A TRANSFORMATIONAL GRAMMAR OF COORDINATE CONJOINED STRUCTURES

by

RAY C. DOUGHERTY
B.A., Dartmouth College, 1962
M.S., Dartmouth College, 1964

SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

at the
MASSACHUSETTS INSTITUTE OF
TECHNOLOGY

September, 1968, i.e. Feb. 1969

Signature of Author

Department of Modern Languages and
Linguistics, August 20, 1968

Certified by

Thesis Supervisor

Accepted by

Chairman, Departmental Committee
on Graduate Students
A TRANSFORMATIONAL GRAMMAR OF COORDINATE CONJOINED STRUCTURES

by

Ray C. Dougherty

submitted to the Department of Modern Languages and Linguistics on August 20, 1968, in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

ABSTRACT

This thesis compares two alternative theories of coordinate conjunction - the transformational hypothesis and the phrase structure rule hypothesis - which are compatible with the same linguistic theory and which attempt to describe the same empirical domain. A particular formulation of the phrase structure rule hypothesis is presented to describe the grammar of the coordinate conjunctions: and, or, and nor; the distributive quantifiers: each, all, both, none, either, and neither; the distributive adverbs: alone, simultaneously, together, etc.; along with and together with phrases; reciprocal constructions, plural reflexives, and respectively constructions. The implications of the theory of coordinate conjunction on the lexical representation of predicates like mix, collide, exceed, etc. is discussed in the last chapter.

Thesis Supervisor: Noam Chomsky
Title: Professor of Linguistics
I wish to extend my gratitude to all those who made the writing of this thesis possible:

to my parents for making my education possible by providing me with the opportunity to go to college,

to Noam Chomsky for those comments, criticisms, and insights which were invaluable, and especially, for suggesting many of the facts which supported my arguments, and for showing me how to organize a set of facts into a coherent argument to decide the relevant issues,

to Morris Halle for suggesting many fruitful avenues of research, for pointing out many generalizations which had been unnoticed, and for many suggestions concerning the overall organization of the thesis and the presentation of the material,

to John Ross for suggesting to me that coordinate conjunction would be an interesting thesis topic, for explaining to me many intricate facts which indicated the great complexity of coordinate conjoined structures, and for patiently examining my early work and offering much constructive criticism,

to Don Walker of the MITRE Corporation for employing me during the summer of 1967 while I worked out an early draft of the thesis,

to Lynda Hagel of the MITRE Corporation for typing the early drafts and final manuscript in time to enable me to meet the deadlines established by the powers that be,

and to the many people that have assisted me either directly or indirectly by providing facts, arguments, or moral support. I would
like to especially thank Adrian Akamajian, Curval de Blangais, Evelyne Delorme, Joseph Emmonds, Louis Gross, Kenneth Hale, Irwin Howard, Ray Jackendoff, Lyle Jenkins, Richard Kayne, Paul Kiparsky, Hugh Matthews, David Perlmutter, and David Vetter.
INTRODUCTION

Webster's International Dictionary defines a conjunction as:

"a connective or connecting particle with the special function of joining together sentences, clauses, phrases, or words."

A coordinate conjunction is defined as:

"a conjunction that marks equal rank between the words or word groups that it connects."

The coordinate conjunctions that will be discussed in this paper are and, or, and nor. There are syntactic grounds for distinguishing these three conjunctions from all of the other conjunctions in English; these reasons will be discussed as the analysis of conjoined structures proceeds. One distinguishing characteristic of these three conjunctions is that they can cooccur with certain distributive quantifiers, i.e. and cooccurs with each, all, and both; or cooccurs with either and any; nor cooccurs with neither.

This thesis attempts to account for the distribution of the coordinating conjunctions and to provide explicit rules to assign structural descriptions to coordinate constructions so that the grammaticality or non-grammaticality of a sentence will be determinable on the basis of the grammatical description. The analysis of coordinate conjunction presented in this thesis differs from previous analyses in a fundamental way.

All previous formulations have been particular formulations of the transformational hypothesis, that is, all previous formulations have transformationally derived a class of conjoined structures from deep structure conjoined sentences. This class of derived structures includes
the set of reciprocal sentences and the set of respectively conjoined sentences. One early formulation advocated the strong form of the transformational hypothesis and attempted to derive all conjoined structures from deep structure conjoined sentences. A more recent formulation has championed the weak form of the transformational hypothesis and transformationally derives some conjoined sentences from deep structure conjoined sentences.

This thesis argues directly against the Transformational hypothesis and supports the Phrase Structure Rule (PSR) hypothesis. The object of this thesis is to show that in an optimal grammar, i.e. an explanatorily adequate grammar, all conjunction must be generated by phrase structure rules of the base. The Transformational Conjunction Rule must be assigned a very restricted role. How the PSR hypothesis can be formulated and how it differs from the Transformational hypothesis are the subject matter of this thesis.

The criticisms of the transformational solutions of coordinate conjunction presented by Dik in Coordinate Conjunction: Its Implications for the Theory of General Linguistics do not bear on the PSR hypothesis presented in this thesis. Dik's arguments apply only to a transformational grammar incorporating "the reduction postulate", i.e. to a grammar that is a particular formulation of the transformational hypothesis. Since the PSR hypothesis is by definition incompatible with "the reduction postulate", no particular formulation of the PSR hypothesis can incorporate the postulate, and consequently, no particular formulation of the PSR hypothesis is subject to Dik's criticism.
# INDEX

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I.0</td>
<td>SEMANTIC NON-SINGULARITY</td>
</tr>
<tr>
<td>9</td>
<td>I.1</td>
<td>The PSR Hypothesis versus the Transformational Hypothesis: Plural Noun Phrases.</td>
</tr>
<tr>
<td>15</td>
<td>II.0</td>
<td>PREVIOUS WORK ON COORDINATE CONJUNCTION</td>
</tr>
<tr>
<td>18</td>
<td>II.1</td>
<td>Sentence Conjunction versus Phrasal Conjunction</td>
</tr>
<tr>
<td>22</td>
<td>II.2</td>
<td>Symmetric Predicates, Non-Symmetric Predicates, and with-Phrases</td>
</tr>
<tr>
<td>23</td>
<td>II.2.1</td>
<td>Symmetric Predicates versus Non-Symmetric Predicates</td>
</tr>
<tr>
<td>25</td>
<td>II.2.2</td>
<td>Syntactic Arguments against Conjunct Movement</td>
</tr>
<tr>
<td>38</td>
<td>III.0</td>
<td>THE PSR GRAMMAR OF COORDINATE CONJUNCTION</td>
</tr>
<tr>
<td>38</td>
<td>III.1</td>
<td>The PSR Schema</td>
</tr>
<tr>
<td>41</td>
<td>III.2</td>
<td>The Distributional Quantifiers, the Feature ([\pm \text{exhaustive}])</td>
</tr>
<tr>
<td>45</td>
<td>III.3</td>
<td>The Quantifiers each and all, the Features ([\pm \text{totality}]) and ([\pm \text{individual}])</td>
</tr>
<tr>
<td>47</td>
<td>III.3.1</td>
<td>Predicates which Require a ([+ \text{individual}]) Subject</td>
</tr>
<tr>
<td>49</td>
<td>III.3.2</td>
<td>The Four Classifications of Coordinate Conjoined Structures</td>
</tr>
<tr>
<td>58</td>
<td>III.4</td>
<td>The PSR Schema</td>
</tr>
<tr>
<td>62</td>
<td>III.5</td>
<td>The Features ([\pm \text{disjunctive}]) and ([\pm \text{negative}])</td>
</tr>
<tr>
<td>68</td>
<td>III.6</td>
<td>The PSR Schema</td>
</tr>
<tr>
<td>69</td>
<td>III.7</td>
<td>Mechanisms Required by the PSR Hypothesis</td>
</tr>
<tr>
<td>76</td>
<td>III.8</td>
<td>The Feature ([+\text{individual}]) and together with Phrases</td>
</tr>
<tr>
<td>Page</td>
<td>Section</td>
<td>Topic</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>83</td>
<td>III.8.1</td>
<td>Further Syntactic Support for the PSR Analysis of <em>together with</em> Phrases</td>
</tr>
<tr>
<td>89</td>
<td>III.9</td>
<td>The Conjunction of Derived Structures</td>
</tr>
<tr>
<td>97</td>
<td>IV.0</td>
<td>THE INTERNAL STRUCTURE OF THE MAJOR CATEGORIES</td>
</tr>
<tr>
<td>104</td>
<td>IV.1</td>
<td>The Internal Structure of the Noun Phrase, ( N )</td>
</tr>
<tr>
<td>105</td>
<td>IV.1.1</td>
<td>The Nodes ( N ) and ( N )</td>
</tr>
<tr>
<td>110</td>
<td>IV.1.2</td>
<td>( N ) and Coordinate Conjoined Structures</td>
</tr>
<tr>
<td>112</td>
<td>IV.1.3</td>
<td>( N ) and Coordinate Conjoined Structures</td>
</tr>
<tr>
<td>115</td>
<td>IV.2</td>
<td>The Internal Structure of the Verb Phrase, ( V )</td>
</tr>
<tr>
<td>116</td>
<td>IV.2.1</td>
<td>( V ) and Coordinate Conjoined Structures</td>
</tr>
<tr>
<td>118</td>
<td>IV.2.2</td>
<td>( V ) and Coordinate Conjoined Structures</td>
</tr>
<tr>
<td>120</td>
<td>IV.3</td>
<td>The Transformational Conjunction Rule</td>
</tr>
<tr>
<td>121</td>
<td>IV.3.1</td>
<td>( N ) and Derived Coordinate Conjoined Structures</td>
</tr>
</tbody>
</table>

(1) Reciprocal Constructions  
(2) Reflexive Constructions  
(3) Respectively Constructions  

<p>| 131  | IV.3.2  | ( V ) and Derive Coordinate Conjoined Structures |
| 137  | IV.4    | Lexical Subcategorization |
| 137  | IV.4.1  | Predicates Subcategorized for Features on ( N ) |
| 141  | IV.4.2  | Predicates Subcategorized for Features on ( N ) |
| 145  | IV.5    | Lexical Insertion: Selection Restrictions and Insertion Conditions |
| 168  | V.0     | RECIPROCAL PRONOUNS, PLURAL REFLEXIVES, AND RESPECTIVELY CONSTRUCTIONS |
| 177  | V.1     | Reciprocal Constructions |</p>
<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>180</td>
<td>V.1.1</td>
</tr>
<tr>
<td>180</td>
<td></td>
</tr>
<tr>
<td>185</td>
<td></td>
</tr>
<tr>
<td>189</td>
<td></td>
</tr>
<tr>
<td>195</td>
<td>V.1.2</td>
</tr>
<tr>
<td>202</td>
<td>V.1.3</td>
</tr>
<tr>
<td>205</td>
<td>V.1.4</td>
</tr>
<tr>
<td>206</td>
<td>V.1.5</td>
</tr>
<tr>
<td>213</td>
<td>V.1.6</td>
</tr>
<tr>
<td>214</td>
<td>V.1.6.1</td>
</tr>
<tr>
<td>223</td>
<td>V.2</td>
</tr>
<tr>
<td>228</td>
<td>V.3</td>
</tr>
<tr>
<td>236</td>
<td>V.3.1</td>
</tr>
<tr>
<td>239</td>
<td>VI.0</td>
</tr>
<tr>
<td>239</td>
<td>VI.1</td>
</tr>
<tr>
<td>246</td>
<td>VI.2</td>
</tr>
<tr>
<td>250</td>
<td>VI.3</td>
</tr>
<tr>
<td>255</td>
<td>VII.0</td>
</tr>
<tr>
<td>257</td>
<td>VII.1</td>
</tr>
<tr>
<td>261</td>
<td>VII.1.1</td>
</tr>
<tr>
<td>265</td>
<td>VII.2</td>
</tr>
<tr>
<td>Page</td>
<td>Section</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
</tr>
<tr>
<td>266</td>
<td>VII.2.1</td>
</tr>
<tr>
<td>271</td>
<td>VII.2.2</td>
</tr>
<tr>
<td>273</td>
<td>VII.2.2.1</td>
</tr>
<tr>
<td>276</td>
<td>VII.3</td>
</tr>
<tr>
<td>284</td>
<td>VII.4</td>
</tr>
</tbody>
</table>
I. SEMANTIC NON-SINGULARITY

This thesis presents a grammar of coordinate conjoined structures and treats the general area of semantic non-singularity. Semantic non-singularity includes collective nouns (group, trio, etc.), plural nouns (men, girls, etc.), coordinated conjoined structures (John, Bill, and Tom, etc.), and mass nouns (sugar, water, etc.). The underlined elements in sentences 1 - 5 are semantic non-singulars.

1. The group scattered when the bomb fell.
2. The trio scattered when the bomb fell.
3. The boys scattered when the bomb fell.
4. John, Bill, and Tom scattered when the bomb fell.
5. The sugar scattered when the bomb fell.

Semantic non-singular is not synonymous with plural. The term plural is reserved for semantic non-singulars that can be counted; the term plural implies a "more than oneness" and this would exclude mass nouns and certain readings of collective nouns. In this thesis all cases of semantic non-singularity are represented as deep structure feature complexes. The term plural will refer to the deep structure feature complexes: [ - semantic singular ] [ + integerwise divisible ] [ + boundaryless ]

The following list presents examples of semantic non-singularity:

I. Collective nouns:
   a. group, club, bunch, team, crew, etc.
   b. pair, trio, couple, duo, quartet, etc.
II. Plural nouns:
   a. men, boys, girls, goats, children, etc.
   b. the two men, the three men, etc.

III. Coordinate Conjoined Structures:
   a. John, Bill, and Tom
   b. John, Bill, or Tom
   c. Neither John, Bill, nor Tom.

IV. Mass nouns:
   a. sugar, water, beer, alcohol, rum, etc.
   b. entrails, guts, mumps, measles, crabs, etc.

These examples of semantic non-singularity are cross classified for deep structure features which determine both syntactic distribution and semantic interpretation. For example, a plural construction, like the donkeys, and a conjunction of noun phrases, like the girl, the goat, and the llama, bear different features and, hence, can occur in different syntactic environments and can have different semantic interpretations. The deep structure feature complex assigned to a plural noun phrase is:

```
[ - semantic singular ]
[ + integerwise divisible ]
[ - boundaryless ]
```

The deep structure feature complex assigned to a conjunction of noun phrases is:

```
[ - semantically singular ]
[ + integerwise divisible ]
[ - boundaryless ]
```

These features are defined in terms of syntactic correlates, specifically; [± integerwise divisible] and [± boundaryless]:

[± integerwise divisible] is defined as follows:
A [- semantically singular] structure is [+ integerwise divisible] if it can occur with the quantifiers each or many; it is [- integerwise divisible] if it can occur with much or a little. The following data shows that the division is:

<table>
<thead>
<tr>
<th></th>
<th>group</th>
<th>trio</th>
<th>the boys</th>
<th>John, Bill, and Tom</th>
<th>sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>[sem.s]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>[int.d]</td>
<td>±</td>
<td>±</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

6. Many in the group were from Texas.
7. Each one in the trio was from Texas.
8. Many of the men were from Texas.
9. John, Bill, and Tom were each from Texas.
10.a.* Many of the sugar was from Texas.
   b.* Each of the sugar was from Texas.
11. Much of the group was from Texas.
12. Some of the octet was from Texas.
13. * Much of the men was from Texas.
14. * Much of John, Bill, and Tom was from Texas.
15. Much of the sugar was from Texas.

It is significant to observe that a collective noun can be in a [+int.d] construction or a [-int.d] construction. The preposition is in if it is a [+int.d] and of if it is a [-int.d] construction. The syntactic agreement of the verb also depends on this feature. A collective in a [+int.d] noun phrase requires a syntactically plural auxiliary:
16. Some in the group were from Texas.
17. Some of the group was from Texas.
18. Most in the group were from Texas.
19. Most of the group was from Texas.

[± boundaryless]

A [-sem.sing] noun phrase is [ +boundaryless] if it can occur as the subject of the predicates double in size, be abundant, or be plentiful; it is [ -boundaryless] if it cannot.

Sentences 20 - 24 indicate that the semantic non-singulars are marked as follows.

<table>
<thead>
<tr>
<th></th>
<th>group</th>
<th>trio</th>
<th>the boys</th>
<th>John, B, and T</th>
<th>sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>[sem.s]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>[int.d]</td>
<td>±</td>
<td>±</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>[bndls]</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

20. The group doubled in size.
22. The men were plentiful.
23. * John, Bill, and Tom were plentiful.
24. The sugar was abundant.

The predicates listed in 25 require a subject to be marked:

[ -semantically singular ]. As 26 - 30 show, the subject must be a [ +integerwise divisible ]
[ +boundaryless ]
collective, like group, or a plural, like boys, men.
25. be numerous, double in number, swell in number.

26. The group doubled in number/ was numerous.

27. * The trio doubled in number / was numerous.

28. The men doubled in number / were numerous.

29. * John, Bill, and Tom doubled in number / were numerous.

30. * The sugar doubled in number / was numerous.

The following chart indicates the syntactic distribution of the semantic non-singulars in the examples so far considered: (* = ungrammatical construction)

<table>
<thead>
<tr>
<th></th>
<th>scatter</th>
<th>each</th>
<th>much</th>
<th>dbl. in size</th>
<th>be numerous</th>
</tr>
</thead>
<tbody>
<tr>
<td>sentences</td>
<td>1-5</td>
<td>6-10</td>
<td>11-15</td>
<td>20-24</td>
<td>26-30</td>
</tr>
<tr>
<td>group</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>trio</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>boys</td>
<td>+</td>
<td>+</td>
<td>*</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>J,B,&amp;T</td>
<td>+</td>
<td>+</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>sugar</td>
<td>+</td>
<td>*</td>
<td>+</td>
<td>+</td>
<td>*</td>
</tr>
</tbody>
</table>

The above discussion was intended to suggest the character of the PSR grammar of semantic non-singular constructions. The three features discussed are not crucial in the later formulation of the grammar of coordinate conjoined structures and they play only a minor role in the subsequent analysis.

A full grammar of semantic non-singularity cannot be presented at this time, but the nature of the solution is clear: Non-singular nouns
are cross-classified for a number of features. These features determine the syntactic structure and the semantic interpretation of a non-singular construction. This assumption - that semantic non-singularity is represented in the deep structure as a feature complex - is, first, internally coherent and amenable to formalization in terms of feature mechanisms already available for linguistic description; second, it is consistent with the facts about English syntactic constructions, specifically: the grammar or coordinate conjunction, reciprocal constructions, reflexive noun phrases, and quantification; and, third, it is motivated by the data. The data does not cleave into clearly definable natural classes with distinct boundaries. Instead, the data indicates an interlocking of properties between the elements group, trio, men, John, Bill, and Tom, and sugar. These elements are cross-classified for a large number of syntactic environments and semantic interpretations.\(^1\) It is precisely a distribution of data of this type, i.e. an interlocking of characteristics and sharing of properties between several elements, that features can most readily describe and which motivated the introduction of features into linguistic theory as a descriptive mechanism.\(^2\)

The following chart and the corresponding examples indicate that the five examples of semantic non-singularity being considered here are cross-classified for more environments than discussed above.

