE (DS) is at some points difficult to isolate from TI, but is sensitive to factors which are specific to discourse, such as staging or such as cohesion; discourse structure considerations affect both intra- and extranuclear material:

- A. TOPICAL STRUCTURE (DS_{TS}) dictates that the "topic" (theme or title) not be surrounded by other NP's but be "outside" the others.
(Usually this is a matter of being to the front, but it seems that in some cases topic may follow.)
- B. INFORMATION STRUCTURE (DS_{IS}) dictates that "old information" (either previously made explicit earlier in the discourse or otherwise assumed by the encoder to be known (or at least uniquely recoverable) to the decoder) precede "new information", which tends to be marked not only by order but also by grammatical explicitness and other devices such as stress (Halliday 1970, Kuno 1971).
- V. MODEL STRINGS (MS) provide answers to an ordered set of questions which in any one natural language number four at most:
 - A. OV OR VO? (or, more strictly, IT V or V IT?) (VO?)
 - 1. If OV, then no more questions are necessary, for the other principles are enough to derive without ambiguity a single order: NSIOV (note 5a).
 - 2. If VO, then the next question is asked.
 - B. VS OR SV? (SV?)
 - 1. If VS, then EI and TI clash, necessitating for this language a third and final question:
 - a. WHO WINS, EI OR TI? (OS?)
 - 1. If SO (TI wins), then the principles dictate VSOIN, and EI avenges itself with a universally dictated alternate order which satisfies it as well as TI: SVOIN (note 5b).
 - 2. If OS (EI_{NUC} wins), then the principles dictate VOSIN (note 5c).
 - 2. If SV, then the next question is asked.
 - C. IO OR OI? (OI?)
 - 1. If IO, then the principles dictate NSIVO (note 5d).
 - 2. If OI, then the last question is asked.
 - D. NI OR IN? (IN?) is in effect asking "AT-IT or IT-AT?"
 - 1. If NI, then we get NSVOI.
 - 2. If IN, then we get SVOIN.

VINOS	IVNOS	INVOS	INOVS	INOSV
VINSO	IVNSO	INVSO	INSVO	INSOV
VIONS	IVONS	IOVNS	IONVS	IONSV
VIOSN	IVOSN	IOVSN	IOSVN	IOSNV
VISNO	IVSNO	ISVNO	SINVO	ISNOV
VISON	IVSON	ISVON	ISOVN	ISONV
VNIOS	NVIOS	NIVOS	NIOVS	NIOSV
VNISO	NVISO	NIVSO	NISVO	NISOV
VNOIS	NVOIS	NOVIS	NOIVS	NOISV
VNOSI	NVOSI	NOVSI	NOSVI	NOSIV
VNSIO	NVSIO	NSVIO	NSIVO	NSIOV
VNSOI	NVSOI	NSVOI	NSOVI	NSOIV
VOINS	OVINS	OIVNS	OINVS	OINSV
VOISN	OVISN	OIVSN	OISVN	OISNV
VONIS	OVNIS	ONVIS	ONIVS	ONISV
VONSI	OVNSI	ONVSI	ONSVI	ONSIV
VOSIN	OVSIN	OSVIN	OSIVN	OSINV
VOSNI	OVSNI	OSVNI	OSNVI	OSNIV
VSINO	SVINO	SIVNO	SINVO	SINOV
VSION	SVION	SIVON	SIOVN	SIONV
VSNIO	SVNIO	SNVIO	SNIVO	SNIOV
VSNOI	SVNOI	SNVOI	SNOVI	SNOIV
VSOIN	SVOIN	SOVIN	SOIVN	SOINV
VSONI	SVONI	SOVNI	SONVI	SONIV

SURVIVORS: TI_{SI}

60/120 = 1/2

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-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VNOSI	NVOSI	NOVSI	NOSVI	NOSIV
VNSIO	NVSIO	NSVIO	NSIVO	NSIOV
VNSOI	NVSOI	NSVOI	NSOVI	NSOIV
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VONSI	OVNSI	ONVSI	ONSVI	ONSIV
VOSIN	OVSIN	OSVIN	OSIVN	OSINV
VOSNI	OVSNI	OSVNI	OSNVI	OSNIV
VSINO	SVINO	SIVNO	SINVO	SINOV
VSION	SVION	SIVON	SIOVN	SIONV
VSNIO	SVNIO	SNVIO	SNIVO	SNIOV
VSNOI	SVNOI	SNVOI	SNOVI	SNOIV
VSOIN	SVOIN	SOVIN	SOIVN	SOINV
VSONI	SVONI	SOVNI	SONVI	SONIV

SURVIVORS: EI_{CONSORD}

40/120 = 1/3

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-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VIOSN	IVOSN	IOVSN	IOSVN	IOSNV
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VNIOS	NVIOS	NIVOS	NIOVS	NIOSV
VNISO	NVISO	NIVSO	NISVO	NISOV
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VNSIO	NVSIO	NSVIO	NSIVO	NSIOV
VNSOI	NVSOI	NSVOI	NSOVI	NSOIV
-----	-----	-----	-----	-----
VOISN	OVISN	OIVSN	OISVN	OISNV
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VOSIN	OVSIN	OSVIN	OSIVN	OSINV
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VSOIN	SVOIN	SOVIN	SOIVN	SOINV
-----	-----	-----	-----	-----