\(* = \text{an ungrammatical construction}\)
<table>
<thead>
<tr>
<th></th>
<th>within</th>
<th>collide</th>
<th>large</th>
<th>respective</th>
</tr>
</thead>
<tbody>
<tr>
<td>sentences</td>
<td>31-35</td>
<td>36-40</td>
<td>41-45</td>
<td>46-50</td>
</tr>
<tr>
<td>group</td>
<td>+</td>
<td>*</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>trio</td>
<td>+</td>
<td>*</td>
<td>*</td>
<td>+</td>
</tr>
<tr>
<td>boys</td>
<td>*</td>
<td>+</td>
<td>*</td>
<td>+</td>
</tr>
<tr>
<td>J,B,&amp;T</td>
<td>*</td>
<td>+</td>
<td>*</td>
<td>+</td>
</tr>
<tr>
<td>sugar</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

31. Within our group we have two longshoremen.
32. Within our trio we have two longshoremen.
33. * Within our boys we have two longshoremen.
34. * Within John, Bill, and Tom we have two longshoremen.
35. * Within the sugar we have flies.
36. * The group collided.
37. * The trio collided.
38. The boys collided.
40. * The sugar collided
41. The group is large.
42. * The trio is large.
43. * The men are large.
44. * John, Bill, and Tom are large.
45. * The sugar is large.
46. Each one in the group knew his respective task.
47. Each one in the trio knew his respective task.
48. Each one of the men knew his respective task.
49. John, Bill, and Tom each knew their respective task.
50. * Each of the sugar was in its respective bowl.
I.1  The PSR Hypothesis versus the Transformational Hypothesis: Plural Noun Phrases.

The grammar presented in this thesis, based on the PSR Hypothesis, considers all cases of semantic non-singularity to be represented in the base as deep structure feature complexes. Under this assumption, a plural noun phrase and conjoined noun phrases should be similar in some respects and different in others. An analysis to encompass this distribution of data is easily formulable in terms of deep structure features; deep structure features permit plural noun phrases and conjoined noun phrases to be cross classified for diverse syntactic environments and semantic interpretations.

An alternative view of grammar, represented as the Transformational Hypothesis, attempts to derive every plural noun phrase from a conjunction of singular noun phrases. Since transformations are not permitted to change meaning, the transformational formulation predicts that a conjunction of singular noun phrases and a plural noun phrase will have the same range of semantic interpretations and the same syntactic distribution.

The following facts, concerning both syntactic distribution and semantic interpretation, support the PSR Hypothesis over the Transformational Hypothesis.

FACT I: There are certain predicates which can have a plural noun phrase as subject but cannot have a conjunction of singular noun
phrases as a subject. The (a) sentences are ill formed, but the (b) sentences are grammatical:

1.a. * John, Bill, and Tom are numerous.
    b. The men are numerous.

2.a. * John, Bill, and Tom were plentiful.
    b. Soldiers are plentiful.

3.a. * John, Bill, and Tom are interspersed.
    b. They are interspersed.

4. Numerous, double in number, swell, swarm, teem, be abundant, be plentiful, be uncountable, intersperse, intersprinkle, intermarry, intermingle, alternate, interlard, be uncountable, be innumerable.

The predicates numerous, etc. must be subcategorized to occur with only plural subjects; a conjunction of singular noun phrases cannot occur as a subject. If a plural noun phrase is derived from conjoined noun phrases, these predicates have no grammatical deep structure and are not generable. List 4 indicates more predicates of this class. This example shows that the fundamental assumption of the transformational hypothesis - that a plural noun phrase and a conjunction of singular noun phrases have the same syntactic distribution - is false over a wide range of predicates.

FACT II: A fact cited in support of the transformational hypothesis is that a plural noun phrase has the same interpretation as a
conjunction of singular noun phrases. By deriving both plural noun phrases and conjoined noun phrases from conjoined "singular" sentences, the interpretive principles can be built into the grammar. That is, the semantic rule which interprets 5 can interpret 6. By deriving sentence 7 from the deep structure 6, only one semantic rule is needed.

5. John perjured himself.
6. John perjured himself and Bill perjured himself.
7. John and Bill perjured themselves.

By deriving plurals from conjoined singulars, the same semantic rule can interpret plurals. That is, the deep structure of sentence 9 is something like 8.

8. He perjured himself and he perjured himself and ...
   ... he perjured himself and ....
9. They perjured themselves.

This analysis overlooks the fact that collective nouns can have the same interpretation as plurals and conjoined noun phrases.

10. The pair perjured themselves.
11. The couple enjoyed themselves at the ballgame.
12. The trio behaved themselves in public.
13. The trio died in the fire.

A semantic rule is needed to interpret the collective noun subjects in 10 - 13 and this semantic rule could be used to interpret
the plural subject in 9 and the conjoined subject in 7. In the PSR analysis, these subjects share the feature [ +individual] and the semantic rule which interprets this feature interprets all of these subjects together with the singular subjects in 5 and 6.

The collective noun subjects in 10-13 are beyond the transformational hypothesis. The transformational hypothesis cannot extend the "singular" semantic interpretation rule to include collectives. It is not possible to derive collective nouns from conjoined singulars because the syntactic distribution of collectives is quite different than the distribution of conjoined structures. Notice in the following sentences that the (a) sentences are grammatical, but a conjunction of singulars in the same environment as the collective noun, i.e. in the (b) sentences, yields a totally ungrammatical sentence:

14.a. The group is homogeneous.
     b. * Mary, Sue, and Jane are homogeneous.

15.a. Our exclusive group has strict entrance requirements.
     b. * Mary, Sue, and Jane have strict entrance requirements.

16.a. We have three new members in our group.
     b. * We have three new members in Mary, Sue, and Jane.

17.a. Within the group we have three longshoremen.
     b. * Within Mary, Sue, and Jane we have three longshoremen.

18.a. The group doubled in size.
     b. * Mary, Sue, and Jane doubled in size.
FACT III: The previous facts indicated that a plural noun phrase and a conjunction of singular noun phrases do not have the same syntactic behavior. The next set of facts indicate that a plural noun phrase and a conjunction of singular noun phrases do not have the same range of semantic interpretations.

Sentence 19 cannot be paraphrased by conjoined sentences such as 20, because sentence 20 contains more information than sentence 19.

19. The boys in my class have beards.
20. The boy in my class has a beard and the boy in my class has a beard and ..........

Sentence 20 indicates only that the boys and beards are in a one to one correspondence. Sentence 19 indicates this too, but also incorporates the fact that there are no boys in my class without beards. That is, sentence 19 is a statement about all the boys. Sentence 19 is equivalent to sentence 21.

21. All of the boys in my class have beards.

FACT IV: The transformational hypothesis must also derive some surface structure sentences from an uncountable infinity of deep structure sentences. How many conjoined sentences underlie 22, 23, and 24? There certainly cannot be one conjunct for each real number.

22. The real numbers are fine.
23. The irrational numbers are divine.
24. The prime numbers are "numero uno".
These sentences indicate that one cannot build the interpretive principles of plural noun phrases into the derivational mechanisms; to do so would require deriving sentence 22 from an uncountable infinity of deep structures, and this is unformalizable.
II. PREVIOUS WORK ON COORDINATE CONJUNCTION

Previous articles dealing with coordinate conjunctions have noted that conjoined noun phrases are of two types, one in which the elements of the conjoined structure are regarded as independently functioning elements, and the other in which the elements of the conjoined structure are conceived as comprising a unity. The former type, exemplified in sentences 1 and 2, has been called sentence conjunction, the latter type, as in examples 3 and 4, has been called phrasal conjunction.

SENTENCE CONJUNCTION
1. John, Bill, and Tom (each) know the answer.  
2. John, Bill, and Tom (each) died.  

PHRASAL CONJUNCTION
3. John, Bill, and Tom (all) met in Boston.  
4. John, Bill, and Tom are (all) identical.  

A sentence containing a conjoined noun phrase of the sentence conjunction type can be paraphrased as conjoined sentences, 1 can be paraphrased as 5.

5. John knows the answer & Bill knows the answer & Tom knows the answer.  

A sentence containing a conjoined noun phrase of the phrasal conjunction type cannot be paraphrased as conjoined sentences, 6 is not a paraphrase of 3.

The previous formulations which have suggested deep structures for coordinate conjunctions have all related the sentences 1 and 5 by generating 5 in the deep structure and deriving 1 from 5 by an optional rule in the transformational component. The notion of phrasal conjunction has only been discussed with respect to conjoined noun phrases; all other conjoined constituents (VP, V, and S) have been considered examples of sentence conjunction and conjoined verbs and verb phrases have been transformationally derived from conjoined sentences. Sentence 7 would be derived from 8, and sentence 9 from 10.

CONJOINED VERB PHRASES
7. John hit Mary and ate supper.
8. John hit Mary and John ate supper.

CONJOINED VERBS
9. John washed and dried the car.
10. John washed the car and John dried the car.

Transformational derivation of conjoined verbs from conjoined sentences requires some subsidiary adjustment transforms to change singualrs to plurals. For example if 12 and 13 are transformationally derived from 11, the object must be plural in 12 and can be either singular or plural in 13.

11. John killed a dog and Bill killed a dog. (not the same dog)
12.a. *John and Bill killed a dog.

b. John and Bill killed dogs.
13.a. John and Bill each killed a dog.

b. John and Bill each killed dogs.

The adjustment transform **must** change the object to plural if each is not present, as in 12, but only optionally change the object to plural if each is present. The adjustment transform which changes conjoined singulars to plurals must refer to the element each. The transform has never been explicitly formulated and cannot be until an analysis of the element each has been integrated into the grammar.

The element each will be called a **distributive quantifier**, a name suggested by the definition of each presented in the Oxford English Dictionary:

```
each- ... - (each on a plural or conjoined noun phrase subject) implies a distribution of the predicate or object parallel to the distribution of the subject (or conversely).
```

This means that if each cooccurs with a conjoined noun phrase (or plural) subject, the sentence containing the conjunction can be paraphrased as conjoined sentences. It will be shown later that all, both, whether, either, neither, and respectively are similar to each in function, they specify the "collective" or "distributive" nature of a conjoined or plural structure. These will also be called distributive quantifiers. In the course of the analysis presented in this paper it will be shown that distributive quantifiers play a fundamental role in the grammar of conjoined structures.
II.1 Sentence Conjunction vs Phrasal Conjunction

The transformational Hypothesis attempts to account for the meaning difference between sentence and phrasal conjunction by structural differences in the underlying forms. In this paper another possibility, the phrase structure rule (PSR) Hypothesis, will be presented. The PSR Hypothesis replaces the binary division of sentence and phrasal conjunction with a four way classification of conjunctions based on the distributional quantifiers each, all, and both. The PSR approach generates all conjoined structures in the phrase structure component of the base, the possible interpretations of a conjoined structure are determined by deep structure features assigned to the conjoined node by the PSR schema and by the logical properties of the coordinate conjunctions. The features correspond to intuitively meaningful notions and are operationally defined in terms of the role they play in the theory, specifically:

1. adverb, adjective, and verb cooccurrence restrictions
2. pronoun cooccurrence restrictions
3. the grammatical constructions in which the features are relevant
4. transformations which refer to the features
5. the surface structure quantifiers the feature complexes represent

The concepts of sentence and phrasal conjunction, which are fundamental to the transformational hypothesis, have never adequately been described. One formulation of the transformational hypothesis does attempt to clarify the notions in the following way: $^6$
8.a. John and Mary left together.
   b. Shakespeare and Marlowe wrote plays together.

9.a. John left with Mary.
   b. Shakespeare wrote plays with Marlowe.

10.a. Both John and Mary left.
       b. Both Shakespeare and Marlowe wrote plays.

11.a. John left and Mary left.
       b. Shakespeare wrote plays and Marlowe wrote plays.

The together and with paraphrases, (8) and (9), indicate underlying phrasal conjunction; the both and the full sentence paraphrases (10) and (11), indicate underlying sentence conjunction (for details, see Peters, 1966).

These diagnostics, however, do not adequately define sentence and phrasal conjunction since both occurs in phrasal conjunction constructions, as in 14 and 15, and together cannot occur in some phrasal conjunction constructions, as in 16 - 19.

14. Bill and John both got in on one ticket.
15. Bill bought both chairs for the price of one.
17. A, B, and C interrelate (*together).
18. John, Bill, and Tom are a motley crew (*together).

The with-phrases will be discussed in the section Symmetric Predicates, Non-Symmetric Predicates, and with-Phrases. In the present section only two facts about with-phrases will be mentioned.
First, with-phrases are not an adequate diagnostic for phrases conjunction because some phrasally conjoined structures have no with-phrases:

20.a. John, Bill, and Tom are a motley crew.
   b. * John and Bill are a motley crew with Tom.

   b. * John and Bill spread out with Tom.

22.a. Bill juggled a ball, a book, and a candle.
   b. * Bill juggled a ball and a book with a candle.

Second, the conjunct movement formulation is only a theory of binary conjunction. With-phrases can be related transformationally with trinary and higher order phrasally conjoined constructions only if one is willing to build the geometry of Euclid into the syntactic component.

Notice that sentences 23 and 24 are complete paraphrases, 23 is true if and only if 24 is true.

23. A, B, and C are parallel.
24. A and B are parallel to C.

Sentences 25 and 26 are not completely synonymous, 26 can be true if 25 is false - i.e. if A and B are parallel. Sentences 25 and 26 have different truth values.
26. A and B are perpendicular to C.

If with-phrases are to be transformationally derived from phrasally conjoined structures, then the transformation must derive 24 from 23 but block deriving 26 from 25. The transformation must incorporate the theorem:

27. Lines parallel to the same line are parallel to each other.

Similar examples can be constructed with respect to kinship terms. Sentences 28 and 29 are synonymous, but 30 and 31 are not. To relate the former and not the latter would require incorporating the kinship terms into the transformation:

28. John, Bill, and Tom are brothers.
29. John and Bill are brothers of Tom's.
30. John, Bill, and Tom are friends.
31. John and Bill are friends of Tom's.

It is obvious that the distinction between sentence and phrasal conjunction rests only on the fact that a conjunction of the sentence conjunction type implies a conjoined sentence paraphrase. The term phrasal conjunction is a catch-all category which includes all conjoined structures which do not have a conjoined sentence paraphrase.
II.2 Symmetric Predicates, Non-Symmetric Predicates, and with-Phrases.

The transformational conjunct movement formulation defines a "symmetric predicate" as a predicate which occurs in sentences 1, 2, and 3, such that all three sentences are cognitively synonymous.

1. X and Y ------.
2. X ------ (PREP) Y.
3. Y ------ (PREP) X.

In the conjunct movement formulation, the following are "symmetric predicates":

4.a. be identical (to), be equal (to), be similar (to).
    b. mix (with), meet (with), confer (with), discuss (with)
    c. match, marry, equal,
    d. differ (from), diverge (from)
    e. write plays (with), leave (with), kill (with)

The following "non-symmetric predicates" are not discussed within the conjunct movement formulation.

5.a. collide (with), be in love (with), share (with)
    b. bump (into), crash (into)
    c. touch (on), border (on)
    d. bump (against), touch (against),

There is no syntactic reason to separate the "symmetric" and "non-symmetric" predicates and assign them different deep structures.
There exists a semantic difference between the two classes, but the semantic difference is vague and has no syntactic correlates. Within the PSR Hypothesis, these transitive predicates are subcategorized for a prepositional phrase which occurs in the deep structure verb phrase, i.e. these predicates are subcategorized for +[NP ____ (prep) NP].

The PSR Hypothesis treats "symmetric" and "non symmetric" predicates as members of the general class of predicates that have a transitive prepositional phrase in the deep structure verb phrase. A very large number of predicates falls in this class. The implications these predicates have for the structure of the lexicon will be discussed and, as the analysis proceeds, it will be seen that "symmetric predicates" are just a special case of this general class of prepositionally transitive predicates. The syntactic mechanisms which the PSR Hypothesis motivates to accomodate the general class of predicates also provides the deep structure for the "symmetric predicates" with no complications.

The notion "symmetric predicate", which is central to the transformational conjunct movement formulation, is not a meaningful syntactic notion within the PSR Hypothesis and the term will not be used in any special sense within the PSR formulation. As the following discussion will show, it is not clear that the term "symmetric predicate" can be given a meaningful, well-motivated operational definition in any theory due to the character of the data.

II.2.1 Symmetric vs Non-symmetric Predicate

One difficulty inherent in any solution which divides the
"symmetric predicates" from the "non-symmetric predicates" is that the line cannot clearly be drawn. The data is not clearly bifurcated into two well-defined classes. There are some predicates which are "clearly symmetric" and some which are "clearly non-symmetric", but there are many in the middle for which it is difficult to decide if they are "non-symmetric", "symmetric" with some exceptional properties, or a new class of predicates. Consider the following examples which range from "clearly non-symmetric" to "clearly symmetric".

<table>
<thead>
<tr>
<th>Clearly non-sym</th>
<th>X is inferior to Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quite non-sym</td>
<td>John and Mary are in love.</td>
</tr>
<tr>
<td></td>
<td>John is in love with Mary.</td>
</tr>
<tr>
<td></td>
<td>Mary is in love with John.</td>
</tr>
<tr>
<td>Medium non-sym</td>
<td>John and Mary collided.</td>
</tr>
<tr>
<td></td>
<td>John collided with Mary.</td>
</tr>
<tr>
<td></td>
<td>Mary collided with John.</td>
</tr>
<tr>
<td>Neutral</td>
<td>* John and Mary reside.</td>
</tr>
<tr>
<td></td>
<td>John resides with Mary.</td>
</tr>
<tr>
<td></td>
<td>Mary resides with John.</td>
</tr>
<tr>
<td>Medium sym</td>
<td>John and Bill are friends.</td>
</tr>
<tr>
<td></td>
<td>John is a friend of Bill.</td>
</tr>
<tr>
<td></td>
<td>Bill is a friend of John.</td>
</tr>
<tr>
<td>Quite sym</td>
<td>* X and Y are near. X and Y are apart.</td>
</tr>
<tr>
<td></td>
<td>X is near Y. * X is apart (prep) Y.</td>
</tr>
<tr>
<td></td>
<td>Y is near X. * Y is apart (prep) X.</td>
</tr>
</tbody>
</table>
Clearly sym  

X and Y met.  

X met with Y.  

Y met with X.  

This list is not meant to be definitive with respect to any specific sense of grammatical distance of one construction from another. The list simply points out that we are at present considering many constructions, some of which share properties with others. The predicates are not bifurcated into two clearly definable classes, instead, they are cross-classified for a number of syntactic properties. A situation such as this—i.e. in which there are no clear-cut demarcations between internally well-defined classes, but instead there exists a gradual sharing of properties among the predicates—can be handled most easily and efficiently by a system of cross-classification using syntactic features. This analysis will be developed and integrated into the PSR framework in section VII when the structure of the lexicon is discussed.

II.2.2 Syntactic Arguments Against Conjunct Movement

The transformational formulation would derive the (b) sentences from the (a) sentences by the optional conjunct movement transformation.

1.a. John and Bill are similar.

b. John is similar to Bill.

2.a. John and Bill are identical.

b. John is identical to Bill.
3.a. John and Bill discussed it.

b. John discussed it with Bill.

There are several facts which argue against this type of derivation and support the claim that the prepositional phrases in the (b) sentences are in the base, i.e. both (a) and (b) are deep structure sentences.

FACT I: The predicate try requires strict deep structure identity of the embedded subject and the matrix subject. The embedded subject must undergo EQ-NP deletion.

4. * John tried for Bill to leave.

5.a. John \textsubscript{k} tried for John \textsubscript{k} to leave.

b. John tried to leave.

Sentence 6 is grammatical and by the deep structure identity condition, the deep structure of 6 must be 7.

6. John tried to meet with Bill

7. John tried for John to meet with Bill.

An analysis which postulates 8 as the deep structure and generates sentences 7 and 6 by a conjunct movement rule would violate the strict deep structure identity constraint.

8. * John tried for John and Bill to meet.
This fact indicates that the prepositional phrase which follows the predicate *meet* is not derived from a conjoined structure but is a deep structure complement of the verb.

FACT II: The conjunct movement transformation would derive sentences 10 and 11 from 9.

9. John and Bill are brothers.
10. John is a brother of Bill's.
11. Bill is a brother of John's.

Sentence 13, however, cannot be derived from 12.

12. * John and Mary are brothers.
13. John is a brother of Mary's
14. * Mary is a brother of John's.

These sentences argue against the conjunct movement formulation and indicate that the "symmetric predicate" *be brothers* is subcategorized for a transitive occurrence, i.e. is subcategorized +[NP ____ of NP].

FACT III: Consider the predicates *live*, reside, and be.

15.a. * John and Mary are.
    b. John is with Mary.
    c. Mary is with John.

16.a. * John and Mary reside.
    b. John resides with Mary.
    c. Mary resides with John.
17. a. * John and Mary live.
    b. John lives with Mary.
    c. Mary lives with John.

In the conjunct movement analysis, the predicates be, live, and reside are like the predicate far, that is, conjunct movement is obligatory.

18. a. * John and Mary are far.
    b. John is far from Mary.
    c. Mary is far from John.

This analysis misses the fact that live, be and reside require a deep structure complement, in particular, live and reside require a deep structure locative complement.

19. * John \( \begin{cases} \text{is} \\ \text{resides} \\ \text{lives} \end{cases} \)

20. John \( \begin{cases} \text{is} \\ \text{resides} \\ \text{lives} \end{cases} \) \( \begin{cases} \text{here} \\ \text{with Mary} \\ \text{near Bill} \\ \text{on a hill} \\ \text{there} \\ \text{across the street} \\ \text{etc.} \end{cases} \) LOCATIVE

If it is a deep structure condition (or the semantic interpretation rules) which requires these predicates to have a complement, then the with-phrases must be in the deep structure verb phrase and cannot be formed by a conjunct movement rule from conjoined subjects. If it is a surface structure condition, then these are the first examples and, unless it can be shown to be a general phenomenon, it must be stated as an ad hoc fact. 80
FACT IV: The grammatical sentences (b) and (c) must be derived from the ungrammatical deep structure sentences (a) in the following examples. If nobody or anybody is one of the conjuncts, it must be stated as an ad hoc fact that conjunct movement is obligatory.

21.a. * John and nobody will discuss politics.
   b. John will discuss politics with nobody.
   c. Nobody will discuss politics with John.

22.a. * John and nobody disagree.
   b. John disagrees with nobody.
   c. Nobody disagrees with John.

23.a. * Do John and anybody disagree?
   b. Does John disagree with anybody?
   c. Does anybody disagree with John?

FACT V: The conjunct movement transformation changes meaning. The (b) and (c) sentences above are not synonymous.

FACT VI: There is a class of exceptions to conjunct movement which leads to redundancy in the lexicon and indicates that the distinction between "symmetric" and "non-symmetric" does not represent a linguistically significant generalization.

The "non-symmetric" predicate collide is like the "symmetric" predicate confer. They both require an NP subject and they both have a with phrase.
   b. * John conferred.

25.a. John and Bill collided.
   b. John collided with Bill.

26.a. John and Bill conferred.
   b. John conferred with Bill.

Since sentences 25a and b are not synonymous, they must be derived from different deep structures: one with a transitive predicate and one with an intransitive predicate.

The lexical entry for *collide* must contain the following markings:

```
collide
A. a. + NP*-----
   b. semantic entry
   c. RULE FEATURE: exception to conjunct movement, must not undergo.
B. a. + NP----- with NP
   b. semantic entry
```

It is important to notice that the transformational hypothesis requires subcategorization A to bear the rule feature (c). The lexical item *collide*, intransitive, must be marked to indicate that it cannot undergo conjunct movement.

A large number of predicates must be treated exactly like *collide*, a partial list is: *bump, collide, crash, be in love*, etc.
27. a. John and Mary are in love.
   b. John is in love with Mary.

28. a. John and Mary bumped.
   b. John bumped with Mary.

It is also the case that none of these verbs has an ambiguous with-phrase, i.e. a with-phrase with two deep structure sources: One source being the transitive with-phrase introduced in the base, the second being the conjunct movement transformation. It is purely an idiosyncratic fact in the Conjunct Movement formulation that all of the verbs that have a deep structure with-phrase, (i.e. are subcategorized for a transitive with-phrase) are exceptions to the conjunct movement transformation.

We will return to this fact later and show how it is positive evidence for the PSR Hypothesis and branching lexical entries.

FACT VII: The conjunct movement formulation is not a grammar of conjunction but only a grammar of binary conjunction. The PSR Hypothesis will discuss a theory of conjoined structures which applies to conjunction of any order.

As has been shown, conjunct movement is restricted to binary conjuncts, and it cannot be extended to higher order conjuncts without building theories of geometry, kinship, and the real world into the grammar. In proving that the conjunct movement transformation is restricted to binary conjuncts, examples of the following type were relevant.
29.a. X, Y, and Z are identical.
   b. X and Y are identical to Z.

30.a. X, Y, and Z are similar.
   b. X and Y are similar to Z.

The (b) sentences cannot be derived from the (a) sentences by the conjunct movement rule; they are derived instead as follows from deep structure conjoined sentences:

DEEP STRUCTURE

31. X and Z are similar and Y and Z are similar.
32. X and Z are identical and Y and Z are identical.

CONJUNCT MOVEMENT APPLIES

33. X is similar to Z and Y is similar to Z.
34. X is identical to Z and Y is identical to Z.

CONJUNCTION REDUCTION APPLIES

35. X and Y are similar to Z.
36. X and Y are identical to Z.

This derivational schema works for the (b) sentences in the above cases, but there is a class of sentences for which it will not produce the correct results. This class of sentences, which will be discussed next, cannot be generated and hence the conjunct movement formulation is observationally inadequate.
FACT VIII: The Conjunct Movement Formulation is Observationally Inadequate.

Consider the following sentences:

1. Did John and Bill split up the cake equally with the blind man, or did they cheat him and give him only a little tiny piece?
2. John and Bill had to share the cake equally with the blind man because the blind man had a friend who could see the size of the pieces.
3. John and Bill shared the cake equally with the blind man.
4. John and Bill split up the cake equally with the blind man.

These sentences are ambiguous, for example, sentence 3 has the readings 5 and 6.

5. John and Bill have one half of the cake and the blind man has one half.
6. John, Bill, and the blind man all have one third of the cake.

In the conjunct movement theory the deep structure of sentence 3 with the reading 5 is 7.

7. 

```
S  
    _______  
   /        
 NP*       VP  
   /        /  
 NP*      NP  
   /        /  
 NP      NP  
  /        /  
 John    Bill  
 
share the cake equally
the blind man
```
The reading 6 cannot be assigned a deep structure within the conjunct movement theory. Consider the possibilities.

A.) Derive reading 6 from 8 by the conjunct movement rule.

8.

\[
S \rightarrow \text{NP*} \rightarrow \text{NP} \rightarrow \text{NP} \rightarrow \text{NP} \rightarrow \text{shared the cake equally}
\]

\[
\text{NP} \rightarrow \text{John}, \text{NP} \rightarrow \text{Bill}, \text{NP} \rightarrow \text{the blind man}
\]

This is impossible since the conjunct movement transform can apply only to binary conjuncts, conjunct movement cannot apply to trinary conjuncts.

B.) Derive 3 from 9 by the conjunct movement rule.

\[
S \rightarrow \text{NP*} \rightarrow \text{NP} \rightarrow \text{NP} \rightarrow \text{NP} \rightarrow \text{share the cake equally}
\]

\[
\text{NP*} \rightarrow \text{John}, \text{NP} \rightarrow \text{Bill}, \text{NP} \rightarrow \text{the blind man}
\]

This is impossible since this is the deep structure of reading 5. If this deep structure could be interpreted to mean that John, Bill, and the blind man each received one third of the cake, then sentence 10 could be interpreted to mean that Mary received two thirds of the cake. This is

10. Mary and Sue split up the cake equally.
clearly incorrect the therefore 9 is not a possible deep structure for sentence 3 reading 6.

C.) Derive sentence 3 reading 6 from 11 by the same procedure that derived X and Y are identical to Z from X is identical to Z and Y is identical to Z.

11.

```
S
  | NP*
  |  VP
  |    | NP
  |    |    share the cake equally
  |    |      NP
  |    |      NP
  |    |    John blind man share the cake equally
  |    |      NP
  |    |      NP
  |    |    Bill blind man
```

This is impossible since this deep structure would require phrasally conjoined noun phrases to be derived from conjoined sentences and this would contradict the tenet that only sentence conjoined noun phrases can be derived from conjoined sentences. Also sentence 11 says nothing about the fact that Bill shares the cake with John.

Sentences 12 and 13 are further examples which cannot be generated within the conjunct movement theory. Consider the reading in which A, B, and C mix only when all three are present, but no two of them mix.

12. A and B mix with C.
13. Water and Alcohol mix with gasoline, but gasoline and water do not mix.

FACT IX: Within the transformational formulation, the conjunct movement transformation is ordered to occur after the passive transformation; it is crucial to the transformational hypothesis that the order be:
Passive transformation
Conjunct Movement transformation

The following indicates that conjunct movement must occur before the Passive transformation.

First, notice that the conjunct movement transformation can correctly generate the (b) sentences from the (a) sentences; conjunct movement is obligatory for these predicates.

1.a. ? Bill's understanding and Bill's wisdom match.
   b. Bill's understanding matches his wisdom.

2.a. * Sam's stupidity and Sam's arrogance equal.
   b. Sam's stupidity equals his arrogance.

Second, notice that the following (c) sentences cannot be generated unless the passive transformation applies to the (b) sentences above.

1.c. Bill's wisdom is matched by his understanding.
2.c. Sam's arrogance is equalled by his stupidity.

These sentences indicate that the order of transformations is:

Conjunct Movement transformation
Passive transformation

This discussion reveals an inconsistency in the transformational hypothesis.

This distribution of data indicates that both the (a) and (b) sentences are generated in the deep structure. This would require
equal and match to be subcategorized both transitively and intran-
sitively, i.e. for 3 and 4.

3. \[ \text{NP} \quad \ldots \ldots \quad \text{[ -semantic singular] \[ +integerwise divisible]} \]

4. \[ \text{NP} \ldots \ldots \text{NP} \]

Section VII discusses this possibility in detail.
III. THE PSR GRAMMAR OF COORDINATE CONJUNCTION

III.1 The PSR Schema

The objective of this paper is to show that in an optimal grammar, conjoined structures are generated in the base by a phrase structure rule schema of the following form:

1. \[ X = \begin{cases} + \text{exhaustive} \\ \pm \text{totality} \\ \pm \text{individual} \\ \pm \text{disjunction} \\ \pm \text{negative} \end{cases} \]

2. \[ X = (\text{QUANTIFIER})^{x^n}(\text{DISTRIBUTIVE ADVERB}) \]
   \[
   \begin{cases}
   + \text{exh} \\
   \pm \text{tot} \\
   \pm \text{ind} \\
   \pm \text{dis} \\
   \pm \text{neg}
   \end{cases}
   \]
   \[
   n = 1, 2, 3, \ldots
   \]

where: \( X = \) the major categories: X, NP, VP

\text{QUANTIFIER} = \text{each, all, both, either, neither, no}

\text{DISTRIBUTIVE ADVERB} = \text{singly, alone, together, simultaneously, en masse, in concert, at once, along with NP, together with NP, etc.}

The features will be defined and clarified in the next sections.

The phrase structure rule schema produces trees like 3.
The following sentences are generated in the base by the rule schema expansions.

CONJOINED SENTENCES

The following are examples of the phrase structure rule schema expansion:

\[ S = (\text{QUANTIFIER}) S^R (\text{DIST ADV}) \]

4.a. **Either** somebody hates me or I'm just unlucky.

b. I wanted **both** for Bill to sing and **for** Tom to dance.

c. Bill sang, Tom danced, and Mary hummed **all** at once.

d. Socrates was an important philosopher, **both** when he was wise and when he was unwise.

e. **Neither** when he was the active member **nor** when he was the passive member was Durcet ever satisfied.
CONJOINED NOUN PHRASES

The following are examples of the expansion:

$$NP = (\text{QUANTIFIER}) \ NP^n (\text{DIST ADV})$$

5.a. The president hit both Duclos and Adonis.
b. Neither Curval nor Durcet visited the chapel.
c. No tobacco, alcohol, or women can be brought on board.

CONJOINED VERB PHRASES

The following are examples of the expansion:

$$NP = (\text{QUANTIFIER}) \ NP^n (\text{DIST ADV})$$

6.a. Duclos neither heard the whip nor felt the pain.
b. Adonis both knew the methods and understood the principles.
c. Curval neither listened to good music nor appreciated the arts.
III.2 The Distributional Quantifiers, the Feature [± exhaustive].

The feature [± exhaustive] differentiates the distributive quantifiers from quantifiers of amount or degree. The distributive quantifiers in list I differ from the quantifiers of amount in list II in at least four ways as described below.

List I

[± exhaustive] quantifiers of distribution

each
all
both
either
neither
no

List II

[- exhaustive] quantifiers of amount or degree.

some
few
many
most
lots
one, two, three, ...

enough
several
etc.

I. The distributional quantifiers, list I, can cooccur with plural noun phrases and also with conjoined major categories, i.e. conjoined NP's VP's and S's. The quantifiers in list II can only cooccur with plural noun phrases.

CONJOINED NOUN PHRASES

1. Bill, John, and Tom all have colds.
2. Bill, John and Tom each have colds.
3. Neither John nor Bill must go.
4. Both John and Bill love Mary.
5. * Some of John and Bill love Mary.
CONJOINED VERB PHRASES

7. John both ate the candy and drank the beer.
8. * John some ate the candy and drank the beer.
9. * John most are the candy and drank the beer.

CONJOINED SENTENCES

10. Either Mary needs a bath or something died in this room.
11. * Many Mary needs a bath or something died in this room.
12. * Some Mary needs a both or something died in this room.

II. The distributive quantifiers, list 1, determine verb, adjective, and adverb selection restrictions. The quantifiers in list II do not. This will be discussed in detail later and only a few examples will be presented here.

VERB SELECTION

13. * The men each met at 4:00.
14. The men all met at 4:00.
15. * A, B, and C each met at 4:00.
16. A, B, and C all met at 4:00.

ADJECTIVE SELECTION

17. * The girls each look alike.
18. The girls all look alike.
20. A, B, and C all look alike.
ADVERB SELECTION

21. * The guns each went off simultaneously.

22. The guns all went off simultaneously.

23. * A, B, and C each went off simultaneously.

24. A, B, and C all went off simultaneously.

III. The [+ exhaustive] quantifiers in list I have no "remainder", they refer exhaustively to all of the elements of the set. The following sentences are all out. (underlying indicates coreferentiality.)

25. * Each of the men died, but the rest of the men lived.
   \{ Each, All, Both, None, Neither \}
   the rest of the men lived.
   the remainder of the men lived.
   the other(s) of the men lived.
   the balance of the men lived.
   etc.

A [+ exhaustive] quantifier cannot be on the subject of one conjoined sentence if the subject of the other conjoined sentence is a complement expression, i.e. the rest, the other(s), the balance, the remainder, etc., and the subjects are coreferential.

Logically, the [+exhaustive] quantifiers involve the entire thing (sum, unit, set) to which they refer; i.e. they leave no "remainder".

The problem above is that the underlined expressions on the left cannot be possible antecedents of the underlined expressions on the right. The complement expressions on the right all require a [-exhaustive] quantifier like some, etc. to be on the antecedent. Some, etc. do not exhaustively refer to all of the elements of the set. Since these quantifiers do not exhaustively refer to all of the elements of a set, the following are grammatical.
of the men died, but the rest of the men lived. the remainder of the men lived. the others of the men lived. the balance of the men lived. etc.

IV. [+ exhaustive] quantifiers can be in apposition with the constituent modified; [- exhaustive] quantifiers cannot, they need the preposition of.

27. The men each wanted to go downtown.
28. The men all wanted to go downtown.
29. Either John or Bill died.
30. No cars, busses, or tracks can park here.
31. * Some John and Bill were here.
32. * The men few were here.
III.3 The quantifiers each and all, The features [ ± totality] and [ ± individual]

An explicit and meaningful classification of conjunction interpretations can be found in terms of the properties of the distributional quantifiers each, all, and both. In the deep structure each, all, and both are represented in terms of the features [ ± totality] and [ ± individual]. In the next sections these features will be motivated and defined in terms of:

1. verb, adjective, noun and adverb selection restrictions.
2. pronoun cooccurrence restrictions
3. grammatical structures, such as reciprocal constructions, in which the features are relevant.
4. transformations which refer to the features
5. the surface structure quantifiers that the feature complexes represent.

For the present these features will be defined as follows: 11

+ individual 1. the adverbs alone, singly, individually, and independently can cooccur with a quantifier having this feature.

2. this feature emphasizes the independent, individual action of each of the constituents of the conjunction and implies that a conjoined sentence paraphrase exists.
-individual 1. the adverbs *alone, singly, individually*, and *independently* cannot cooccur with a quantifier having this feature.
2. no conjoined sentence paraphrase exists. The elements of the conjunction are like the elements in a series bound together by plus signs. Often *and* and *plus* are interchangeable conjunctions with [ - individual] quantifiers, for example: Two and/plus two is four.

+ totality 1. the adverbs *together, simultaneously, en masse, at once, and in chorus* can cooccur with a quantifier having this feature. The surface structure quantifier is always *all*.
2. the feature emphasizes that the conjunctions is to be considered as a unity, the conjuncts act "mutually".

- totality 1. the adverbs *simultaneously, en masse*, etc. cannot cooccur with a quantifier having this feature.
2. the conjunction is not to be considered as a unity, the conjuncts do not act "mutually".

These definitions are merely suggestive, the real content of the features comes from the role they play in the grammar.  

These two features provide the basis for a four way classification of conjoined structures.
III.3.1 Predicates which require [+ individual] subjects

There is a class of predicates in English which can occur with either a singular or conjoined (or plural) subject, but the conjoined (plural) subject must always be considered [+ individual]. That is, the action of the subject is distributed over each element of the conjunction (plural). Each element of the conjunction (plural) is considered as performing the action of the verb independently. It is semantically anomalous to consider these subjects in a [- individual] sense. Consider the examples:

33. John, Bill, and Tom are alive.
33. John, Bill and Tom thought clean thoughts.
34. John, Bill, and Tom perjured themselves
    fell asleep
died
sneezed
coughed
cried
etc.

These predicates can be entered in the lexicon with the subcategorization 35.

35. + NP ------
    [ + ind]

Further examples of predicates which require this subcategorization are listed in 36.

36. Predicates Which Require [+ Individual] subjects:
36.1 ADJECTIVE PHRASES
be tall, short, asleep, fat, clever, tired, pregnant, timid, intelligent, etc.

36.2 NOUN PHRASES
be a hero, a giant, a mother, a father, a wizard, a genius, a virgin,

36.3 VERBS
think, believe, know, dream, imagine, doubt, wonder, suspect, feel sick, etc.

There are also some predicates which require a \([ + \text{individual}]\) object and must be subcategorized with the feature 37.

37. \(+ \text{NP} \quad \ldots \quad \text{NP}[ + \text{ind}]\)

Some predicates which are subcategorized for 37 are listed here:

38. kill, murder, give birth to, deceive, convince, assassinate, fool, deflower, make pregnant,

The set of predicates marked for 35 and 37 play a significant role in the grammar of conjoined structures. These predicates will be discussed in detail later, specifically in section 3.2, when the quantifier all is discussed and in section 8, when together with phrases are discussed.
III.3.2 The Four Classifications of Coordinate Conjoined Structures

I. The feature complex [ - totality ] becomes the surface structure [ + individual] quantifier each. each is [ +individual] since it occurs with alone and is [ - totality] since it does not occur with simultaneously.

39. John, Bill, and Tom each ate alone.
40. * John, Bill, and Tom each ate together, simultaneously, etc.

each on a conjoined node implies that a conjoined sentence paraphrase exists; it occurs with words indicating independent, individual action: singly, alone, independently, individually, etc. If a plural subject has an each modifying it, the verb must be able to occur with a singular subject.

3. The cup, the saucer and the teapot each broke when the table fell.
4. John, Bill, and Tom each sneezed.
5. They each broke when the table fell.
6. The men each sneezed.