SURVIVORS: TI_{SI} AND EI_{CONSO}RD (BOTH EXCEPTIONLESS)

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-----	-----	-----	-----	-----
VNSIO	NVSIO	NSVIO	NSIVO	NSIOV
VNSOI	NVSOI	NSVOI	NSOVI	NSOIV
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VOSIN	OVSIN	OSVIN	OSIVN	OSINV
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VSOIN	SVOIN	SOVIN	SOIVN	SOINV
-----	-----	-----	-----	-----

SURVIVORS: TI _{SO}			60/120 = 1/2	
-----	-----	-----	-----	-----
VINSO	IVNSO	INVS0	INSVO	INSOV
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VISNO	IVSNO	ISVNO	ISNVO	ISNOV
VISON	IVSON	ISVON	ISOVN	ISONV
-----	-----	-----	-----	-----
VNISO	NVISO	NIVSO	NISVO	NISOV
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VNSIO	NVSIO	NSVIO	NSIVO	NSIOV
VNSOI	NVSOI	NSVOI	NSOVI	NSOIV
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
VSINO	SVINO	SIVNO	SINVO	SINOV
VISION	SVION	SIVON	SIOVN	SIONV
VSNIO	SVNIO	SNVIO	SNIVO	SNIOV
VSNOI	SVNOI	SNVOI	SNOVI	SNOIV
VSOIN	SVOIN	SOVIN	SOIVN	SOINV
VSONI	SVONI	SOVNI	NONVI	SONIV

SURVIVORS: EI_{NUC}

48/120 = 2/5

-----	-----	INVOS	INOVS	-----
-----	-----	-----	INSVO	INSOV
-----	IVONS	IOVNS	-----	-----
-----	IVOSN	IOVSN	-----	-----
-----	-----	-----	ISNVO	ISNOV
-----	-----	ISVON	ISOVN	-----
-----	-----	NIVOS	NIOVS	-----
-----	-----	-----	NISVO	NISOV
-----	NVOIS	NOVIS	-----	-----
-----	NVOSI	NOVSI	-----	-----
-----	-----	-----	NSIVO	NSIOV
-----	-----	NSVOI	NSOVI	-----
VOINS	OVINS	-----	-----	-----
VOISN	OVISN	-----	-----	-----
VONIS	OVNIS	-----	-----	-----
VONSI	OVNSI	-----	-----	-----
VOSIN	OVSIN	-----	-----	-----
VOSNI	OVSNI	-----	-----	-----
-----	-----	-----	SINVO	SINOV
-----	-----	SIVON	SIOVN	-----
-----	-----	-----	SNIVO	SNIOV
-----	-----	SNVOI	SNOVI	-----
-----	SVOIN	SOVIN	-----	-----
-----	SVONI	SOVNI	-----	-----

	EI _{CON}	EI _{NUC}	TI _{SI}	TI _{SO}	LI _{NVN}	LI _{FIT}
NSIOV	+	+	+	+	-	-
NSIVO	+	+	+	+	+	-
NSVOI	+	+	+	+	+	+
SVOIN	+	+	+	+	+	+
VSOIN	+	-	+	+	-	+
VOSIN	+	+	+	-	-	-
NSOVI	+	+	+	+	-	+
SOVIN	+	+	+	+	-	+

Assuming that the first six orders represented above do occur as only or unmarked orders in natural languages, and that the bottom two do not, one might expect that the "good" orders be valued more highly than the "bad" ones below. However, with respect to the two major principles which are appropriate to the ordering considerations of the moment, i.e., EI and TI, two "good" orders (VSOIN and VOSIN) fail to satisfy the principles fully while two "bad" orders (NSOVI and SOVIN) do satisfy the same principles fully.

Also, why should it be that the conjunction of EI with TI admits just the right number of survivors (six orders out of one hundred twenty possible orders) and yet excludes the two "good" orders (VSOIN and VOSIN) in favor of the two "bad" ones?

If, as pointed out in Greenberg's Universal One and in the remarks immediately preceding it, VOS order is so rare in contrast to VSO, SV0, and SOV that it is to be discounted for general purposes (it violates TI), then why should it be found at all? And why should it be that one and only one of the three remaining orders (i.e., VSO) is characterized by always having at least one alternate order (SV), as noted in Greenberg's Universal Six?

Perhaps the reader has noticed that the two somewhat "defective" orders, VOS and VSO (i.e. VOSIN and VSOIN), have in common the fact that they are verb-initial; and further, they differ only in the matter of S0 versus OS. The significance of these obvious observations becomes transparently clear when we consider that it is only in the case of verb-initial languages that there could ever be any conflict whatsoever in the orders dictated by EI and TI (i.e., EI_{NUC} and TI_{SO}). If the verb is

initial, then it will be impossible to satisfy both temporal iconicity and the nuclear integrity which is dictated by EI. Given that all three logically possible positions for verbs (with respect to S and O) are realized, then it cannot be surprising that any order violating temporal iconicity (e.g. VOS) should be very rare, and that the other verb-initial order (VSO, which violates nuclear integrity in favor of temporal iconicity) should have without exception among languages of the world an alternant order which, also satisfying temporal iconicity, restores nuclear integrity: SVO. Thus it is seen that what at first glance appears to be random exceptions to predictions made by the principles is really a remarkable reflection of the unique point of predictive clash between EI and TI which explains in a certain sense the distributional rarity of the one order (VOS) and the universal and unique alternant (SV) of the other (VSO).