II. The feature complex [ + totality ] becomes the surface structure quantifier all - or, if only two conjuncts are present - the quantifier both. All of the conjuncts are considered as a whole, but they may or may not act independently. All and both occur with alone and simultaneously.
45. John, Bill, and Tom all left alone.
46. John, Bill, and Tom all left simultaneously.
47. John, and Bill both left simultaneously (at once, etc).14
48. John and Bill both left alone.

All with the deep structure features [ + individual] is
[ + totality ]
superficially similar to each as in sentences 49, 50, 51, and 52 but
sentences 53 and 54 show that there is a fundamental difference.

49. John, Bill, and Tom all weigh less than 200 pounds.
50. The cup, the saucer, and the teapot all cost 50¢ apiece.
51. They all weigh less than 200 pounds.
52. They all cost 50¢ apiece.
53. I called the police after all of the men left.
54. I called the police after each of the men left.

In sentence 53 the police are called only once; in sentence 54 the
police receive several calls. Notice that 53 says nothing about how
the men left, i.e. it isn't specified if they left together or singly,
the sentence specifies only that the "totality" of the men has completed
the action.

All, in the [ + individual] sense, is similar to each in that
if the subject is marked [ + individual], the verb must be able to
occur with a singular subject. All is different from each in that all
can cooccur with adverbs which indicate properties of the entire set
of elements of the plural, or conjunction, considered as a whole:
i.e. adverbs which indicate simultaneity, etc.: concurrently, simultaneously, at one time, en masse, in different directions, etc.

55. * John, Bill, and Tom each sneezed simultaneously.
56. John, Bill, and Tom all sneezed simultaneously.

57. * The men each sneezed simultaneously.
58. The men all sneezed simultaneously.

59. * The girls each left the room en masse.
60. The girls all left the room en masse.

If the adverb together occurs, it is synonymous with simultaneously.

61. * The guns each went off together.
62. The guns all went off together.
63. The guns all went off simultaneously.

The analysis presented in this paper introduces the adverbs together, alone, etc. by means of the phrase structure rule schema. These distributive adverbs are selected with respect to the deep structure quantifier on the conjoined or plural node; together may occur with [+ totality], alone may occur with [+ individual]. No distributive adverbs are introduced from higher sentences.

III. The feature complex [+ totality] becomes the surface structure [+ individual] quantifier all. In the case of two conjuncts, both may not appear. Both is the dual of all only in the II case.
John, Bill, and Tom all met in NY.

* John and Bill both met in NY.

* John, Bill, and Tom met independently in NY.

* John, Bill, and Tom met simultaneously in NY.

This deep structure quantifier is associated with the mutual action or interaction of the elements of the conjunction. In this interpretation the conjuncts are not considered independently; the conjunction and often means plus.

Two and four is six.

Two and four are six. [ - individual ]

Two and four both are six. [ + totality ]

Two plus four is six.

Two and four is even numbers.

Two and four are even numbers. [ + individual ]

Two and four are both even numbers. [ + totality ]

Two plus four are even numbers.

Some predicates are subcategorized to require [ + totality ]

[ - individual ]

subjects, the intransitive predicates meet, collide, bump, and be alike are of this type.

The car collided.

The car and the truck collided.

The car and the truck collided simultaneously.
79. * The car and the truck both collided.
80. The car, the bus, and the truck all collided.

*Both and simultaneously are [ + totality ] and therefore sentences 78
[ + individual] and 79 violate quantifier and adverb insertion conditions respectively. 15

The transitive verb kill has a subcategorization which requires a
[ + totality ] subject.
[ - individual]

81. John and Bill killed Mary Poppins.
82. * John and Bill each killed Mary Poppins.
83. * John and Bill both killed Mary Poppins.
84. * John and Bill killed Mary Poppins simultaneously.
85. * John, Bill, and Tom all killed Mary Poppins at one time or
other.
86. John, Bill, and Tom all killed Mary Poppins.

Sentences 82 - 85 are excluded for the same reason as 87 and 88, that is, a person can die only once. It is semantically anomalous for a person to die two or more times. (Underlining indicates coreferentiality.)

87. * John killed Mary and Bill killed Mary.
88. * John killed Mary and Bill killed Mary a short time later.

The above interpretation of kill requires the subcategorization feature 89.
89. \[ \text{NP} \quad ----- \quad \text{NP} \]
\[ [ +\text{tot}] \quad [ +\text{ind}] \]
\[ [ -\text{ind}] \]

A second subcategorization is required for the following interpretation of kill.

90. John killed someone.
91. John and Bill each killed someone.
92. John and Bill both killed someone.
93. John and Bill killed someone.
94. Simultaneously, John and Bill killed someone.
95. John, Bill, and Tom all killed someone at one time or other.
96. John, Bill, and Tom all killed someone.

The object must be non-specific, such as an indefinite noun phrase.\(^\text{16}\)

97.a. John and Bill each killed a policeman.
      b. * John and Bill each killed the policeman.
98.a. John and Bill each killed someone.
      b. * John and Bill each killed this man.

The verb kill must be subcategorized as 99.

99. \[ \text{NP} \quad --- \quad \text{NP} \]
\[ [ +\text{ind}] \quad [ +\text{ind}] \]
[the object must be interpreted as non-specific]

The verb kill (also: murder, assassinate, deflower, and depucilate)
has a lexical entry with two subcategorizations:
The verbs kill, deflower, etc provide examples of subject-object dependency. The mechanisms for this will be discussed in the section on lexical entries.

All in the [ + totality ] sense occurs with words like:
[ - individual]

all told, in toto, mutually, etc.

100. \[
\begin{align*}
\text{kill} & \quad \text{murder} \\
\text{assassinate} & \quad \text{deflower} \\
\text{depucilate} &
\end{align*}
\]

\[
\begin{align*}
1. & \quad \text{NP} \quad \text{NP} \\
& \quad [ +\text{tot}] \quad [ +\text{ind}] \\
& \quad \text{NP} \\
2. & \quad \text{NP} \quad \text{NP} \\
& \quad [ +\text{ind}] \quad [ +\text{ind}] \quad \text{non-specific}
\end{align*}
\]

101. 50¢, 57¢, 19¢, and 21¢ add up to $1.46 all told.

Consider the two interpretations of all, 102 and 104 are [ +tot], 103 [ +ind] and 105 are [ +tot].
[ -ind]

102. The cup, the saucer, and the teapot all cost 50¢ apiece.
103. The cup, the saucer, and the teapot all cost $1.50 all told.
104. The cup and the saucer both cost 50¢ apiece.
105. * The cup and the saucer both cost $1.00 all told.

Together may cooccur as in 106, 107, 108, and 109, or it may not occur as in 110, 111, 112, and 113.

106. The chemicals all mix together in this big tank.
107. A, B, and C all mix together in this big tank.
They all wrote the book together.
John, Bill, and Tom all wrote the book together.
The facts all interrelate (*together).
A, B, and C all interrelate (*together).
They all interplay (*together).
A, B, and C all interplay (*together).

All with the [ -individual] interpretation does not cooccur with the word simultaneously, and together is more like an abbreviation for PREP each other. Sentence 114 is not a paraphrase of sentence 109.

* John, Bill, and Tom all wrote the book simultaneously.

It is worthwhile to observe the difference between the two senses of all and the ambiguities of the word together. Consider the following sentences with the verb to hit. In sentences 115 and 116 the plural subject has the [ + individual] interpretation and together means simultaneously.

The arrows all hit (the target) together.
The arrows all hit (the target) simultaneously.

In 117 and 118 the plural subject has the [ - individual] interpretation and together is analogous with the reciprocal pronoun each other.

The arrows all hit together (in the air).
The arrows all hit each other (in the air).
IV. The deep structure feature complex [ -totality ] is associated [ -individual]

with no surface structure quantifier. This deep structure feature complex is associated with the words: disperse, homogeneous, heterogeneous, scatter, etc. which do not cooccur with each and all, nor with the distributive adverbs.

119. John, Bill, and Tom are a motley crew.
120. * John, Bill, and Tom are all a motley crew.
121. * John, Bill, and Tom are each a motley crew.

122. John, Bill, and Tom are heterogeneous.
123. * John, Bill, and Tom are heterogeneous independently.
124. * John, Bill, and Tom are heterogeneous en masse.

These predicates can all have collective subjects and many of them can have mass nouns as subjects. A short list of these predicates is given as list 125, the (a) list can also have mass nouns as subjects, the (b) list cannot.

125. Predicates requiring a [ - totality ] subject:
      [ - individuality]

125. (a) disperse, heterogeneous, homogeneous, scatter, dissolve, double in size, swell in size, dwindle, diminish, dissipate, abound,

125. (b) be numerous, double in number, be a motley crew, be variegated, be of every description.
III.4 The Phrase Structure Rule Schema

The Phrase Structure Rule Schema presented as 1 and 2 can be more explicitly stated as 126. The quantifiers and adverbs are subcategorized as indicated. (The feature \[ \pm \text{disjunctive} \] will be discussed later. It accounts for the conjunctions and/or-nor and causes no complications for the discussion below. The feature \[ \pm \text{negative} \] accounts for the distinction or/nor.)

126.

\[
\begin{array}{c}
X \\
\underline{\text{(QUANTIFIER)}}
\end{array}
\begin{array}{c}
x^n \\
\underline{\text{(DISTRIBUTIVE ADVERB)}}
\end{array}
\]

\[
\begin{cases}
\text{each}/ [-\text{tot}] & \text{Class I/} [-\text{tot}] \\
\text{all } / [+\text{tot}] & \text{Class I/} [+\text{tot}] \\
\text{both } / [+\text{ind}] & \text{Class II/} [+\text{ind}] \\
\text{all } / [+\text{tot}] & \text{Class III/} [+\text{tot}] \\
\ast \text{both } / [-\text{ind}] & \emptyset / [-\text{tot}] \\
\emptyset / [-\text{tot}] & \emptyset / [-\text{ind}]
\end{cases}
\]

\[X = \text{the major categories: S, NP, and VP}\]

Class I: \[+ \text{individual}\]

independently, alone, apiece, individually, singly, per capita, along with NP, together with NP, etc.
Class II: [+ individual]  
[+ totality ]  
	simultaneously, in concert, en masse, at once, at the same time, at  
different times, together, etc.

Class III: [+ totality ]  
[- individual]  

all told, in toto, among PROselves, between PROselves, unanimously, etc.

The features [+ individual] and [+ totality] also determine Noun,  
Adjective, and Verb selection restrictions:

127. Predicates requiring a [+ individual] subject:  
verbs: die, sleep, think, wonder, dream, etc.  
adj's: be pregnant, be happy, be, silly, be fat, etc.  
nouns: be a virgin, be a hero, be a giant, etc.

128. Predicates requiring a [+ individual] object: kill, murder,  
deflower, depucilate, etc.

129. Predicates requiring a [+ totality ] subject.  
[- individual]  
intransitive: kiss, meet, mix, collide, bump, etc.

130. Predicates requiring a [+ totality ] object.  
[- individual]  
shuffle (cards), etc.

131. Predicates requiring a [+ totality ] object:  
[+ individual]  
distribute, pass out (leaflets), juggle (balls)
The PSR schema generates all conjoined structures in the base and accounts for the different interpretations by features assigned to the conjoined node. The deep structures of sentences 132a, 133a, 134a, and 135a are 132b, 133b, 134b, and 135b respectively. The transformations which are employed in the derivations are discussed in the next section.

132.a. John, Bill, and Tom each died alone.

132.b.

```
S -> NP [+exh] [-tot] [+ind] [-dis] [-neg] VP died
  \____/  \____/  \____/  \____/  \____/  \____/  \____/  \____/
     NP    NP    NP    NP    NP    DADV
   each  John  Bill  Tom  alone
```

133.a. John, Bill, and Tom all died simultaneously.

133.b.

```
S -> NP [+exh] [+tot] [+ind] [-dis] [-neg] VP died
  \____/  \____/  \____/  \____/  \____/  \____/  \____/  \____/
     NP    NP    NP    NP    NP    DADV
   all  John  Bill  Tom  simultaneously
```
133.a. John, Bill, and Tom all met in Altoona.

133.b.

134.a. John, Bill, and Tom are a motley crew.

134.b.
III.5 The Features \([\pm \text{ disjunction}]\) and \([\pm \text{ negative}]\)

The feature \([\pm \text{ disjunction}]\) divides the \([\pm \text{ exhaustive}]\) quantifiers into two groups: (1) those quantifiers which indicate "conjunctive" coordinate conjoined structures in which the coordinate conjunction is \(\text{and or plus}\), and (2) those quantifiers which indicate "disjunctive" coordinate conjoined structures in which the coordinate conjunction is \(\text{or or nor}\).

Before discussing the feature \([\pm \text{ disjunctive}]\), the quantifiers \textit{either, neither, and no} will be shown to be \([-\text{ totality }\]), that is, \([+\text{ individual}]\).

They behave \(\textit{each}\) with respect to adjective, verb, noun, and adverb selection restrictions. \textit{Either, neither, and no} are \([+\text{ individual}]\) since they occur with the verbs, adjectives, adverbs, and nouns which require a \([+\text{ individual}]\) conjunction, and they also imply that a coordinate disjoined sentence paraphrase exists.

\([+\text{ individual}]\) verbs

135. John and Bill each died.
136. Either John or Bill died.
137. Neither John nor Bill died.
138. No man, woman, or child died.

\([+\text{ individual}]\) adjectives

139. Mary and Sue are each pregnant.
140. Either Mary or Sue is pregnant.
141. Neither Mary nor Sue is pregnant.
142. No man, woman, or child is pregnant.

[+ individual] nouns
143. Mary and Sue are each virgins
144. Either Mary or Sue is a virgin.
145. Neither Mary nor Sue is a virgin.
146. No man, woman, or child is a virgin.

[+ individual] adverbs
147. John and Bill each live alone.
148. Either John or Bill lives alone.
149. Neither John nor Bill lives alone.
150. No man, woman, or child lives alone.

The quantifiers are not [+ totality ] since they do not cooccur
[+ individual]

with the [+ totality ] adverbs:
[+ individual]
151. * John and Bill each died simultaneously.
152. * Either John or Bill died simultaneously.
153. * Neither John nor Bill died simultaneously.
150. * No man, woman, or child died simultaneously.

The quantifiers are not [+ totality ] since they cannot be on the
[- individual]
subject of a predicate requiring a [+ totality ] subject, such as mix,
[- individual]
interrelate, collide, bump, etc when used intransitively.
161. * John and Bill each collided.
162. * Either John or Bill collided.
163. * Neither John nor Bill collided.
164. * No man, woman, or child collided.

The quantifiers are not [- totality ] since they cannot be on the
[- individual] subject of a predicate requiring a [- totality ] subject.
[- individual]

165. * John and Bill are each a motley crew.
166. * Either John or Bill is a motley crew.
167. * Neither John nor Bill is a motley crew.
168. * No man, woman, or child is a motley crew.

Therefore, the distributive quantifiers either, neither, no and
each form a natural class, the [- totality ] quantifiers. With respect
[+ individual] to verb, adjective, noun, and adverb selection restrictions, the
[+ exhaustive] quantifiers can be grouped as follows:

<table>
<thead>
<tr>
<th></th>
<th>+TOT</th>
<th>- TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ IND</td>
<td>all</td>
<td>each</td>
</tr>
<tr>
<td></td>
<td>both</td>
<td>either</td>
</tr>
<tr>
<td></td>
<td></td>
<td>neither</td>
</tr>
<tr>
<td>- IND</td>
<td>all</td>
<td></td>
</tr>
<tr>
<td></td>
<td>#both</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Feature [± disjunctive] and or, nor, and and.

The feature [± disjunctive] determines the distributional quantifier and the conjunction which may be inserted. The conjunction and is inserted for [- disjunctive] quantifiers and the conjunctions or/ nor are inserted for the [+ disjunctive] quantifiers. The distinction between or and nor is accounted for by the feature [± negative]. These features account for the distribution of sentences 169 - 174.

169. John and Bill each died.
170. * John or Bill each died.
171. Either John or Bill died.
172. * Either John and Bill died.
173. Neither John nor Bill died.
174. * Neither John or Bill died.

The quantifiers can be grouped as follows:

<table>
<thead>
<tr>
<th></th>
<th>+TOT</th>
<th>-TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ IND</td>
<td>all - and</td>
<td>- DIS</td>
</tr>
<tr>
<td></td>
<td>both - and</td>
<td>each - and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- NEG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>either - or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+ NEG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>neither - nor</td>
</tr>
<tr>
<td>- IND</td>
<td>all - and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*both - amd</td>
<td>Ø</td>
</tr>
</tbody>
</table>

The Feature [± disjunctive] and or, nor, and and.
The deep structure of 175a is 175b. The deep structure of 176a is 176b.

175.a. Either John or Bill is a crook.

175.b.

176.a. Neither John nor Bill is a crook.

b.

In the dialect described here, either and neither can cooccur with trinary and higher order conjuncts.

177.a. Either John or Bill is a crook.

b. Either John, Bill, or Tom is a crook.

c. Either John, Bill, Tom, or Harry is a crook.
178.a. Neither John nor Bill is a crook.
   b. Neither John, Bill, nor Harry is a crook.
   c. Neither John, Bill, Tom nor Harry is a crook.

Both can only cooccur with binary conjuncts, all is required for trinary and higher order conjuncts.

179.a. Both John and Bill are crooks.
   b. * Both John, Bill, and Tom are crooks.

180.a. * John and Bill are all crooks.
   b. John, Bill, and Tom are all crooks.
   c. John, Bill, and Tom, and Harry are all crooks.
The phrase structure rule schema is then statable as:

178. $X$

- **exhaustive**
- **totality**
- **individual**
- **disjunctive**
- **negative**

(QUANTIFIER) $X^n$ (DISTRIBUTIVE ADVERB)

- **each**
  - **ind**
  - **dis**
  - **neg**
  - **tot**
  - $S^n$
  - Class I/ [+ind]

- **either**
  - **ind**
  - **dis**
  - **neg**
  - **tot**
  - $NP^n$
  - $VP^n$
  - Class I and / [+tot]
  - Class II [+ind]
  - Class III/ [+tot]
  - [-ind]

- **neither**
  - **ind**
  - **dis**
  - **neg**
  - **tot**
  - $\emptyset$
  - / [-tot]
  - [-ind]

- **all**
  - **ind**
  - **dis**
  - **neg**
  - **tot**

- **both**
  - **ind**
  - **dis**
  - **neg**

- **all**
  - **ind**
  - **dis**
  - **neg**
  - *both* / [-tot]
  - [-ind]

- **none** / [-tot]
  - [-ind]
  - [-dis]
  - [-neg]
III.7 Mechanisms Required by the PSR Formulation

The following descriptive mechanisms are required by the PSR formulation of coordinate conjunction.

LEXICAL INSERTION MECHANISMS
1. Distributive quantifier, coordinate conjunction, and distributive adverb insertion.
2. Insertion of predicates with respect to the features on the subject and object nodes.

TRANSFORMATIONAL MECHANISMS
1. Quantifier Postposition Transformation
2. Quantifier Movement Transformation
3. Distributive Adverb Movement Transformation.

III.7.1 Lexical Insertion Mechanisms

The insertion of distributive quantifiers and distributive adverbs is discussed in section IV.5. The insertion of coordinate conjunctions is discussed later in the same section, in IV.5.(3).

The insertion of a predicate with respect to the distributive features...
on the subject is discussed in section IV.4.

The subject-object dependency of some predicates is discussed in section VII.1.

The filtering effect of the transformational lexical insertion rule is discussed in section VII.1.1.

Strict subcategorization restrictions, selection restrictions, and lexical entries are discussed in sections IV.4 and VII.

These mechanisms will be developed after the theory of the base component is discussed in section IV.

III.7.2 Transformational Mechanisms

1. The Quantifier Postposition Transformation

The quantifier postposition transformation moves each, all, both, and none, i.e. the [+exh] quantifiers as follows:

\[
\begin{array}{c}
\text{NP} \\
\text{VP}
\end{array}
\]

This transformation accounts for the following distribution of data:

179. Each of the men will hit a dog.
180. The men will each hit a dog.
181. * Each of the men will each hit a dog.
182. All of the men will hit a dog.
183. The men will all hit a dog.
184. * All of the men will all hit a dog.
185. Both of the men will hit a dog.
186. The men will both hit a dog.
187. * Both of the men will both hit a dog.
188. None of the men will hit a dog.
189. The men will not hit a dog.
190. * None of the men will not hit a dog.

The transformation is optional for plural noun phrases and obligatory for conjoined noun phrases. The transformation will be formulated in full generality after transformational schema are discussed.

The sentences 188, 189 and 190 correlate with the work of Chomsky which indicates that the scope of negation is determined in the surface structure. In this thesis, the feature [± negative] is introduced in the deep structure on the S, NP, and AUX nodes, but the scope of negation is determined from surface structure considerations such as position of the negative element, stress contours, intonation, etc. Therefore the negative elements no and none can be moved transformationally.
2. The Quantifier Movement Transformation.

This transformation follows the Quantifier Postposition Transformation and accounts for the following (c) sentences. The (b) sentences are formed from the (a) sentences by Quantifier Postposition. The Quantifier Movement Transformation optionally forms the (c) sentences from the (b) sentences.

1.a. Each of us gave five dollars.

   b. We each gave five dollars.

   c. We gave five dollars each.

   d. * Each of us gave five dollars each.

   e. * We each gave five dollars each.

   f. * Each of us each gave five dollars each.

2.a. Each of us prays in his own way.

   b. We each pray in our own way.

   c. We pray each in our own way.

   d. * Each of us prays each in his own way.

   e. * We each pray each in his own way.

   f. * Each of us each prays each in his own way.

3.a. Each of the men would die for the others.

   b. The men would each die for the others.

   c. ? The men would die each for the others.

   d. The men would die for each other.

   e. * Each of the men would die for each other.

   f. * The men would each die for each other.
g. * Each of the men would each die for the others.

h. * Each of the men would each die for each other.

By inserting only one each and moving it from left to right, the correct distribution of sentences is generated. If there were several sources of each, there would be difficulty in stating the cooccurrence restrictions between all of the each's.

3. The Distributive Adverb Movement Transformation

The DADV movement transformation moves the distributive adverb from the conjoined (or plural) node into sentence adverb position, i.e. attaches the DADV to the S node immediately dominating:

This transformation accounts for the following sentences:

X = NOUN PHRASE

207. John, Bill, and Tom simultaneously shouted.

208. Simultaneously, John, Bill, and Tom shouted.

209. John, Bill, and Tom shouted simultaneously.


211. * Simultaneously, John, Bill, and Tom shouted simultaneously.

X = VERB PHRASE

212. John strummed the guitar and blew a whistle simultaneously.
213. Simultaneously, John strummed the guitar and blew a whistle.

214. * Simultaneously, John strummed the guitar and blew a whistle simultaneously.

\[
X = \text{SENTENCE}
\]

215. The toilet overflowed and the baby cried simultaneously.

216. Simultaneously, the toilet overflowed and the baby cried.

217. * Simultaneously, the toilet overflowed and the baby cried simultaneously.

4. Plural/Singular Agreement Transformation

This must follow the quantifier movement transformation. It accounts for the singular in case 1 and the plural in case 2 by moving the syntactic feature [+sing] or [-sing] from the subject to the predicate:

1. Each of the men was sick.
   \[
   [+\text{sg}] \quad \text{+sg}
   \]

2. The men were each sick.
   \[
   -\text{sg} \quad -\text{sg}
   \]

5. Nominative/Objective Agreement Transformation

This must follow quantifier movement. If quantifier movement has applied then the pronoun must become nominative:

1. Each of us was there.
   \[
   -\text{obj}
   \]

2. We were each there.
   \[
   +\text{nom}
   \]

6. Person Agreement Transformation

1. Each of us wanted it for ourselves.
2. We each wanted it for ourselves.

First - Plural
3. Each of the men wanted it for himself.
4. Each of the girls wanted it for herself.

7. Gender Agreement Transformation

1. Each of the men wanted the hat for himself.  
   male
2. Each of the girls wanted the hat for herself.  
   female
3. Each of the dogs wanted it for itself.  
   neuter
III. 8 The Feature [+ individual] and together with phrases.

Together with and along with phrases can originate in the distributive adverb node, NP\(_{DADV}\), which is introduced by the PSR schema expansion 201.

201.\footnote{NT?} NP = (QUANT)\(\text{NP}^n\)(NP\(_{DADV}\))

202. NP\(_{DADV}\) = \text{PREP} NP

together with
along with
hand in hand with
arm in arm with
etc.
in addition to
in conjunction with
as well as
(just) like
besides
instead of
etc.

The class of together with phrases is characterized by the following sentences. The together and along are optionally deletable in some dialects.

203. Along with Tom, John and Bill hit Sally.
204. John, along with his wife, believed in animism.
205. Together with many others, John and Bill died in the fire.
206. Along with Sam, Bill and Tom perjured themselves to avoid convicting poor Mary.
207. Along with vodka, gin, and bourbon, scotch and rum mix well with water.
208. Italy and France, together with Spain, Belgium, and Denmark, have signed a mutual defense pact with China.

209. Along with John, Bill, and Tom, Sam shook hands with the king.

210. Italy and France, along with Belgium and Denmark, border on Germany.

211. Together with Bill, Sam, and Larry, Jack and Peter each met with Mary once a week for a yoga lesson.

212. Along with John, both Bill and Tom feared the police.

The deep structure of sentence 203 is 213:

213. 

The prepositional phrase along with Tom is dominated by the node, NP DADV, which is the same node which dominates the distributive adverbs alone, simultaneously, etc. Therefore the same adverb movement rule, the DADV movement transformation, which yields 215a, b, and c from 214, yields 216a, b, and c from 213.
214.

215. a. John and Bill simultaneously hit Sally.
   b. Simultaneously John and Bill hit Sally.
   c. John and Bill hit Sally simultaneously.

216. a. John and Bill, along with Tom, hit Sally.
   b. Along with Tom, John and Bill hit Sally.
   c. John and Bill hit Sally along with Tom.

No additional machinery is needed to account for the surface structure distribution of together with phrases. They occur in the same surface positions as do the distributional adverbs simultaneously, alone, en masse, etc. No movement transformations need to be postulated in addition to the DADV movement transform which is motivated by considerations divorced from together with phrases.

Sentences 217, 218, 219, and 220 are examples of together with phrases in object position.

217. Jack deflowered Mary, along with Susan, Harriet, and Jane.
218. The indians killed John together with his family.
219. I sold the land along with the house.
220. Simon Legree sold a male slave together with his wife for slightly less than twice the price of the male slave alone.

221. The police arrested Bonnie and Clyde along with C.W. Moss.

The deep structure of 218 is 222.

222.

```
S
  NP
    the indians
  VP
    V
      killed
    NP
      [+exh]
      [+tot]
      [+ind]
      [+dis]
      [-neg]
    NP
      John
    PREP NP
      together with
      along with
      his family
```

If the passive transformation applies to the deep structure 222, then the following sentences can result:

223.a. John, together with his family, was killed by the indians.

b. Together with his family, John was killed by the indians.

c. John was killed by the indians along with his family.

The deep structure of sentence 207 is 224.

(207.) Along with vodka; scotch and rum mix well with water.
The deep structure of 212 is 225.

(212.) Along with John, both Bill and Tom feared the police.

The deep structure of sentence 226 in which each replaces both would be identical to the above except that the feature \([\text{tot}]\) would be \([-\text{tot}]\).

226. Along with John, Bill and Tom each feared the police.

Together with phrases can cooccur with \([+\text{disjunctive}]\) conjoined nodes.
227. Together with Harry, either John or Bill will be shot at dawn.
228. Along with Sam either John or Bill will go to China with a Fullbright.
229. In addition to Harry, either Jack or Bill will go to England with a Fullbright.
230. Besides Harry, Jack or Bill will go to England with a fellowship.

231.a. John or Bill, instead of Harry, will be elected.
    b. Instead of Harry, John or Bill will be elected.
    c. John or Bill will be elected instead of Harry.

232.a. John and Bill, instead of Harry, will be elected.
    b. Instead of Harry, John and Bill will be elected.
    c. John and Bill will be elected instead of Harry.

The deep structure of 231 is 233, the deep structure of 232 is 234.
I will elect instead of Harry by PASS.
III.8.1 Further Syntactic Support for the PSR Analysis of *together with*

Phrases.

**Fact I:** The distributive adverbs which cooccur with [+individual] conjoined structures do not cooccur with *together with* phrases. This is because they originate from the same node.

235. John and Bill hit a man simultaneously.
236. * John, along with Bill, hit a man simultaneously.
237. * John and Bill, along with Harry, hit a man simultaneously.

**Fact II:** The [+individual] distributional adverbs do occur if they are conjoined to the *together with* phrase. This correlates with fact I in support of the hypothesis that they originate in the same node.

238. Did the master sell the slave with his wife or separately?
239. Did John rob the bank alone or together with Bill?
240.a. John, neither with his wife nor alone, could find happiness.
   b. Neither with his wife nor alone could John find happiness.
   c. John could find happiness neither with his wife nor alone.

The deep structure of sentence 239 is 241.
Fact III: The distribution of the quantifier both is correctly accounted for in the PSR analysis.

With binary conjuncts having the features [+ totality] the quantifier both can occur. The deep structure 242 yields 243a and b.
243. a. Both John and Bill hit a man.
   b. John and Bill both hit a man.

If *together with* phrases were derived transformationally from binary conjuncts, as in 242, then the ungrammatical sentences 244, 245, and 246 would have to be blocked by some condition which depended on *together with* phrase formation.

244. * Both John, together with Bill, hit a man.
245. * John both, together with Bill, hit a man.
246. * John both hit a man together with Bill.

By deriving *together with* phrases from the DADV node, sentences such as 247 and 248 would not have binary conjoined nodes in the deep structure.

247. John together with Bill hit a man.
248. John hit a man together with Bill.

Therefore, sentences 244 - 246 are excluded by the same condition which excludes 249 and 250 - this condition states that *both*

249. * John both hit a man.
250. * John, Bill, and Tom both hit a man.

requires binary (dual) conjuncts. The ungrammaticality of sentences 244, 245, and 246 is not due to the presence of the *together with* phrase since *both* does occur with *together with* phrases if there is a binary conjunction:
Along with their brother Sam, both John and Bill led lives of crime.

Consequently, both John and Bill were arrested along with Sam when the police cracked down.

The deep structure of 251 is 253.

Fact IV: There are no together with phrases with predicates which require a [- totality ] subject, such as motley, disperse etc. Predicates requiring a [-tot] subject do not cooccur with each and all, nor do they cooccur with distributive adverbs.

254. John, Bill, and Tom are a motley crew.

255. * John, Bill, and Tom are a motley crew en masse.

256. * John, Bill, and Tom are a motley crew individually.
a natural consequence of the PSR Hypothesis that no together with phrases can occur.

257. * John and Bill are a motley crew along with Tom.

258. * Along with Tom, John and Bill are a motley crew.

259. * Together with Tom, John is a motley crew.

Fact V: There are no together with phrases with [+tot] noun phrases [-ind] such as the subjects in 260 and 261.

260. One and one add up to two.

261. John, Bill, and Mary spread out.

262.a. * One, along with one, adds up to two.
   b. * Together with one, one adds up to two.

263.a. * John and Bill, together with Mary, spread out.
   b. * Along with Mary, John and Bill spread out.

Sentences 262 and 263 are blocked in the same way that sentences 264 and 265 are blocked, that is, [+ind] adverbs cannot cooccur with [-ind] conjoined structures.

264. * One and one simultaneously add up to two.

265. * John, Bill, and Mary spread out en masse.

It might be argued that mix, meet, etc. do form together with phrases, but it is shown in the appendix that together is a particle with these verbs and that the with phrase is in the deep structure.
verb phrase. *Together with* is not a constituent with *mix* as it is with a [4ind] predicate like *die*. First notice that the *together with* phrase in 266 can be moved as a constituent yielding 267a and b. This is not so with 268 as 269a and b indicate.

266. The man died together with the woman.

267. a. Together with the woman, the man died.
   b. The man, together with the woman, died.

268. The acid mixed together with the water.

269. a. *Together with the water, the acid mixed.*
   b. *The acid, together with the water, mixed.*

Second, *along with* can replace *together with* in 266 but not in 268.

270. The man died along the woman.

271. *The acid mixed along with the water.*

**Fact VI:** As was already mentioned, no additional machinery is needed to account for the surface structure distribution of the *together with* phrases. They are moved by the DADV movement transformation and occur in the same surface structure positions as the distributive adverbs *alone, simultaneously, together,* etc.
There are some sentences containing conjoined structures which cannot be directly generated in the base by the PSR schema. Consider sentence 1 which has an active verb phrase conjoined with a passive verb phrase. Since passives are formed from active sentences by a transformational rule, sentence 1 cannot be generated in the deep structure by the PSR schema.

1. John lived in Boston and was beaten by hoodlums. The PSR Hypothesis will derive 1 from the deep structure 2 by a transformational Conjunction Rule.

The PSR schema applies in the phrase structure derivation of $S_1$ to produce the conjoined verb phrases dominated by $VP_1$. $VP_4$ is not expanded farther and terminates in the dummy symbol.
On the first cycle, the passive rule applies to $S_2$ yielding the structure 3.

3.

\[
S_0,
\begin{array}{c}
[+\text{exh}] \\
[+\text{ind}] \\
[-\text{dis}] \\
[-\text{neg}]
\end{array}
\]

\[
S_1\quad\quad\quad\quad\quad S_2\quad\quad\quad\quad\quad NP
\]

\[
NP\quad\quad\quad\quad VP_1\quad\quad\quad\quad NP
\]

\[
\text{John} \quad [+\text{exh}] \\
\quad [+\text{tot}] \\
\quad [+\text{ind}] \\
\quad [-\text{dis}] \\
\quad [-\text{neg}]
\]

\[
\text{was beaten up by hoodlums}
\]

\[
\text{NP}
\]

\[
\text{was beaten up by hoodlums}
\]

\[
\text{NP}
\]

\[
\text{NP}
\]

\[
\text{NP}
\]

\[
\text{lived in Boston and}
\]

\[
\Delta
\]

The Conjunction Rule will now substitute $VP_2$ for the dummy symbol at $VP_4$ and erase $S_2$, yielding the structure 4.

4.

\[
S_0,
\begin{array}{c}
[+\text{exh}] \\
[+\text{ind}] \\
[-\text{dis}] \\
[-\text{neg}]
\end{array}
\]

\[
NP\quad\quad\quad\quad VP_1\quad\quad\quad\quad NP
\]

\[
\text{John} \quad [+\text{exh}] \\
\quad [+\text{tot}] \\
\quad [+\text{ind}] \\
\quad [-\text{dis}] \\
\quad [-\text{neg}]
\]

\[
\text{lived in Boston and}
\]

\[
\text{was beaten up by hoodlums}
\]

\[
\text{NP}
\]

\[
\text{NP}
\]

\[
\text{NP}
\]
This is the general procedure to generate conjoined structures of derived constructions. The Conjunction Rule operates to "fill in" dummy elements which are introduced as terminal elements in conjoined structures produced by the PSR schema. 21

If there is a distributional quantifier on the conjoined node, as in 5, the derivation is essentially the same as above - the presence of the quantifier does not introduce complications.

5. John either died accidentally or was murdered by Bill.

The deep structure of 5 is 6.

6. 

The Passive Transformation applies to 6 to yield 7.
The **Conjunction Rule** then forms 8 from 7.

8.

The **PSR Conjunction Rule** can be stated as 9.
The PSR Conjunction Rule:

9. SD: \( (X(M(\Delta)N)Y)(X(A')Y) \)
   \( S_0 S_1 A A A A S_1 S_2 A A S_2 S_0 \)

SC: \( (X(M(A')N)Y) \)
   \( S_0 A A A A S_0 \)

The Phrase Structure Rule Schema and the Conjunction Rule provide an explicit formulation for the general rule for conjunction suggested by Chomsky in *Aspects*. (pp 212)

The general rule for conjunction seems to be roughly this: if XYZ and XZ'Y are two strings such that for some category A, Z is an A and Z' is an A, then we may form the string X-Z-and-Z'-Y, where Z-and-Z' is an A.... But clearly, A must be a category of a special type; in fact, we come much closer to characterizing the actual range of possibilities if we limit A to major categories.
The Conjunction Rule accounts for the ambiguity of sentence 10, which has the two possible answers 11 and 12.22

10. Did you live in New York or Boston?

11.a. New York
   b. Boston

12.a. Yes
   b. No

The sentence 13 is not ambiguous and can only be answered by 14, 15 is not an answer.

13. Did you live in Boston or did you live in New York?

14.a. New York
   b. Boston

15.a. * Yes
   b. * No

The deep structure of 13 is 16..
16. 

The deep structure of sentence 10 with the answer 12 is 17.

17. 

The deep structure of sentence 10 with the answer 12 is 17.
The deep structure of sentence 10 with the reading 11 is 18.

18.

The conjunction rule operates and produces 19 from 18.

19.
IV. THE INTERNAL STRUCTURE OF THE MAJOR CATEGORIES

The grammar of coordinate conjoined structures offers support for the hypothesis that the major categories - S, NP, and VP - have the same internal skeletal structure. The phrase structure rules of the base can be stated in a bar notation which emphasizes the parallel skeletal structure of the major categories.

Using the bar notation, the phrase structure rules of the base can be formalized as:

\[
\overline{\overline{X}} = \text{C.S.} \\
\overline{X} = ([SP,\overline{X}]) \quad \overline{X}^n \quad ([\text{CPL},\overline{X}]) \\
\overline{X} = \text{C.S.} \\
\overline{X} = ([SP,\overline{X}]) \quad \overline{X}^n \quad ([\text{CPL},\overline{X}]) \\
\overline{X} = \text{C.S.} \\
\overline{X} = ([SP,\overline{X}]) \quad \overline{X}^n \quad ([\text{CPL},\overline{X}])
\]

where: \(X\) = the categories: S, N, V

- C.S. = complex symbol
- [SP,\overline{X}] = specifier of \(\overline{X}\)
- [SP,\overline{X}] = specifier of \(\overline{X}\)
- [SP,X] = specifier of \(X\)
- [CPL,\overline{X}] = complement of \(\overline{X}\)
- [CPL,\overline{X}] = complement of \(\overline{X}\)
- [CPL,X] = complement of \(X\)

The phrase structure rule schema for coordinate conjunction of major categories can be stated as follows:
\[ \overline{X} = [\text{exh}] = [+e, \pm t, \pm i, \pm d, \pm n] \]
\[ \overline{X} = [\text{tot}] \]
\[ \overline{X} = [\text{ind}] \]
\[ \overline{X} = [\text{dis}] \]
\[ \overline{X} = \text{[neg]} \]

\[ \overline{\overline{X}} = ([\text{SP}, \overline{X}]) \overline{X}^n ([\text{CPL}, \overline{X}]) \]

\[ \overline{\overline{X}} = ([\text{SP}, \overline{X}]) \overline{X}^n ([\text{CPL}, \overline{X}]) \]

\[ \overline{X} = \text{Complex Symbol} \]

\[ \overline{X} = ([\text{SP}, \overline{X}]) X^n ([\text{CPL}, \overline{X}]) \]

where: \( X \) = the categories S, N, and V

\[ [\text{SP}, \overline{X}] \] = the specifier of \( \overline{X} \), including the distributive quantifiers: each, all, either, etc.

\[ [\text{CPL}, \overline{X}] \] = the complement of \( \overline{X} \), including the distributive adverbs: simultaneously, alone, etc.

\[ [\text{SP}, \overline{X}] \] = the specifier of \( \overline{X} \), including the distributive quantifiers. This includes the determiner structure if \( X = N \), the auxiliary structure if \( X = V \).

\[ [\text{CPL}, \overline{X}] \] = the complement of \( \overline{X} \), including the distributive adverbs.