To return to the questions of two pages earlier, how could the conjunction of EI and TI have allowed as survivors the two orders that "do not belong"? This question brings to mind two obvious possibilities. First, perhaps the principles are correct and our information concerning what orders do and do not occur as basic is false. Second, it may be that our facts are correct but the principles wrong. As far as I can tell at this time, both the principles and the facts are correct. This leads us then to reconsider the question in a new way. So far we have been discussing the principles as though they were operating upon (i.e. selecting from) the full set of the 120 logically possible orders of the full set of 5 elements types (S, O, I, V, NT). It will be remembered, however, that the intended interpretation of the principles was originally not so much to perform a simultaneous selection from all possible orders of the full set of elements as it was to predict or dictate the development of those orders which do occur in terms of the options available at each given point in the acquisition of that set.

It is predicted by the space hierarchy of EI and reported by observers of acquisition (e.g. Dale 1972:50, lines 1-3) that the use of nouns as Object (Patient) precedes the use of nouns as Agent (Actor). It is also reported that in early speech the most common of the various N + N constructions is the Agent + Object (Dale 1972:46-48, lines 21-23). These facts, taken together with a principle which we might call NON (NOW OR NEVER), lead to a natural explanation of the non-occurrence of the two orders which appear to satisfy EI and TI, NSOVI and SOVIN. The reader will remember that the sequence of acquisition is that of OV or VO, then the Agentive Subject (S), and then I and NT. Although the essence of the NOW OR NEVER principle is better captured in the visual representation below, it can be stated as follows:

If the verb is either initial or final after the acquisition of S, then the verb will remain so throughout the acquisition of basic order; the remainder of order acquisition will then be uniquely dictated by EI.

Remembering that acquisition of S is in effect acquisition of "N number two", we have a visual representation of the NON principle at work:

TIME ₁ (V,0)	VN	VN	VN	VN	NV	NV	NV	NV
TIME ₂ (+S)	NVN	NVN	VNN	VNN	NNV	NNV	NVN	NVN
TIME ₃ (+I or NT)	NVNN	NNVN	VNNN	*NVNN	NNNV	*NNVN	NNVN	NVNN

In cases where the acquisition of S leaves the verb neither initial nor final, then EI determinacy of course awaits further input from model strings.

SURVIVORS: EI, TI, AND NON

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-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	NSIVO	NSIOV
-----	-----	NSVOI	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
(VOSIN)	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
(VSOIN)	SVOIN	-----	-----	-----
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It might be noted that interactions of the first three principles (EI, TI, LI) derives the extended nucleus (S(0)I) which yields a left-to-right characterization of the hierarchy of terms I, II, and III (grammatical relations subject, object, and indirect object) as discussed in Perlmutter and Postal's relational grammar (LSA 1974), and furthers characterizes everything else as non-term by virtue of extranuclearity.

Inasmuch as the principles specify or characterize "possible word order" they provide limits not only to linguistic variation (synchronic) at this level but also of course to linguistic change (diachronic); it is speculated that the principles will be instrumental in describing and perhaps to some extent explaining certain patterns of change in word order through time. One example of what I envision as explanatory applications of the principles is their order, which I take to represent as reflecting the sequences of "decisions" in the language acquisition of every native speaker of a natural language. Presumably dialects of a same language (and likewise different stages of a language through time) should vary "one step at a time", i.e., one "decision" or "question" at a time. Possible evidence for productive research in this direction is seen in the fact that Mandarin Chinese and Cantonese (both SVO) differ syntactically precisely in their different answers to OI? together with facts derived specifically from this (or at least related to it); thus Mandarin is NSIVO and Cantonese is NSVOI; both are VO, both SV, both AT-IT.

Another interesting set of language facts which may to some extent be explained in terms of the principles and especially interaction between two of the principles is exemplified by the so-called passive in IT-AT languages. Temporal iconicity and Linkage iconicity are satisfied in the "active sentences", while the passives satisfy the dictates of IT-AT consistency (EI) to the fullest. This area of contradictory mandates between the two major principles (EI and TI) defines an area of variation in English and in numerous other languages as well. To simply say that passive is a matter of topicalization of the Object is to ignore two questions: first, if passivization is object topicalization, then why should it be so easy to topicalize the Object without the passive construction? Second, and less trivial, is the question of verb agreement which asks why verb agreement changes only with "topicalization" of Objects and with nothing else. This variation of construction (active-passive) is at least in some weak sense explained by the fact that each satisfies the set of ordering principles in some way that the other cannot (cf. the alternation of SVO with VSO in VSO languages and the corresponding clash of predictions of EI and TI).

Representative of the diversity of phenomena which yield to unitary characterization in terms of egodeictic iconicity are such things as the distribution of the Jinghpaw (Kachin) postposition yang. In traditional dictionaries (and, presumably grammars) there are at least three entries each spelled yang and each pronounced with the same distinctive tone [yāŋ]. One is a loose sort of locative postposition which is used to designate location or place; another is used as a postposition for expressing location in time as opposed to space, "when" instead of "where".