This schema will yield trees of the following form:
The deep structure of sentence 4 is 5.

4. The boys and the girls will both have a water-closet.

5. 

[Diagram]

The deep structure of sentence 6 is 7.

6. Each of the girls will both hit a dog and whip a cat.

7. (see next page)
6. Each of the girls will both hit a dog and whip a cat.

7.
The deep structure of sentence 8 is 9.

8. McCarthy both did win in New Hampshire and will win here.

9. 

The deep structure of sentence 10 is 11.

10. Each of the workers will both hit a fellow worker and kick the boss.

11. (see next page)
Each of the workers will both hit a fellow worker and kick the boss.
IV.1 The Internal Structure of the Noun Phrase, $\overline{N}$

In accordance with the rule schema, the expansion of the noun phrase is:

1. $\overline{N} = [+e, \pm t, \pm i, \pm d, \pm n]$

\[
\overline{N} = ([SP,N]) \overline{N}^n ([CPL,N])
\]

\[
[+e, \pm t, \pm i, \pm d, \pm n]
\]

$\overline{N} = [+e, \pm t, \pm i, \pm d, \pm n]$

\[
\overline{N} = ([SP,N]) \overline{N}^n ([CPL,N])
\]

\[
[+e, \pm t, \pm i, \pm d, \pm n]
\]

$\overline{N} = \text{Complex Symbol}$

\[
[N] = ([SP,N]) \overline{N}^n ([CPL,N])
\]

where:

$N =$ the category noun

$[SP,N] =$ the specifier of $\overline{N}$, including the distributive quantifiers.

$[SP,N] =$ the specifier of $\overline{N}$, including the determiner structure, the prearticles, and the distributive quantifiers

$[SP,N] =$ the specifier of $N$, including elements like fellow, etc. (see section V.1.1)

$[CPL,N] =$ the complement of $\overline{N}$, including the distributive adverbs.

$[CPL,N] =$ the complement of $\overline{N}$, including the distributive adverbs.

$[CPL,N] =$ the complement of $N$, including the postnominal complements discussed in Nominalizations.
IV.1.1 The Nodes $\bar{N}$ and $\bar{N}$.

Sentences 1 and 2 show the role of $\bar{N}$ and $\bar{N}$.

1. The men and the women will each put on a play.
2. The men and women will each put on a play.

In the dialect described here, sentence 1 has one reading; there will be only two plays. Sentence 1 is equivalent to sentence 3.

3.a. Both the men and the women will put on a play.
   b. The men and the women will both put on a play.

Sentence 2 is ambiguous. One reading is equivalent to 3, and the second reading is equivalent to 4. There will be many plays.

4. Each of the men and women will put on a play.

The deep structure of sentence 1 is 5.

5. \[
\begin{array}{c}
\text{[SP,N]} \\
\text{each} \\
\text{[SP,N]} \\
\text{the men} \\
\text{[SP,N]} \\
\text{[SP,N]} \\
\text{will} \\
\text{put on} \\
\text{[SP,N]} \\
\text{a play}
\end{array}
\]
The deep structure of sentence 2 with the reading 4 is 6.

6.

```
      S
     /\  \\
    /   \ \\
   /     \ \\
  S     S  S
 /     /   /
N     N    V
       /\   |
      /   \\  |
     [ +e, t, -d, -n ]
       /\   /|
      /   / \\
     [ SP, N ] N N
       /   /   \\
      /     \    \\
     each of the N N
        men   women

[ SP, V ]
/     |
V     |
/     |
[ SP, N ]
/   |
N N
/ |
\ |
play
```

The deep structure 5 is similar to the deep structure 8 which underlies sentence 7.

7. The boy and the girl will each put on a play.
The *each* in the deep structures 5 and 8 must be moved to the *V* node.

The quantifier postposition transformation is obligatory for *each* dominated by [SP,N]. Sentences 10 and 12 are ungrammatical.

9. The men and the women will each put on a play.

10. * Each (of) the men and the women will put on a play.

11. The boy and the girl will each put on a play.

12. * Each (of) the boy and the girl will put on a play.

We will now examine how the above analysis accounts for the ambiguity of sentence 2 and the correct distribution of readings for sentences 13 - 15.
13. Each of the men and women will put on a play.
14. The men and the women will each put on a play.
15. The men and women will each put on a play.

Sentence 13 is unambiguous and can only be derived from deep structure 6. It cannot be derived from deep structure 5 since each is obligatorily postposed in deep structures 5 and 8.

Sentence 14 is unambiguous and can only come from the deep structure 5. Sentence 14 contains two definite articles, i.e. two [SP, N]'s, and the deep structure 6 contains only one definite article.

Sentence 15 (and sentence 2) is ambiguous since it is derived from 5 by postposing the each, or from 6 by postposing the each and deleting the second specifier (the) by the optional specifier deletion transformation discussed below.

The optional specifier deletion transformation can delete the second and later specifiers in a structure like 16 if the specifiers are identical.

16.

```
        N
       /|\
      N  N  ...
     /  \
    N  N
   /    \
  [SP, N]  [SP, N]  [SP, N]
   |       |       |
  the    the    the
  a      a      a
this    this    this
etc.    etc.    etc.

SD:  1  2  3  4  5  6
SC:  1  2  Ø  4  Ø  6
```
conditions \( 1 = 3 = 5 = \ldots \)

This rule derives the (b) sentences from the (a) sentences:

17.a. This boy and this girl killed each other.
    b. This boy and girl killed each other.
    c. * These boy and girl killed each other.

18.a. That boy and that girl killed each other.
    b. That boy and girl killed each other.
    c. * Those boy and girl killed each other.

19.a. The boy and the girl killed each other.
    b. The boy and girl killed each other.

20.a. A boy and a girl killed each other.
    b. A boy and girl killed each other.
    c. * Boy and girl killed each other.

The second and later articles are deleted. The articles are not "combined" into one article by a node raising rule since the (c) sentences are ungrammatical.

This rule turns 14 into 15 (and hence 2).

(14.) The men and the women will each put on a play.
(15,2.) The men and women will each put on a play.

Therefore sentence 15 (and 2) is ambiguous since it is derived from both 5 and 6.
IV.1.2 N and Coordinate Conjoined Structures

The quantifiers underlined in the following sentences are introduced by the phrase structure rules 1 and 2 in a tree like 3.

1. \( N = [+e, \pm i, \pm t, \pm d, \pm n] \)

2. \( N = ([SP,N]) \quad N^n \quad ([CPL,N]) \)

\[ [+e, \pm i, \pm t, \pm d, \pm n] \]

3. \( [SP,N]\)

\( e \)ach

\( a\)ll

\( b\)oth

\( e\)ither

\( n\)either

\( n\)o

\( [SP,N]\)

\( N \)

\( N \)

\( (N) \)

\( ([SP,N]) \)

\( [SP,N]\)

\( N \)

\( [SP,N]\)

\( N \)

\( [SP,N]\)

\( N \)

\( \{\text{men}\} \)

\( \{\text{woman}\} \)

\( \{\text{child}\} \)

4.a. The man, the woman, and the child all have different color life preservers.

b. The men, the women, and the children all have different color life preservers.

5.a. The man and the woman will each have their own restroom.

b. The men and the women will each have their own restroom.

6. The men and the women both met in New York.

7. Neither the men nor the women met in New York.

8. Did either the men or the women meet in New York?
The following sentences involve the transformational conjunction rule and will be discussed in section IV.3.1.

RECIProCAL CONSTRUCTIONS

9. Either the men or the women hit each other.
10. Both the men and the women hit each other.

REFLEXIVE CONSTRUCTIONS

11. The men and the women both keep to themselves.
12. The Walbiri and the Zulus both govern themselves.
13. Do either the Walbiri or the Zulus govern themselves?
14. The men and the women both fight among themselves.

RESPECTIVELY CONSTRUCTIONS

15. The boy and the girl will and will not go to New York respectively.
16. The men and the women met in New York and Boston respectively.
IV.1.3 \( \overline{N} \) and Coordinate Conjoined Structures

The quantifiers underlined in the following sentences are introduced by the phrase structure rules 17 and 18 in a structure like 19.

17. \( \overline{N} = [+e, \pm i, \pm t, \pm d, \pm n] \)

18. \( \overline{N} = ( [SP,N] ) \overline{N}^n ( [CPL,N] ) \) \([+e, \pm i, \pm t, \pm d, \pm n]\)

19. \[
\begin{array}{c}
\overline{N} \\
\overline{N} \\
([SP,N]) \\
N \\
N \\
N \\
\end{array}
\]

\( \begin{array}{c}
\text{each of the} \\
\text{all} \\
\text{both} \\
\text{neither} \\
\text{either} \\
\text{none} \\
\end{array} \)

\( \begin{array}{c}
\text{men} \\
\text{women} \\
\text{children} \\
\end{array} \)

20.a. Each of the men could have a headache.

b. All of the men could have a headache.

c. Neither of the men could have a headache.

d. Either of the men could have a headache.

e. Both of the men could have a headache.

21.a. Each of the men and women could have a headache.

b. All of the men, women, and children could have a headache.

c. Neither of the men could have a headache.
21.d. *Either* of the men could have a headache.

e. *Both* of the men could have a headache.

It is possible to have a quantifier introduced at \([SP,N]\) and \([SP,N]\) as in the following sentences.

22. Some of the men gave a dollar each.

23. All of the men gave a dollar each.

24. Some of the men hit each other.

25. All of the men hit each other.

26. Either the men or the women hit each other.

27.a. Both the men and the women hit each other.

   b. Both the men and the women are fighting with each other.

The deep structure of sentence 23 is 28. The deep structure of sentence 25 is 29. These deep structures and derivations are discussed in section V.1.5. The deep structure and derivation of sentence 26 is presented in section IV.3.1.
(23.a.) Each of all of the men gave one dollar.

b. All of the men gave one dollar each.

(25.) All of the men hit each other.
IV.2 The Internal Structure of the Verb Phrase, $\overline{V}$

In accordance with the rule schema, the expansion of the verb phrase is:

$$\overline{V} = [+e, \pm t, \pm i, \pm d, \pm n]$$

$$\overline{V} = ([SP,\overline{V}] \quad \overline{V}^n \quad ([CPL,\overline{V}])$$

$$[+e, \pm t, \pm i, \pm d, \pm n]$$

$$\overline{V} = ([SP,\overline{V}] \quad \overline{V}^n \quad ([CPL,\overline{V}])$$

$$\overline{V} = \text{Complex Symbol}$$

$$\overline{V} = ([SP,\overline{V}] \quad \overline{V}^n \quad ([CPL,\overline{V}])$$

[C.S.]

where: $\overline{V}$ = the category verb

[SP, $\overline{V}$] = the specifier of $\overline{V}$, including the distributional quantifiers

[SP, $\overline{V}$] = the specifier of $\overline{V}$, including the auxiliary structure and the distributive quantifiers.

[SP, $\overline{V}$] = the specifier of $\overline{V}$, the preverbal elements.

[CPL, $\overline{V}$] = the complement of $\overline{V}$, including the distributional adverbs.

[CPL, $\overline{V}$] = the complement of $\overline{V}$, including the distributional adverbs.

[CPL, $\overline{V}$] = the complement of $\overline{V}$, including direct objects, prepositional complements, etc.
IV.2.1 \( \overline{V} \) and Coordinate Conjoined Structures

The underlined quantifiers in the following sentences are introduced by the phrase structure rules 1 and 2 in a structure like 3.

1. \( \overline{V} = [e, \pm t, \pm i, \pm d, \pm n] \)
2. \( \overline{V} = ([SP, \overline{V}]) \overline{V}^n ([CPL, \overline{V}]) \)
   \[ +e, \pm t, \pm i, \pm d, \pm n \]
3. \( \overline{V} \)
   \[ ([SP, \overline{V})] \overline{V} \]
   \[ ([SP, \overline{V})] \overline{V} \]
   \[ ([SP, \overline{V})] \overline{V} \]
   \[ ([SP, \overline{V})] \overline{V} \]

4. McCarthy \underline{both} did win in New Hampshire and will win here.
5.a. John \underline{either} will go to New York or will not go to New York.
   b. John \underline{either} will or will not go to New York.
6. John \underline{both} can go to New York and will go to New York.
7.a. You can't have your cake and eat it too.
   b. You can't \underline{both} have your cake and eat it too.
8.a. John \underline{both} was late and was arrested by the cop.
   b. John \underline{both} was late and arrested by the cop.
9.a. John \underline{neither} was late nor was arrested by the cop.
   b. John \underline{neither} late nor arrested by the cop.
10. John and Bill \underline{will} go to New York and will not go to New York respectively.
11. John and Bill will and will not go to New York respectively.

12. The men perjured themselves and met in Sing Sing.

13.a. The men are guilty and will be shot at dawn.

b. The men neither are guilty nor will be shot at dawn.

Sentences 8, 9, 10, 11, 12, and 13 involve the transformational conjunction rule and will be discussed in the next section. The deep structure of sentence 5a is 14.

(5.a.) John either will go to New York or will not go to New York.

14.
IV.2.2 \( \overline{V} \) and Coordinate Conjoined Structures

The underlined quantifiers in the following sentences are introduced by the phrase structure rules 15 and 16 in a structure like 17.

15. \( \overline{V} = [+e, \pm t, \pm i, \pm d, \pm n] \)

16. \( \overline{V} = ([SP, \overline{V}]) \overline{V}^n ([CPL, \overline{V}]) \)

17. \( \overline{V} \)

\( \overline{V} \)

\( [+e, \pm t, \pm i, \pm d, \pm n] \)

\( ([SP, \overline{V}]) \)

auxiliary  both  all  either  no

\( \overline{V} \)

\( ([CPL, \overline{V}]) \)

\( \overline{V} \)

\( ([CPL, \overline{V}]) \)

wash

etc.

shave

etc.

18. John will both wash and shave.

19. John will neither wash nor shave.

20. John will either wash or shave.

21. John will both wash the cat and shave the poodle.

22. John will wash the cat, shave the poodle, and kiss the goat all at one time.

23. John shot a dog, skinned a cat, and poisoned a mule all in the space of a minute.

The deep structure of sentence 20 is 24.
(20) John will either wash or shave.
IV.3 The Transformational Conjunction Rule

In this section we will discuss reciprocal, reflexive, and respectively constructions. Only the deep structures and derivations will be discussed here; the motivation behind the particular analyses is contained in later sections of this thesis. In these later sections, constructions as complex as those presented here will not be discussed. This present section has two objectives: The first is to show that the full range of relevant constructions is not beyond the PSR formulation. The second is to indicate the capacity of the bar notation in formulating linguistic descriptions.

The transformational conjunction rule can be stated as:

This rule accounts for the following sentences:
RECI PROCAL SENTENCES

The deep structure of sentence 2 is 3.

2. The men or the women will hit each other.

3. (see next page)

The rules:

1. Quantifier Postposition
2. Quantifier Movement
3. each other formation

convert 3 into 4 on the $S_1$ and the $S_2$ cycles.

4. (see the page after the next.)

The transformational conjunction rule then forms 5 from 4.

5. (see the third page hence)
(2) The men or the women hit each other.

3.

```
S
  S
    S
      S
        V
          V
            V
              V
                V
                  V
                    V
                      V
                        V
                          V
                            V
                                V
                                    V
                                        V
                                            V
                                                V
                                                    V
                                                        V
                                                            V
                                                                V
                                                                    V
                                                                        V
                                                                                V
                                                                                    V
                                                                                        V
                                                                                            V
                                                                                                V
                                                                                                    V
                                                                                                      V
                                                                                                           V
                                                                                                               V
                                                                                                                   V
                                                                                                                       V
                                                                                                                           V
                                                                                                                               V
                                                                                                                                   V
                                                                                                                                       V
                                                                                                                                             V
                                                                                                                                                V
                                                                                                                                                    V
                                                                                                                                                           V
                                                                OUTH                                             v
                                                                                                                                                    V
                                                                                                           V
                                                                                       [SP,N]          [SP,N]          [SP,N]          [SP,N]
                                                                                         V               V               V               V
                                                                                       hit            hit            hit            hit
                                                                                      [CPL,N]     [CPL,N]     [CPL,N]     [CPL,N]
                                                                                         N             N             N             N
                                                                                       of the men_k of the men_k of the men_k of the women_j
                                                                                      N
                                                                                          ones
                                                                                      N
                                                                                          ones
                                                                                       each of the each of the each of the
                                                                                       men_k men_k men_k
                                                                                       (or)
                                                                                       N
                                                                                       N
                                                                                       each of the
                                                                                       N
                                                                                       N
                                                                                       men_k
                                                                                       [SP,N]
                                                                                       each of the
                                                                                       N
                                                                                       N
                                                                                       men_k
                                                                                       [SP,N]
                                                                                       each of the
                                                                                       N
                                                                                       N
                                                                                       women_j
                                                                                       [SP,N]
                                                                                       each of the
                                                                                       N
                                                                                       N
                                                                                       ones
                                                                                       [SP,N]
                                                                                       each of the
                                                                                       N
                                                                                       N
                                                                                       ones
```
5.

\[
S_0 \\
S \\
S \\
S
\]

\[
N \quad [+e,+i,-t,+d,-n] \\
N \quad (or) \quad N \quad [+e,+i,-t,-d,-n] \quad [+e,+i,-t,-d,-n]
\]

\[
[SP,N] \\
the \quad N \\
men
\]

\[
[SP,N] \\
the \quad N \\
women
\]

\[
[SP,V] \\
will \quad V \\
hit \quad N \\
each \quad other
\]
REFLEXIVE SENTENCES

The following sentences have similar derivations:

1. Both the men and the women keep to themselves.
2. Neither the Walbiri nor the Zulus govern themselves.
3. Do either the boys or the girls fight among themselves?

The deep structure of sentence 1 is 4.

4. (see the next page)

The transformational conjunction rule converts 4 to 5.

5. (see the page after the next)

Sentences 6 and 7 are also derived from deep structure conjoined sentences.

6.a. John and Mary could not satisfy themselves or each other.
    b. John and Bill were incapable of satisfying themselves or each other.
7.a. John and Mary saw themselves and each other in the mirror.
(1) Both the men and the women keep to themselves.

4. 

```
S
[+e,+i,+t,-d,-n]
```

```
S

S

[+e,+i,+t,-d,-n]
[SP,N]

both

[SP,N]

the

men

```

```
V

pres

[SP,V]

N

to themselves

men

```

```
V

N

[SP,N]

the

women

keep

```

```
V

N

[SP,V]

N

to themselves

```

I the 

I N Le N = I keen N I men 

women to themselves

5.

\[ S \]

\[ +e,+i,+t,-d,-n \]

\[ S \]

\[ S \]

\[ S \]

\[ N \]

\[ +e,+i,+t,-d,-n \]

\[ N \]

\[ +e,+t,-i,-d,-n \]

\[ +e,+t,-i,-d,-n \]

\[ SP,N \]

\[ N \]

both

\[ SP,R \]

\[ N \]

the

\[ SP,N \]

\[ N \]

the men

\[ SP,V \]

\[ V \]

\[ N \]

pres keep 

\[ SP,N \]

\[ N \]

to themselves
RESPECTIVELY CONSTRUCTIONS

The deep structure of 1 is 3.

1. The men and the women met in New York and Chicago respectively.
2. * John and Bill met in New York and Chicago respectively.

3. (see next page)

The transformational conjunction rule converts this to 4.

4. (see the page after the next)
(1.) The men and the women met in New York and Chicago respectively.
(1.) The men and the women met in New York and Chicago respectively.

(4.)

(The subscript "r" stands for the feature [+respectively].)
IV.3.2 $\mathcal{V}$ and Derived Coordinate Conjoined Structures

The deep structure of la, b, and c is 4.

1.a. John both was late and was arrested by the cop.
    b. John both was late and arrested by the cop.
    c. John was both late and arrested by the cop.

2.a. John neither was late nor was arrested by the cop.
    b. John neither was late nor arrested by the cop.
    c. John was neither late nor arrested by the cop.

3.a. John neither is nor will be the worlds greatest tennis player.
    b. John neither is the world's greatest tennis player nor will be the world's greatest tennis player.

4. (see next page)

The passive transformation applies on the $S_2$ cycle yielding 5.

5. (see the page after the next).

The transformational conjunction rule then derives 6 from 5.

6. (see three pages hence)
(1) John both was late and was arrested by the cop.

4.

\[
\begin{array}{c}
\text{S} \\
\text{S} \\
\text{S}_1 \\
\text{N} \\
\text{N} \\
\text{John} \\
\text{V} \\
\text{both} \\
\text{V} \\
\text{was} \\
\text{V} \\
\text{late} \\
\end{array}
\]
5.

\[ S \rightarrow \text{[SP, V]} \]

\[ \text{[SP, V]} \rightarrow \text{[+e, +l, t, -d, -n]} \]

\[ \text{[+e, +l, t, -d, -n]} \rightarrow \text{late} \]

\[ \text{late} \rightarrow \text{was} \]

\[ \text{was} \rightarrow \text{both} \]

\[ \text{both} \rightarrow \text{N} \]

\[ \text{N} \rightarrow \text{cop} \]

\[ \text{cop} \rightarrow \text{by the} \]

\[ \text{by the} \rightarrow \text{arrested} \]

\[ \text{arrested} \rightarrow \text{was} \]

\[ \text{was} \rightarrow \text{John} \]

\[ \text{John} \rightarrow \text{N} \]

\[ \text{N} \rightarrow \text{S} \]

\[ \text{S} \rightarrow \text{S}_1 \]

\[ \text{S}_1 \rightarrow \text{N} \]

\[ \text{N} \rightarrow \text{N} \]
The specifier deletion transformation developed in the last section to delete the second and later \([SP,N]\) in structures like 7 also deletes the second and later \([SP,V]\) in structures like 8.

7.

The specifier deletion transformation developed in the last section to delete the second and later \([SP,N]\) in structures like 7 also deletes the second and later \([SP,V]\) in structures like 8.
These two rules can be combined and the specifier deletion transformation can be stated as a schema as in 9.

Specifier Deletion Transformation: \( \text{(optional)} \)

These transformation converts sentence 6 to sentence 10.
(6) John both was late and was arrested by the cop.

10. John both was late and arrested by the cop.

The quantifier movement transformation optionally moves the quantifier both and forms sentence 11.

11. John was both late and arrested by the cop.
IV.4 Lexical Representations: Subcategorization Restrictions

Predicates must be subcategorized for the features on $\overline{N}$, $\overline{N}$, $\overline{N}$, and $\overline{N}$. Here we will discuss only subcategorization of $\overline{N}$ and $\overline{N}$ for the distributional features.

IV.4.1 Predicates Subcategorized for $\overline{N}$

One reading of sentence 1 can be paraphrases as sentence 2. Sentence 3 cannot be paraphrased as sentence 4 on any reading.

1. The men and the women met at my house.
2. The men met at my house and the women met at my house.
3. The men and the women are identical.
4. * The men are identical and the women are identical.

Sentence 4 is grammatical, but it is not synonymous with sentence 3 on any reading. Notice that the [+individual] quantifiers each and both can occur with meet but not with identical:

5. Both the men and the women met at my house.
6. The men and the women each met at my house.
7. * Both the men and the women are identical.
8. * The men and the women are each identical.

Within the PSR formulation, the syntactic difference between the predicates of 9 and 10 is accounted for by the predicate's selection restrictions for the $\overline{N}$ subject node. The predicates in 9 and 10 are assigned different strict subcategorization restrictions. The predicates in 9 can occur
in syntactic environments 11 and 12. The predicates in 10 can occur in environment 11 but not in environment 12.

9. meet, discuss, confer, converse, gather, swarm

10. be identical, be parallel, be similar, be equal, be related, be perpendicular, look alike, be alike.

11. 

12. 

The predicates in 10 must be subcategorized so that they do not occur with an N node as subject; they are marked for the subcategorization [+ind]
feature 13. This indicates that the predicates of 10 cannot occur in structures like 12.

13. \[- \[ N \quad \text{AUX} \quad \__ \\] [+ind] \]

This subcategorization restriction will block the [+individual] quantifiers and adverbs from occurring on the subject of the predicates listed in 10. As the following shows [+individual] adverbs and together with phrases can occur with the predicates in 9, but cannot occur with the predicates in 10.

14.a. The men and the women, together with the children, met at my house.
    b. Along with the children, the men and women met at my house.

15.a. * The men and the women, together with the children, are identical.
    b. * Along with the children, the men and women are identical.

As will be shown in section V, respectively constructions require the feature [+individual] on the coreferential nodes. Therefore, subcategorization restriction 13 rules out sentences 17a and b.

16. The men and the women met in New York and Boston respectively.

17.a. * The men and the women are similar in this respect and in that respect respectively.
    b. * The men and the women are similar by this criteria and by that criteria respectively.

The deep structure and derivation of sentence 16 is presented in section IV.3.1 (3). The deep structure of sentence 14 is 18.
18.

S

[S, N] [S, N] [S, N] DADV

[+e, +i, +t, -d, -n] [+e, +i, +t, -d, -n] [+e, +i, +t, -d, -n]

[SP, N] [SP, N] [SP, N]

[the, men] [the, women] [together with the children]

V

[SP, V]

[past, meet]

[SP, N]

[at my house]
IV.4.2 Predicates Subcategorized for \( \mathbb{N} \)

This node \( \mathbb{N} \) corresponds to the node NP discussed in section III.

As was shown there, predicates are subcategorized for the features \([\pm\text{totality } \pm\text{individual}]\) on the subject and object. Some examples are:

I. Predicates subcategorized for \( + \ [ \mathbb{N} \ \text{AUX } + \text{ind} ] \)

- perjure oneself
- die
- be smart
- behave oneself
- burp
- be tall
- enjoy oneself
- sneeze
- be short
- absent oneself
- cough
- be sick
- collect oneself
- think
- be a virgin
- comport oneself
- sleep
- be a giant
- compose oneself
- dream
- be a hero
- conduct oneself
- imagine
- be a mother

II. Predicates subcategorized for \( + \ [ \mathbb{N} \ \text{AUX } +\text{tot} \ [-\text{ind}] \)

- meet
- touch
- be brothers
- discuss
- clash
- be friends
- collide
- match
- rhyme
- confer
- mix
- be equal
- bump
- be twins
- be similar

There is a subclass of these predicates which must be also subcategorized
for the feature \(- [ \overline{N} \text{ AUX} \ ]\), as was discussed in the last section. These are:

- be identical
- be equal
- be similar
- be perpendicular
- be related
- be parallel

III. Predicates subcategorized for \(+ [ \overline{N} \text{ AUX} \ ]\)

- be a motley crew
- be heterogeneous
- disperse
- double in size
- double in number
- diminish
- be variegated
- be numerous
- dissolve
- abound
- be plentiful
- be of every description

We will now examine a conjunction of predicates from different classes. Consider sentences 1, 2, and 3.

1. The men both perjured themselves and met in Sing Sing.
2. The men neither perjured themselves nor met in Sing Sing.
3. The men either died or met in Sing Sing.

The predicate \textit{perjure oneself} and \textit{die} require an \(\overline{N}\) subject. The predicate \textit{meet} requires an \(\overline{N}\) subject. Clearly the subject \textit{the men} cannot bear both feature specifications. Sentence 1 is derived by the transformational conjunction rule from the deep structure 4. Sentences 2 and 3 are also derived from deep structure conjoined sentences.

4. (see next page)
The men both perjured themselves and met in Sing Sing.
The subject of $V_1$ is $N_1$. The subject of $V_3$ is $N_2$. There is no feature disagreement and the predicates can be inserted with no complications. The conjunction rule then forms 5 from 4.

5.  

\[
\begin{array}{c}
S_0 \\
[+e,+i,+t,-d,-n] \\
S \\
S \\
S
\end{array}
\]

\[
\begin{array}{c}
N \\
[+ind] \\
[+tot]
\end{array}
\]

\[
\begin{array}{c}
[SP,N] \\
the \\
men
\end{array}
\]

\[
\begin{array}{c}
V \\
[SP,V] \\
[SP,V]
\end{array}
\]

\[
\begin{array}{c}
both \\
past \\
perjure
\end{array}
\]

\[
\begin{array}{c}
[SP,N] \\
thesmell \\
in \\
Sing Sing
\end{array}
\]

The statement of the conjunction rule will have to be modified to permit the features to differ on the subject nodes $N_1$ and $N_2$. This is possible and compatible with the PSR hypothesis.
IV.5 Lexical Insertion: Selection Restrictions and Insertion Conditions.

In the previous sections it was shown that predicates must be subcategorized for the distributional features on the nodes: \( N \) and \( N' \). The lexical insertion rule can then insert a predicate into a base phrase marker on the basis of the agreement between (1) the feature restrictions marked in the subcategorization of the predicates in the lexicon and (2) the feature specification of the nominal categories in the base phrase marker. For example, the predicate be similar cannot be inserted into a phrase marker with an \( N \) subject. The predicate perjure oneself can only be inserted into a phrase marker with an \( N \) subject.

The restrictions that exist between the predicate and the nominal categories will be called selection restrictions. Selection restrictions express inter-category cooccurrence restrictions, i.e. the cooccurrence restrictions between major categories.

Insertion conditions refer to the restrictions that exist between a dominated and a dominating node. These express intra-category cooccurrence restrictions, that is, the cooccurrence restrictions between the specifier, the complement, and the head of a major category.

For example, in the structure 1, the distributive quantifiers and adverbs, dominated by \([SP,X]\) and \([CPL,X]\) respectively, must be selected with respect to the distributive features on the dominating
node $\overline{x}$. The distributive quantifiers and adverbs, dominated by $[\text{SP}, \overline{x}]$ and $[\text{CPL}, \overline{x}]$ respectively, are selected with respect to the distributional features on $\overline{x}$.

1. 

\[
\begin{array}{c}
\overline{x}^n \\
[\text{SP}, \overline{x}] \\
\text{each, all, both} \\
\text{either, neither, none}
\end{array}
\]

\[
\begin{array}{c}
\overline{x}^n \\
[\text{CPL}, \overline{x}] \\
\text{all told, simultaneously} \\
\text{en masse, apiece, alone} \\
\text{together with N, along with N}
\end{array}
\]

The insertion of the distributive quantifiers and adverbs is accomplished by the following feature percolation mechanism:

The features of the node $X$ n-bar are duplicated on $[\text{SP}, X \text{n-1 bar}]$, $X \text{n-1 bar}$, and $[\text{CPL}, X \text{n-1 bar}]$.

This means:

1. The features of $\overline{x}$ are duplicated on the $[\text{SP}, \overline{x}]$, $\overline{x}$, and $[\text{CPL}, \overline{x}]$ nodes.

2. The features of $\overline{x}$ are duplicated on the $[\text{SP}, \overline{x}]$, $\overline{x}$, and $[\text{CPL}, \overline{x}]$ nodes.

3. The features of $\overline{x}$ are duplicated on the $[\text{SP}, \overline{x}]$, $\overline{x}$, and $[\text{CPL}, \overline{x}]$ nodes.
This feature percolation mechanism is equivalent to the statement:

A node is marked for all of the features of its head element.

This convention of feature percolation will yield trees such as:

2. 

The feature bundle \([+e, \pm i, \pm t, \pm d, \pm n]_j\), abbreviated to \([F]_j\), is introduced by the phrase structure rule 3.

3. \(\overline{X} = [+e, \pm i, \pm t, \pm d, \pm n]\)

The feature bundle \([+e, \pm i, \pm t, \pm d, \pm n]_k\), abbreviated to \([F]_k\), is introduced by the phrase structure rule 4.
4. \[ \bar{X} = [+e, \pm f, \pm t, \pm d, \pm n] \]

The feature bundle \([F]_1\) is introduced by the phrase structure rule 5.

5. \[ \bar{X} = \text{Complex Symbol} = [F]_1 \]

After the phrase structure rules have introduced the features and the tree has been generated, the feature percolation mechanism duplicates the features on the lower nodes.

The distributional quantifiers and adverbs are then inserted depending on the features of the specifier and the complement respectively.

This mechanism accounts for the cooccurrence restrictions between the distributive quantifiers and the distributive adverbs. Notice that sentence 6 is ill-formed but that sentence 7 is grammatical.

7. All of the men died simultaneously.

The deep structure of sentence 6 is 8. The adverb simultaneously requires a \([\text{CPL}, X \_\_ \_\_ \text{n bar}], \) and therefore sentence 6 is excluded because the deep \([+\text{ind}]\) \([+\text{tot}]\) structure 8 is ill-formed. Deep structure 8 violates an insertion condition: the distributive features of the \([\text{CPL}, X \_\_\_\_ \text{n bar}],\) must match the features of the distributional adverb in order for the adverb to be inserted in the base phrase marker.
In short, the insertion of distributional quantifiers and adverbs is accounted for by:

1. The **feature percolation mechanism** which writes the features of $X \_n\_\text{bar}$ on $[SP,X \_n\_1\_\text{bar}]$, $X \_n\_1\_\text{bar}$, and $[\text{CPL},X \_n\_1\_\text{bar}]$.

2. The **insertion condition** which requires the features of the distributional quantifier (or adverb) to match the features of the dominating node, i.e. the $[SP,X \_m\_\text{bar}]$, (or the $[\text{CPL},X \_m\_\text{bar}]$). $[m = 2 \text{ or } 1]$
quantifiers or vice versa.

The feature percolation mechanism accounts for several other facts independent of quantifier and adverb insertion.

FIRST: This mechanism accounts for the number agreement of demonstratives in English:

1.a. This man left.
   b. That man left.

2.a. * These man left.
   b. * Those man left.

3.a. * This men left.
   b. * That men left.

4.a. These men left.
   b. Those men left.

The deep structure of 3a is 5.

5.

\[
S \quad \begin{array}{c}
  N \\
  +[\text{plu}]_k \\
  [\text{SP,N}] \\
  +[\text{plu}]_k \\
  \text{these} / +\text{plu} \\
  *\text{this} / -\text{plu} \\
  N \\
  +[\text{plu}]_k \\
  \text{men} \\
  [\text{SP,V}] \\
  \text{past} \\
  \text{leave}
\end{array}
\]
Sentence 3a is deviant because this is [-plural] and the dominating specifier is [+plural]. It is irrelevant to this discussion if this and these are inserted from the lexicon or formed by a morphological transformation.

SECOND: This mechanism seems also to be appropriate to describe case marking and article-noun agreement in inflected languages. For example, the features [+dative], etc. must be written onto the specifier. Consider the German example: 29

1. 

```
N
[+sing]
[+dat ] k

N
[+sing]
[+dat ] k

[SP,N]
[+sing]
[+dat ] k

Junge

dem

N
[+sing]
[+dat ] j

N
[+sing]
[+dat ] j

[SP,N]
[+sing]
[+dat ] j

Jungen

dem
```
THIRD: This feature percolation mechanism seems to be the correct device to account for the syntactic occurrence of the coordinate conjunctions.

One could consider the coordinate conjunctions and, or, and nor to be dominated by the specifier node. Then the conjunctions would be inserted into the base structure like 1.

This would account for the three way if and only if condition which exists between the quantifier, the coordinate conjunction, and the distributive adverb. This would exclude sentences 2, 3, and 4.

2. * Either John and Bill died.
3. * John or Bill died simultaneously.
4. * Neither John and Bill died at the same time.

It would also insure that the conjunction remained the same for all the conjuncts, i.e. exclude 6 but permit 5.

5. John and Bill and Tom and Harry all left.
6.a. * John and Bill and Tom or Harry all left.
   b. * John nor Bill or Tom and Harry all left.
FOURTH: This feature percolation mechanism accounts for the fact that in a conjunction of noun phrases, there is a tendency for all of the conjuncts to "agree" in definiteness, number, etc. A conjunction of noun phrases which "agree" behaves differently than a conjunction of noun phrases which do not "agree".

The sentences listed under 1 and 2 are all grammatical, but there is evidence that sentences 1 are kernel sentences, and that sentences 2 are transformationally reduced from conjoined sentences by the transformational conjunction rule.

1.a. A man, a girl, and a boy came to see me.
   b. These men, these girls, and these boys came to see me.
   c. The men, the girls, and the boys came to see me.

2.a. A man, those girls, and some boy came to see me.
   b. A few men, the group, and a boy came to see me.
   c. John, a trio of girls, and many a boy came to see me.

The sentences in 1 would be generated in the base in the PSR formulation. The features [+definite], [+demonstrative], [+plural], etc. are entered on N, and they percolate down the tree to the lower nodes as in deep structure 3.
The sentences in 2 are formed by the transformational conjunction rule from deep structure conjoined sentences. For example the deep structure of sentence 2.a. would be:

\[
\begin{array}{c}
\text{(a man)} \ (\Delta) \ (\Delta) \\
\hline
\text{N}
\end{array}
\]

came to see me & those girls came to see me & some boy came to see me.

There are several facts to support this analysis. Since we cannot take the space to prove that the PSR formulation excludes all of the ungrammatical sentences as claimed, the sentences will be presented but the arguments will only be outlined.

Support I: This analysis would generate sentences 4 and exclude sentences 5.
4.a. John, Bill, and Tom had a dollar between them.
   b. The man and the woman did it themselves.
   c. The man and woman did it themselves.
   d. John, Bill, and Tom split it up among themselves.

5.a. * John, the boy, and the group had a dollar between them.
   b. * The man and the women did it themselves.
   c. * The girls and boy did it themselves.
   d. * The girls and the trio split it up among themselves.
   e. * The girl and the trio split it up among themselves.

The conjunctions in 5 are ruled out by the feature percolation mechanism so they cannot be kernel sentences. They cannot be generated by the transformational conjunction rule because they are [-individual] conjunctions.

Support II: This analysis would generate sentences 6 but exclude sentences 7.

6.a. A man, a boy, and a girl hit each other.
   b. These men, these boys, and these girls hit each other.
   c. John, Bill, and Tom hit each other.
   d. The man and the woman hit each other.

7.a. * A man and a trio of boys hit each other.
   b. * The man and women hit each other.
   c. * The girls and a boy hit each other.
   d. * The girls and boy hit each other.
7.e. * Some men and woman hit each other.
   f. * A group and John hit each other.
   g. * A group and man hit each other.

Sentences 6 are generated as in section V.1. Sentences 7 cannot be generated in the PSR formulation because the feature percolation mechanism would exclude these conjunctions. These sentences cannot be generated by the transformational conjunction rule since there is no conjoined sentence paraphrase for reciprocal constructions within the PSR formulation.

Support III: This analysis would generate sentences 8 but exclude those sentences listed in 9.

8.a. The boy and girl like soup and nuts respectively.
   b. The boy and the girl like soup and nuts respectively.
   c. The boys and girls like soup and nuts respectively.
   d. These boys and these girls like soup and nuts respectively.

9.a. * The boy and these girls like soup and nuts respectively.
   b. * Some boys and all girls like soup and nuts respectively.
   c. * The boy and girls like soup and nuts respectively.
   d. * These boys and the girl like soup and nuts respectively.

Sentences 8 are kernel sentences. Sentences 9 cannot be kernel sentences since they violate the feature percolation mechanism. They also cannot be generated by the transformational conjunction rule. See section V.3 for the deep structure of respectively constructions.
FIFTH: This feature percolation mechanism could account for the fact that a question and an imperative cannot be conjoined with an indicative sentence. The sentence features on \( S_0 \) percolate down to \( S_1, S_2, S_3, \) etc. as in 1. This rules out sentences 4 and 5 but allows sentences 2 and 3.