The third is called a subjunctive conjunction corresponding to the "if" in conditionals. It is of some interest that each of the "three yang's" can occur either after a noun phrase or after a subordinate clause (i.e. is in effect both postposition to NP and subordinating conjunction to S) and that both uses obtain for SPA, for TEM, and for LOG. Further, as a postposition to NP it may follow a series of additional postpositions of location, etc. This set of phenomena yields easily to direct characterization in terms of EI; Yang in Jinghpaw is simply a direct realization of extranuclear AT (extranuclear in the sense that it does not freely occur with AT/SOC, in the innermost space which is, except in so-called ergative languages (predictably VOSIN or NSIOV), incorporated into an extended nucleus).

Another instance of generalized representation of AT can be seen in Japanese, where a "neutral" (non-topicalized) subject may be marked with the postpositive particle ga and AT may be marked ni for human beings (both as datives and also as Agent in passives!), places, and times. Thus for AT/SOC, AT/SPA, and AT/TEM (I have not been able to find out for AT/LOG) we have the particle ni which occurs after (outside) additional postpositional material, while IT within the nucleus may be marked ga. It is interesting to see further that at least in cases where for example one sentence contains both an outer and an inner (extranuclear and intranuclear) locative expression, there is a differentiated marking of AT; the nuclear AT of location is marked by ni and the extranuclear AT/SPA is marked by de (which itself is a historical descendant of nite).

In Jinghpaw and apparently in Burmese the topic marker (as I would call it) occurs freely with four classes of NP or subordinate clause: gaw in Jinghpaw and ka in Burmese occur freely with what EI would designate AT/SOC, AT/SPA, AT/TEM, and AT/LOG.

The principles of EI, TI, LI, DS, together with the ordered set of questions in model strings and the NON principle, relate in an interesting and to some extent explanatory way to some of the well-known Greenberg Universals. We shall briefly survey some of these points of contact.

Universal 1: In declarative sentences with nominal subject and object, the dominant order is almost always one in which the subject precedes the object.

This phenomenon of Agent-Object order is predicted by TI. It is noted in Chomsky 1965:126-127 and supported as a cognitive principle in experiments where N+V+N passives are at a certain age interpreted as actives (Dale 1972:150-151, lines 15-23). The principles in the case of verb- or nucleus-initial languages make contrary predictions in a systematic way, a way which predicts correctly the very few exceptions to TI; any exception to Greenberg's observation (Universal One) occurs always and only because of this clash with EI in the case of verb- or nucleus-initial structures; therefore, every exception should accord strictly with whatever EI dictates. The principles in conjunction also make predictions (or decrees, if we think in terms of acquisition) to the effect that only 6/120 of the possible orders of (Agentive) Subject, Verb, Object, Indirect Object, and Nonterm material (e.g. adverbial material such as PP's)

satisfy them. Ultimately, it is shown, the six orders prescribed correspond to the six known to exist as basic orders in natural languages.

Universal 3: Languages with dominant VSO order are always prepositional.

That this should be so is predicted both by LI and the VO vs. OV criteria.

Universal 4: With overwhelmingly greater than chance frequency, languages with normal SOV order are postpositional.

This is likewise predicted by both OV and LI. I have not had the opportunity yet to check on any of the listed exceptions except Amharic, but it seems that the fact that this universal could not be stated as absolute has to do with a failure to distinguish between NP- or argument-internal versus NP-external (deep case) marking, already discussed here. Amharic, listed by Greenberg as an exception to Universal Two, is described by Gene B. Gragg (1972:159) as having both prepositions and postpositions. If this is the case, then I suspect that the postpositions are NP-external and the prepositions are NP-internal. Even if it is the other way around, the principles (and presumably Greenberg's universals) can only be falsified or truly contradicted in cases wherein one order or another is either uniquely or clearly predominant; in cases of free variation of word order the principles are rendered empty of prediction, except for DS in its domain.

Universal 6: All languages with dominant VSO order have SV0 as an alternative or as the only alternative order.

This is explained by fact that verb-initial structures cannot satisfy both EI and TI. VSO (as opposed to VOS) satisfies TI at the expense of nuclear integrity (EI) and therefore has at least one alternate order which satisfies both EI and TI, i.e. SV0, VS0IN, SVOIN).

Universal 7: If in a language with dominant SOV order, there is no alternative basic order, or only OSV as the alternative, then all adverbial modifiers of the verb likewise precede the verb.

Universal Seven follows from NON.

Universal 13: If the nominal object always precedes the verb, then verb forms subordinate to the main verb also precede it.

This follow from NON.

Universal 14: In conditional statements, the conditional clause precedes the conclusion as the normal order in all languages.

This is a matter in the case of IT-AT languages of preposing, which reflects sensitivity to information structure (DS_{IS}). A related preposing phenomenon of apparently universal scope in the case of languages showing responsiveness or sensitivity to DS is the position of AT with respect to IT in existential as opposed to locative sentences (Kuno 1973 or 1971). The only reason that we need limit these comments on preposing to IT-AT languages is that the "preposed" position is in effect already basic in any AT-IT language which is not sensitive to DS. Therefore Greenberg is able to state (p. 311) that "It seems probably that all language expressions of time and place may appear in the initial positions in the sentence". This of course is imply a matter of sensitivity to IS in IT-AT languages, since only DS would ever result in anything else in an AT-IT language. The following quote from Greenberg (also from page 311) illustrates vividly the point of contact between DS and TI;

The order of elements in language parallels that in physical experience or the order of knowledge. In the instance of conditionals, although the truth relations are timeless, logicians have always symbolized in the order implying, implied exactly as in spoken language. If modus ponens is used in proof, then we have a pragmatic example which follows the order of reasoning. No one thinks to write a proof backwards.

Universal 15: In expressions of volition and purpose, a subordinate verbal form always follows the main verb as the normal order except in those languages in which the nominal object always precedes the verb.

This universal, which holds even in some verb-final languages such as Burmese and Jinghpaw, follows of course from TI.

Universal 16: In languages with dominant order VSO, an inflected auxiliary always precedes the main verb. In languages with dominant order SOV, and inflected auxiliary always follows the main verb.

This universal follows from NON, but only if the so-called "inflected auxiliary" is analyzed as a higher verb.

Universal 39: Where morphemes of both number and case are present and both follow or both precede the noun base, the expression of number almost always comes between the noun base and the expression of case.

That this should be the case follows from EI. This relation of EI to Greenberg's Universal Thirty-nine is clear only in the light of the acquisitional sequences provided in Slobin 1966:141-143, where the earlier acquisition of number (concrete, NP-internal) is shown to precede the acquisition of relational classes such as case (NP-external, less concrete) in Russian. Thus EI characterizes Universal 39 and Slobin's facts as related by predicting both.

7. The Space Hierarchy and Psychological Reality: Sequence as Hierarchy in Cognitive Development and Language Acquisition

It was mentioned earlier that there was possibly available a class of evidence external to linguistic study that lends independent support to the space hierarchy of egodeictic iconicity. That source of evidence lies in the sequence of what I would call "space acquisitions" which are studied as a part of cognitive development. The fact that all my references in this area either are written by Piaget and his colleagues or refer to his work almost exclusively in some cases reflects not so much a theoretical bias on my part as the fact that Piaget seems to have no serious competition in the field of cognitive development (theory and experimentation). It will be seen, however, that the observations cited in support of the hierarchy of spaces I have discussed are empirically based material and not merely theoretical construct-stages. Further, not only is Piaget not committed to any given linguistically defined acquisition theory but he makes no detailed application of the cited sequences in cognitive development to sequences in "space" acquisition as reflected in language.

It will be recalled that the principle of EI is a claim at one level that order outward from some center (head of construction, base form, etc.) in linguistic representation reflects directly the sequence of linguistic acquisition which itself preserves sequence in cognitive development.

We will not trace the sequence of acquisitions in cognitive development which I take to underly the other two reflecting orders. First, though, we observe that the cognitive development of a child is segmented into approximately four stages: the first stage, the sensory-motor period, is in many cases observed to cover the two years immediately following birth, the second is a preoperational period (2-7); then there is the period of concrete operations (7-11); and a period of formal operations (11-15). I assume that, regardless of the status of these divisions as such, their sequence is uncontested.

The beginning point of the process of egodecentration which we are about to trace is such that is a lack of differentiation between self-internal and self-external states, processes, or constructs. (The extracts from Beadle 1971, Carroll 1964, Slobin 1971, and Piaget and Inhelder 1969 have been provided in the final appendix for a more coherent and integrated presentation of Piaget's work as it touches our subject. In this text, however, I shall only sketch a crude outline of pertinent material.) At first there is no basis for systematic differentiation among the contents of consciousness with reference to distribution of entities in terms of persons, places, times, or condition. At first all is perceptual and concrete:

For children in the sensory-motor period of development, the time dimension is now; the space dimension is here; and the orientation is me. (Beadle 1971:131-132, lines 1-3)

During the first two years of life we have the emergence of perceptual invariants which will later be differentiated into persons and nonpersons (or things). The process of restructuring the contents of consciousness during this time from a world without others to a world wherein others not only exist but also have their own perspectives precedes the process of parallel decentration with respect to the physical universe. That is, SOC develops (is "factored out" of the contents of consciousness) before SPA and TEM come in, i.e., before the restructuring of the universe from being centered on the body of the child to being an objective spatio-temporal realm independent of immediate perception. (Piaget and Inhelder 1969:21-26, esp. lines 1-41 and 116-134; 92-95, esp. lines 37-68)

By the time that a child begins to construct a world of space and time he is already living in a world of persons. During the period of concrete operations we see a focusing and differentiation in the realm of the spatial and the temporal; time comes to be differentiated from space with the development of the notion of speed with reference to moving objects (cf. Fillmore 1971 and the problem of Source and Goal in Place and Time which was discussed earlier). (Piaget and Inhelder 1969:107-109, esp. lines 29-50)

Somewhere around ages eleven or twelve through fourteen or fifteen we see the acquisition of LOG or abstract space, wherein operations are performed on form independent of concrete content. (Piaget and Inhelder 1969:100, 130-133, 152-153)

It is of course unnecessary to belabor the point that "space acquisition" as I have called it is not a matter of adding something onto an otherwise intact structure; rather, each new structure incorporates and integrates the previously acquired ones. (Piaget and Inhelder 1969: 152-153) Thus we note a consistently transitive asymmetry in distribution (of spaces) in spaces:

Nonzero distribution in SOC entails nonzero distribution in SPA;
Nonzero distribution in SPA entails nonzero distribution in TEM;
Nonzero distribution in TEM entails nonzero distribution in LOG.

Nonzero distribution in LOG does not entail distribution in TEM;
Nonzero distribution in TEM does not entail distribution in SPA;
Nonzero distribution in SPA does not entail distribution in SOC.

It will be recalled that the relation of IT versus AT is something imposed upon things which are actually in a continuum relationship and may be divided differently in different languages. For example, it has been suggested that, while a tree may be either an IT or an AT in English depending upon the nature of the other referent, a tree is not treated so freely as an AT in Japanese as it is in English (Prof. Mathias of East Asian Languages and Literatures, Indiana University, personal communication). If we take the classes of entities and positions of a given space as a continuous whole, the space inclusions mentioned above might be characterized informally as follows:

Distribution with respect to persons is distribution in SOC.

Persons are widely interpreted either as being bodies or as having bodies in the sense of being "in" bodies.

Bodies are physical objects.

Distribution of or with respect to physical objects is distribution in SPA. Ultimately, locations in SPA are difficult to show to be essentially different from entities or objects in SPA, i.e. physical objects (e.g., the arbitrarily defined difference based on magnitude leads us to feel that a continent is less a physical object than a lump on the forehead or to feel that a piece of paper is less a location than a farm, but it is not difficult to find another object/location to reverse the status of IT versus AT). Likewise, it is difficult to show locations or positions in TEM as being independent of reference to or definition in terms of temporal entities, i.e. events or processes.

Further, examination and reflection reveal that physical objects necessarily have extent in time as well as obvious extent in space:

What we think of as a phenomenal thing is distinguished from what we think of as a phenomenal event or process only in the pattern of differences among its temporal parts. A thing is a monotonous event; an event is an unstable thing. (Goodman 1966:357)

Distribution of or with respect to events in time is distribution in TEM.

Actual events, processes, objects, are widely interpreted as having potentially alternative events, processes, objects which are conceivable but not actual.

Actual relations or conjunctions of events, objects, qualia, are thus in some sense a subset of the conceivable, i.e., the variables in propositions which correspond to actual referents are a subset of those (indices or classes of indices) which are conceivable.

Distribution of or with respect to abstract propositions is distribution in LOG.

Yet another way of showing how the spaces relate (it should not be forgotten that, although our discussion has been limited to the four spaces which are interpreted as external to self, I suspect that every regularity which we have observed with respect to the external hierarchy of spaces has an equally interesting (linguistically and otherwise) counterpart in the three or so internal spaces) is to consider the following sequence of differentiation:

First of course there is the dissociation of self from nonself:

1. THE WORLD INSIDE $\neq$ THE WORLD OUTSIDE

Detecting that nonself or the world outside contains objects which persistently show signs of being like self, we differentiate beings and nonbeings:

2. PERSONS $\neq$ THINGS

Within the realm of nonbeings, some are much more stable than others (cf. the extracted observation from Goodman 1966):

3. THINGS ≠ HAPPENINGS

When form is apprehended and can be exploited without reference to content, then the concrete and the abstract can be dissociated:

4. THE ACTUAL ≠ THE CONCEIVABLE (events ≠ propositions)

Lack of time, space, and, presumably, the patience of the reader take us directly now to another sphere of support or disconfirmation of the space hierarchy of EI.

It has been argued that the emergence of the grammatical categories verb and noun is a reflection of the separation of the object from the act which is observed at the end of the sensory-motor period (McNeill 1970:73). Regardless of the success of that argument, one might ask if the space hierarchy, which is assumed to represent sequence in acquisition of both cognitive and linguistic structures, might not be falsifiable at least to some extent in terms of acquisition sequences as well as word order. On the basis of a very limited amount of material I shall try to show that such observations as are available in the literature not only do not disconfirm the proposed sequence but support it. If the space hierarchy is not false or vacuous one might expect to find evidence that the nucleus is developed prior to the surrounding spaces. The table which Dale (1972:46-48) adapts from Brown shows the first two-element sequences in child speech in terms of structural meaning (function) as well as grammatical class.

According to the EI space hierarchy, the acquisition of AT/SOC could not precede that of anything nuclear, since SOC is a surrounding space. Thus EI could be falsified at this point if it were observed that acquisition of Agent NP ever preceded that of Object NP, for example. Note that the table does have an example of nuclear V+IT (#11. Action-Object) but does not have any example of objectless Agent-Action). Of the two most common noun functions (the most common N+N construction is Agent-Object according to Dale 1972: 46-48, lines 21-23) it is reported that Agents appear later (Dale 1972: 50):

In the earliest sentences of children, nouns frequently occur as objects of actions but seldom as the agents who perform the action. Agents appear later. Similarly, during the development of noun phrases, elaboration occurs first for noun phrases that are objects and only later for noun phrases that occur earlier in the sentence.

Dale attributes this sequence of elaboration as a matter of elaborating or adding to that which is at the end of what is acquired so far, but the difference of Object and Agent in acquisitional sequence is of course independent of such considerations. The other sentence and construction types of the table would have to have some way to distinguish inner from outer AT's in order to have any empirical bearing on the EI hierarchy.

After SOC is acquired, we might expect that SPA, TEM, and LOG be signalled in that sequence. Slobin (1966:141-143) has suggested that the order of grammatical classes, inflections is determined by the semantic and conceptual aspects of the forms to be learned. Referring to the use of common prepositions in Russian, he quotes Feofanov 1958:124:

Initially, their use is confined to relations with a concrete meaning understood by the child from visual perception (space relations...); then it extends to relations without such visual support (relations of purpose, time relations, and space relations used figuratively).

Thus we have seen some evidence for the sequence of acquisition NUC then SOC then SPA then TEM. Remaining to be shown is some sort of indication that evidence is likewise available to show that LOG is last:

The conditional is very late, not being used until 2; 10, though its grammatical structure is exceedingly simple. Conditional subordinate clauses are also later, emerging at about 2; 8. In both cases it seems to be the semantic and not the grammatical aspect that is difficult for the child.

(Slobin 1966:141-143, lines 21-26)

It is suggested that any additional evidence which will bear on the correctness of the space hierarchy together with the consequences of its being assumed will in fact be supportive of EI.

NOTE ONE FILLMORE'S CASES

Agentive (A), the case of the typically animate perceived instigator of the action identified by the verb.³¹

³¹ The escape qualification 'typically' expresses my awareness that contexts which I will say require agents are sometimes occupied by 'inanimate' nouns like robot or human institution nouns like nation. Since I know of no way of dealing with these matters at the moment, I shall just assume for all agents that they are 'animate'.

Instrumental (I), the case of the inanimate force or object causally involved in the action or state identified by the verb.³²

³² Paul Postal has reminded me of the existence of sentences like

i. I rapped him on the head with a snake.

The requirement that instrumental NP's are 'inanimate' is the requirement to interpret i as having in its underlying structure something equivalent to with the body of a snake. The fact that there are languages which would require mention of a stem meaning 'body' in this context may be considered as support for this position, and so may the unacceptability, pointed out by Lakoff, of sentences like ii:

ii. *John broke the window with himself. (See Lakoff, 1967.)

Dative (D), the case of the animate being affected by the state or the action identified by the verb.

Factitive (F), the case of the object or being resulting from the action or state identified by the verb, or understood as a part of the meaning of the verb.

Locative (L), the case which identifies the location or spatial orientation of the state or action identified by the verb.

Objective (O), the semantically most neutral case, the case of anything representable by a noun whose role is the action or state identified by the verb is identified by the semantic interpretation of the verb itself; conceivably the concept should be limited to things which are affected by the action or state identified by the verb. The term is not to be confused with notion of direct object, nor with the name of the surface case synonymous with accusative.

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

I have lately become comfortable with the following cases: Agent, Experiencer, Instrument, Object, Source, Goal, Place, and Time. There is one more, but I'm saving that till later. I used to talk about "Datives," but I have reanalyzed the old Dative by spreading it around among the other cases. Where there is genuine psychological event or state verb, we have the Experiencer; where there is a non-psychological verb which indicates a change of state, such as one of dying or growing, we have the object; where there is a transfer or movement of something to a person, the receiver as destination is taken as the Goal. I no longer confuse selection restrictions to animates with true case-like notions. (Fillmore 1971:251)

NOTE TWO

The 'explanatory' use of this framework resides in the necessary claim that, although there can be compound instances of a single case (through noun phrase conjunction), each case relationship occurs only once in a simple sentence.²⁶

²⁶ It follows that whenever more than one case form appears in the surface structure of the same sentence (on different noun phrases), either more than one deep-structure case is involved or the sentence is complex. If, for example, German lehren is described as a verb which 'takes two accusatives', we have reason to believe that in the deep structure, the two object nouns are distinct as to case. Often enough the language will provide evidence for the distinction, as in the occurrence of such passive sentences as das wurde mir gelehrt. (Fillmore 1968:21; cf. Gruber 1965)

NOTE THREE

In order to formalize a characterization for certain phenomena of overlap among case forms in English and other languages and facts of implication (e.g. "The perfective of the dynamic implies the (unmarked) imperfective of the static sentence which is in correspondence with it" Lyons 1968:398), Anderson proposes that loc(ative) and all(ative), which do not contrast (or co-occur) in a clause, be collapsed to loc and that the difference between dynamic and static clauses be manifested by the presence or absence of the abl(ative) case category. This corresponds closely to Gruber's derivation of TO from AT (when the verb is "motional") and FROM from TO NOT from AT NOT (see Fillmore 1966:fn12; Gruber 1970:52-53; Anderson 119-124). The question will be ignored in our discussion.

NOTE FOUR

Mostly because of lack of space and time, we will not deal with those cases which are not Pathway terminals, such as Instrument and Manner.

NOTE FIVE

$$a. \quad (V.A.1.) \quad OV = \frac{SOV}{TI_{so}} = \frac{SIOV}{EI_{nuc}} = \frac{NSIOV}{EI_{consord}}$$

TI_{si}

NON

$$b. \quad (V.B.1a(1)) \quad VSO = \frac{VSOI}{NON} = \frac{VSOIN}{NON}$$

or
 $\frac{EI_{nuc}}{TI_{si}}$

$$c. \quad V.B.1a(2)) \quad VOS = \frac{VOSI}{TI_{si}} = \frac{VOSIN}{EI_{consord}}$$

or
 (NON) NON

$$d. \quad (V.C.1) \quad SVO = \frac{SIVO}{SI} = \frac{NSIVO}{EI_{nuc}} = \frac{NSIVO}{EI_{consord}}$$

TI_{si}

REFERENCES

The references below in some cases do not represent original sources. The first reason for this is that I have been unable to take the time so far to do more than skim the literatures of language acquisition and cognitive development for appropriate material such as is represented here. The second reason is for the convenience of the reader: I have tried to use as references those works which would be most accessible to most readers.

- Anderson, John M. 1971. The Grammar of Case: Towards a Localistic Theory. Cambridge Studies in Linguistics 4. Cambridge, England: The University Press.
- Beadle, Muriel 1971. A Child's Mind: How Children Learn During the Critical Years from Birth to Age Five. Garden City, New York: Doubleday.
- Bever, T.G. 1970. "The Cognitive Basis for Linguistic Structures" in J. R. Hayes (ed.) Cognition and the Development of Language. New York: Wiley.
- Boyle, Elizabeth L., Delgridge, Pauline Ng, and others. 1970. Cantonese: Basic Course Vols. I and II. Foreign Service Institute Basic Course Series. Washington, D.C.: Foreign Service Institute.
- Brown, R. 1970. Psycholinguistics: Selected Papers. New York: Free Press.
- Carroll, John B. 1964. Language and Thought. Foundations of Modern Psychology Series. Englewood Cliffs, New Jersey: Prentice-Hall.
- Chao Yuen-Ren 1968. A Grammar of Spoken Chinese. Berkeley: University of California Press.
- Chomsky, Noam 1965. Aspects of the Theory of Syntax. Cambridge, Mass.: MIT Press.
- Dale Philip S. 1972. Language Development: Structure and Function. Hinsdale, Illinois: The Dryden Press.
- Fillmore, Charles J. 1966. "Towards a Modern Theory of Case". Project on Linguistic Analysis Report No. 13. Columbus, Ohio: Ohio State University Research Foundation.
also in Reibel and Schane (eds.) 1969. Modern Studies in English: Readings in Transformational Grammar. Englewood Cliffs, New Jersey: Prentice-Hall.

- Fillmore, Charles J. 1968. "The Case for Case". Bach and Harms (eds.) Universals in Linguistic Theory. New York: Holt, Rinehart and Winston.
- Fillmore, Charles J. 1971. "Some Problems for Case Grammar". Working Papers in Linguistics 10.245-265. Columbus: Ohio State University.
- Frantz, Donald G. 1974. Generative Semantics. Summer Institute of Linguistics.
- Goodman, Nelson 1966 (1951). The Structure of Appearance. New York: The Bobbs-Merrill Company.
- Greenberg, Joseph H. 1963. "Some Universals of Grammar with particular reference to the order of meaningful elements". J.H. Greenberg (ed.) Universals of Language. Cambridge, Mass.: MIT Press.
also in Keiler (ed.) 1966. A Reader in Historical and Comparative Linguistics. New York: Holt, Rinehart and Winston.
- Gruber, Jeffrey S. 1965. Studies in Lexical Relations. unpublished dissertation: MIT. reproduced by Indiana University Linguistics Club. 1970.
- Halliday, M. A. K. 1970. "Language Structure and Language Function". New Horizons in Linguistics (John Lyons ed.). Baltimore: Penguin Books.
- Jackendoff, Ray S. 1972. Semantic Interpretation in a Generative Grammar. Studies in Linguistics, No. 2. Cambridge, Mass.: MIT Press.
- Kimball, John 1971. "The Grammar of Facing". reproduced by Indiana University Linguistics Club. 1974.
- Kimball, John 1973. "The Grammar of Existence". Papers from the Ninth Regional Meeting (of the) Chicago Linguistic Society. Chicago: CLS.
- Koutsoudas, Andreas and Sanders, Gerald A. 1974. "On the Universality of Rules and Rule-Ordering Constraints". reproduced by the Indiana University Linguistics Club.
- Kuno Susumu 1971. "The Position of Locatives in Existential Sentences". Linguistic Inquiry Vol. 2, No. 3, pp. 333-378. also in Kuno 1973.
- Kuno Susumu 1973. The Structure of the Japanese Language. Current Studies in Linguistics, Vol. 3. Cambridge, Mass.: MIT Press.
- Lakoff, George 1970. "Pronominalization, Negation, and the Analysis of Adverbs" In Jacobs and Rosenbaum ed. and Readings in English Transformational Grammar. Waltham, Mass.: Ginn and Co.
- Lyons, John 1968. Introduction to Theoretical Linguistics. Cambridge: The University Press.
- McNeill, David 1970. The Acquisition of Language: The study of Developmental Psycholinguistics. New York: Harper and Row.

- Piaget, Jean and Inhelder, Bärbel 1969. The Psychology of the Child (translated by H. Weaver). New York: Basic Books.
1966. La psychologie de l'enfant. Presses Universitaires de France.
- Sohn, John Young. 1973. A Study of Grammatical Cases of Korean, Japanese, and Other Major Altaic Languages. unpublished dissertation: Indiana University.
- Slobin, Dan I. 1966. "The Acquisition of Russian as a Native Language". Smith and Miller (eds.) The Genesis of Language: a Psycholinguistic Approach. Cambridge, Mass.: MIT Press.
- Slobin, Dan I. 1971. Psycholinguistics. Glenview, Illinois: Scott, Foresman.
- Starosta, Stanley 1973. "The Faces of Case". Language Sciences No. 25. Bloomington: Research Center for the Language Sciences.
- Venneman, Theo 1973. "Explanations in Syntax" in Syntax and Semantics (Vol. 2) Kimball ed. New York and London: Seminar Press.