1. \[
\begin{array}{c}
S_0 \\
\quad \quad [+\text{imperative}] \\
\quad \quad [+\text{question } ]_k \\
\quad S_1 \\
\quad \quad [+\text{imperative}] \\
\quad \quad [+\text{question } ]_k \\
S_2 \\
\quad \quad [+\text{imperative}] \\
\quad \quad [+\text{question } ]_k \\
S_3 \\
\end{array}
\]

2. Turn on, tune in, and drop out!
3. Are you a hippie or are you a flower child?
4. * Turn on!, and your sister likes apple sauce.
5. * Your mother is ill and are you a hippie?

SIXTH: The feature percolation mechanism accounts for the fact that the conjoined complements of a predicate must be of the same type. Two examples will be given: The first is the semantic agreement of complement types. The second is the syntactic agreement of complementizers.

First, sentences 1 are grammatical, but sentences 2 are ill-formed.

1.a. John went either to New York, to Boston, or to Chicago.
1.b. John went either by bus, by car, or by train.
1.c. John went either at 6:00, at 7:00, or at 8:00.
2.a. * John went either to New York, at 6:00, or by train.

b. * John went either at 6:00, to New York, or at 7:00.

c. * John went either at 6:00, by train, or by bus.

In the coordinate conjoined structure, the complements must all be of the same type: i.e., all directional adverbs (1a), all time adverbs (1b), or all means adverbs (1c). The deep structure of 1a would be 3. Feature percolation insures that all conjuncts are of the same type.
The sentences 2 are illformed because they violate the feature percolation mechanism.

The second fact correctly described by feature percolation is that in a conjunction of complements, the complementizers must be the same. The (a) and (b) sentences are grammatical, but the (c) sentence is ill-formed.
4. a. John liked to swim and to dance.
b. John liked swimming and dancing.
c. * John liked swimming and to dance.

5. a. John learned to swim and to dance.
b. John learned that Mary loved him and that Sue hated him.
c. * John learned to swim and that Sue hated him.

The deep structure of sentence 4a is 6. The feature percolation mechanism writes the type of complementizer onto the lower nodes. The (c) sentences are excluded by the feature percolation mechanism.
John past V S
learn [+e,+i,+t,-d,-n] [+for-to] j
for to S [F] j [F] k and for to S [F] j [F] k

[SP,V] V S

S

[SP,S] [F] j [F] k

S

John V S

S

John V V

V

swim
dance
SEVENTH: Feature percolation accounts for the uniform case marking of coordinate conjoined elements. Consider the sentences 1 and 2.

1.a. He and she are here.
    b. * Him and she are here.
    c. * His and she are here.
    d. * He and her are here.

2.a. A friend of John's or of Bill's is here.
    b. * A friend John or of Bill's is here.

The deep structure of 2a is 3.
a friend

[SP,N] [F] [F]

friend

[SP,N] [F] [F]

of John's

[SP,N] [F] [F]

Bill's

[SP,V] V N

past

be

here

(+e,+i,-t,+d,-n)

(+possession)

(+e,+i,-t,+d,-n)

(+possession)
EIGHTH: In some languages, the deep structure distributional features do not correspond to a separate surface structure element like *each* and *all*. Instead, the distributional features are realized in the surface structure as a morphological variant of the head word of the phrase. The feature percolation mechanism is in accord with this fact.

The morphological forms of the head word need only be marked in the lexicon for the distributional features. Then the forms are inserted into the deep structure tree in accordance with the lexical insertion conditions discussed earlier.

NINTH: Feature percolation accounts for the cooccurrence restrictions that exist between the tense of the verbal specifier, [SP,V], and the time adverbs internal to the verb phrase, V. Consider sentences 1, 2, and 3.

1.a. Bill has recently sung a song.
   b. Bill recently sang a song.
   c. * Bill will recently sing a song.

2.a. Bill will sing a song in a little while.
   b. * Bill sang a song in a little while.
   c. ? Bill sings a song in a little while.

3.a. Bill sang a year ago.
   b. * Bill sings a year ago.
   c. * Bill will sing a year ago.

The adverb *recently* cannot cooccur with a future tense auxiliary;
in a little while cannot cooccur with a past auxiliary; a year ago cannot cooccur with a future or a present auxiliary.

Other time adverbs with tense restrictions are:

4. lately right now shortly
   of late in a while in a spell

The feature percolation mechanism accounts for the cooccurrence restrictions between the tense of the \([SP,V]\) and the time adverbs introduced inside of the verb phrase \(-V-\) by marking the verb phrase for the tense by phrase structure rule 5.

5.a. \(X = C.S.\)

b. \(C.S./V = \left\{ \begin{array}{l} [+past] \\ [+present] \\ [+future] \\ [+progressive] \\ [+perfective] \end{array} \right.\)

where: \(C.S. = \) Complex Symbol

This will yield structures like 6. This is the deep structure of sentence 2.
The adverb *recently* is blocked by the insertion conditions. The [CPL,V] is [+fut], and *recently* is marked [-fut] in the lexicon.

The same mechanism also accounts for: (1) the cooccurrence restrictions
between a progressive auxiliary and those adverbs which cannot cooccur with a progressive auxiliary, and (2) those adverbs which can only cooccur with a perfective tense as in 7 and 8.

7.a. * He drank a gallon of vodka by now.
   b. He has drunk a gallon of vodka by now.
   c. He must have drank a gallon of vodka by now.

8.a. * His lordship finished eating now.
   b. His lordship has finished eating now.
   c. His lordship must have finished eating now.

In a previous discussion it was shown that the feature percolation mechanism eliminated the necessity of subcategorizing the distributive adverbs in terms of the distributive quantifiers. Here it can be seen that the mechanism accounts for the cooccurrence restrictions between the time adverbs and the auxiliary without the necessity of subcategorizing the time adverbs with respect to the auxiliary or vice versa.

TENTH: The adverbs ever, at all, anymore, etc. can only occur in a question or a negative sentence. This cooccurrence restriction is described by the feature percolation mechanism; the features [+negative] and [+question] are introduced on the sentence node by phrase structure rule 1, and then they filter down the tree. The at all can be inserted since it is marked in the lexicon as requiring a [+negative] or a [+question] dominating node.

1. \( S \rightarrow [\pm \text{negative}] \\
   \quad [\pm \text{question}] \)

The deep structure of sentence 2 is 3.
2. Curval does not eat candy at all.

3. The ungrammatical sentence 4 cannot be generated since at all cannot be inserted into the deep structure 5. The insertion of at all into the deep structure 5 violates an insertion condition.

4. * Curval ate candy at all.
4. * Curval ate candy at all.

5. 

```
S
  |-neg
  S
  |-neg
  S
  |-neg
S
  |-neg
N
  |-neg
  N
  |-neg
Curval
    [SP,V]
    |-neg
    pres
    V
    |-neg
eat
    N
    |-neg
    N
    |-neg
    N
    |-neg
    candy
```

[+neg] violates insertion condition at all/
ELEVENTH: The feature percolation mechanism accounts for the cooccurrence restrictions between modals and those adverbs, like in 1, which can be introduced inside of the verb phrase:

1. certainly, positively, undoubtedly, absolutely, definitely.

Notice that sentence 2 is ambiguous between the readings 3 and 4:

2. Curval may go to the Alps.
3. There is a chance that Curval will go to the Alps.
4. Curval is allowed to go to the Alps.

It is a fact that the adverbs listed in 1 cannot occur within the same verb phrase as the modal *may* with reading 3, but they may occur in the same verb phrase as the modal *may* with reading 4. Sentence 5 is unambiguous; the modal *may* can only be interpreted as in 4.

5. Curval may certainly go to the Alps.

This indicates that the adverbs listed in 1 cannot occur within the same verb phrase as the modal *may* with reading 3; the following sentences must be blocked for the *may* of reading 3:

6. * There is a chance that Curval may certainly go to the Alps.
7. * There is a chance that Curval may undoubtedly go to the Alps.
8. * Curval may undoubtedly go to the Alps.

The adverbs in 1 can occur in the sentence if they are outside of the verb phrase containing the modal *may* with reading 3:

9. Certainly, Curval may go to the Alps.
10. Undoubtedly, Curval may go to the Alps.
These modal/adverb cooccurrence restrictions which exist within the verb phrase can be accounted for by the same mechanism which accounts for the tense/time-adverb cooccurrence restrictions discussed previously. The verb phrase, \( \overline{V} \), is marked for modality just as it is marked for tense. The phrase structure rule 11 introduces the modality features.

11. \( \overline{V} = \text{C.S.} \)

\[
\text{C.S.} = \begin{cases} 
([+\text{past} ] \\
([+\text{future} ] \\
([+\text{present} ] \\
[+\text{progressive} ] \\
[+\text{perfective} ] \\
[+\text{modality feature}_1] \\
[+\text{modality feature}_2] \\
[+\text{modality feature}_3] \\
\text{etc.}
\end{cases}
\]

To facilitate the exposition, suppose that [+modality feature\_1] corresponds to the may of possibility, i.e. reading 3. The adverbs in 1 would be specified in the lexicon as being [-modality feature\_1].

The deep structure of the ungrammatical sentence 8 would be the ill-formed 12. Deep structure 10 violates an insertion condition.

8. * Curval may undoubtedly go to the Alps.

12. (see next page)
(8.)  * Curval may undoubtedly go to the Alps.

The sentence 10 is well-formed since the adverb undoubtedly can be inserted without violation outside of the verb phrase. The deep structure of 10 is 13:

10. Undoubtedly, Curval may go to the Alps.
V. RECIPROCAL PRONOUNS, PLURAL REFLEXIVES, AND RESPECTIVELY CONSTRUCTIONS

There are at least seven ways in which plural reflexives, reciprocal constructions, and respectively conjunction are similar.

I. The antecedent in each construction must be a single node. A reflexive pronoun is not simply an anaphoric pronoun which is in the same simple sentence as its antecedent. The antecedent of a reflexive must be a single node. The anaphoric they in 1 refers to John and Mary, the reflexive in 2 cannot refer to John and Mary.

1. John told Mary that they would soon marry.

2.a. * John told Mary stories about themselves.
     b. * John talked to Mary about themselves.

3.a. John and Bill told stories about themselves.
     b. John and Bill talked to Mary about themselves.

This constraint on the antecedent holds for plural reflexives, reciprocal constructions, and respectively constructions.

RECIPROCAL CONSTRUCTIONS

4. John and Bill told stories about each other.

5.a. * John, along with Bill, told stories about each other.
     b. * Together with Bill, John told stories about each other.

6. * John told Mary stories about each other.
7. a. John and Mary discussed each other.
   b. * John discussed with Mary each other.
   c. * John discussed each other with Mary.

PLURAL REFLEXIVES
8. a. John and Bill discussed themselves.
   b. * John discussed with Bill themselves.
   c. * John discussed themselves with Bill.

9. a. John and Bill killed themselves.
   b. * Along with Bill, John killed themselves.

RESPECTIVELY CONSTRUCTIONS
10. a. John and Bill hit Mary and Sue respectively
     b. * John, along with Bill, hit Mary and Sue respectively.
     c. * Together with John, Bill hit Mary and Sue respectively.

The antecedent noun phrase in reflexive, reciprocal, and respectively constructions must be of the form:

11. 

   \[
   \begin{array}{c}
   N \\
   \hline
   ([SP,N]) \\
   N \quad (N) \quad \ldots \quad (N)
   \end{array}
   \]

The \([SP,N]\) is a distributive quantifier, as in 12, 13, and 14.

12. The husband and the wife each cheated on the other.
13. The husband and the wife each loved themselves.
14. Each of the real numbers is smaller than its respective square.
II. The three constructions all exhibit constraints within a single sentence.

II.1 The antecedent of a reflexive pronoun must be in the same simple sentence as is the reflexive pronoun. 32

15. John hit himself.
16. * John told me that Mary hit him(*self).

II.2 If both coreferents in a reciprocal construction are internal to the same simple sentence, then the each can be with either coreferent.

17. Each of the men hit the others.
18. The men hit each other.

If the antecedent is in a higher sentence, then each can only be with the antecedent. Sentence 19 is grammatical, but sentence 20 is ill-formed.

19. Each of the men thought that the cop had arrested the others.
20. * The men thought that the cop had arrested each other.

II.3 The two related elements of a respectively construction must be in the same simple sentence.

21.a. John and Bill loved Mary and Sue respectively.
21.b. * John and Bill thought that I loved Mary and Sue respectively.
21.c. John and Bill thought that I loved Mary and that I loved Sue respectively.
The following do not cross a sentence boundary and are grammatical:

22. John and Bill gave candy to Mary and Sue respectively.
23. John and Bill gave Mary candy and ice cream respectively.

III. Emphatic reflexives cannot cooccur with these three constructions:

24. John and Mary themselves convinced the boy.
25. * John and Mary themselves convinced each other.
26. * John and Mary themselves convinced themselves.
27. * John and Mary themselves convinced Bill and Sam respectively.
28. John and Mary convinced the boy themselves.
29. * John and Mary convinced each other themselves.
30. * John and Mary convinced themselves themselves.
31. * John and Mary convinced Bill and Sam respectively themselves.

IV. In some languages, the reciprocal pronoun is the same as the reflexive pronoun. The following example is from French:

32. Ils s'aiment.
33. Ils se sont donné des coups de pied.

The German sentence 34 uses the non-reciprocal pronoun uns in a reciprocal sense.

34. Wir treffen uns um sechs Uhr.
In the English sentences below, the reflexive pronouns and the reciprocal pronouns yield similar readings:

35. The Zulus watch out for themselves.
36. The Zulus watch out for each other.
37. The Zulus rely on themselves for food.
38. The Zulus rely only on each other for food.

The plural reflexive pronouns in 35 and 37 are [+totality ], like the [-individual] reflexive in 39.

39. The Zulus govern themselves.

Sentence 39 is not synonymous with 40. The reflexive in 39 is not [+individual] as it is in 40.

40. Each of the Zulus governs himself.

In English and in French the reciprocal pronoun is used in constructions formally analogous to respectively constructions.

41. John and Bill read newspapers, the one the Times, the other the News.
42. John et Bill ont lu des journaux, l'un le "Times", l'autre le "News".

stress to V. The assignment of reflexives and reciprocals is the same. When the subject is questioned by a wh-word, the stress in the answer falls on the subject unless the answer is a reflexive or a reciprocal sentence.
Consider the following question and answer pairs:

43. Who killed the men?
44. Sám killed the men.
45. We killed the men.

But if the answer is a reflexive or a reciprocal, the stress is not on the subject:

46. The men killed themselves.
47. The men killed each other.

The sentences:

48. The men killed themselves.
49. The men killed each other.

answer the questions 50 and 51 respectively, not question 43.

50. Who killed themselves?
51. Who killed each other?

VI. Just as there are predicates with optionally deletable reflexive objects, there are predicates with optionally deletable reciprocal objects. Normally a reflexive object cannot be deleted, but there are verbs which permit deletion of the reflexive object without changing the meaning of the sentence. Kill is not of this type, but wash is.

52. John killed himself.
53. * John killed.
but:

54. John washed himself and shaved himself.
55. John washed and shaved.

The same phenomenon exists with reciprocal pronouns. Many verbs with
the prefix *inter-* and a few other verbs can delete the reciprocal pro-
noun with no change in meaning:

56. John and Bill resemble each other.
57. *John and Bill resemble.

but:

58. They \{interplay \}
    \{interrelate \}
    \{switch \}
    \{alternate \} with each other.
59. They \{interplay \}
    \{interrelate \}
    \{switch \}
    \{alternate \}

60. They are \{identical \} to each other.
    \{related \}
61. They are \{identical \}.
    \{related \}

VII. No quantifiers can occur on the reciprocal pronoun each other,
on the reflexive pronouns themselves, etc., or on the second constotuent
of a respectively construction.

RECIPROCAL PRONOUN

1.a. John, Bill, and Tom hit each other.
b. * John, Bill, and Tom hit some of each other.

2.a. The men hit each other.

b. * The men hit some of each other.

REFLEXIVE PRONOUNS

3.a. John, Bill, and Tom hit themselves.

b. * John, Bill, and Tom hit some of themselves.

4.a. The men hit themselves.

b. * The men hit some of themselves.

RESPECTIVELY CONSTRUCTIONS

5.a. John, Bill, and Tom hit their respective wives.

b. * John, Bill, and Tom hit some of their respective wives.

6.a. The men hit their respective wives.

b. * The men hit some of their respective wives.

VIII. each other, themselves (etc.), and POSS respective N can never be the subject of a simple sentence. These are always in oblique positions.

1. John and Bill hit each other.

2. * Each other hit John and Bill.

3. * Each other were hit by John and Bill.

4. John and Bill hit themselves.

5. * Themselves hit John and Bill.

6. * Themselves were hit by John and Bill.
7. John and Bill hit their respective wives.
8. * Their respective wives hit John and Bill
9. * Their respective wives were hit by John and Bill.
V.1 RECIROCAL CONSTRUCTIONS

The complement expressions, listed in 1, refer to the part of a set which is not referred to by a partitive quantifier. This will be elaborated in the next section. Consider sentences 2, 3, and 4.

1. the other, the rest, the balance, the remainder
2. Some of the girls hate the other girls.
3. Many of the men are taller than the others.
4. Most of the boys dislike the rest of the boys.

A complement expression is interpreted as indicating a non-identical coreference with its antecedent. In this sense, the complement expressions are opposed to the reflexive constructions, which indicate identical coreference.

5. Some of the men dislike the others.
6. Some of the men dislike themselves.

If the PSR schema, as discussed in the previous sections, introduces one of the distributive quantifiers: each, either, neither or any on the antecedent of a complement expression, the result is a reciprocal construction as characterized by the following sentences:

7.a. Each of the men would die for the others.
    b. The men would each die for the others.
    c. The men would die for each other.
8. Each one in the group mistrusted the others.
9. Each one in the trio thought that one of the others had brought the music.
10. Every one of the men would die for the others.
11. Any of the men would die for the others.
12. None of the men would die for the others.
13. Either of the men would die for the other.
14. Neither of the men would die for the other.
15. Did the husband and the wife each believe the other to be true?
16. Did either the husband or the wife believe the other to be true?
17. Neither the husband nor the wife believed the other to be true.
18. Each of the prisoners mistrusted the rest of the prisoners.

Notice that sentences 19 and 20 are not synonymous. Sentence 20 is ungrammatical.

19. Each of the men thought that the killer shot the others.
20. * The men thought that the killer shot each other.

The features [+totality] and [+individual] developed in section III to account for verb, adjective, and adverb selection restrictions, together with phrases, the interpretation of conjoined and plural structures, and the surface structure distributional quantifiers each and all provide a simple means to characterize reciprocal constructions:
A sentence with a reciprocal interpretation results if

a [-totality ] quantifier (each, either, any, and neither) [+individual]

occurs on a plural or conjoined antecedent of a complement expression.

The next sections will discuss the deep structure of the complement expressions, the class of reciprocal constructions, the pronoun each other, the quantifier every, reciprocal constructions with collective nouns as the head of the antecedent node, and sundry other topics.
V.1.1 The Complement Expressions

A complement expression is interpreted as indicating a non-identical coreference with its antecedent. There are three types of complement expressions: (1) those which originate in the determiner, as in 1; (2) those that originate as partitive constructions, as in 2; and (3) those that originate as deep structure nouns, as in 3.

1.a. Each of the workers spied on the other workers.
   b. Each of the workers spied on one other worker.
   c. Each of the workers spied on another worker.

2.a. Each of the workers spied on the rest of the workers.
   b. Each of the workers spied on the balance of the workers.
   c. Each of the workers spied on the remainder of the workers.

3.a. Each of the workers spied on his fellow workers.
   b. Each of the workers spied on his coworkers.
   c. Each player on the team spied on his teammates.
   d. Each player on the team spied on his fellow players.

(1) Complement Expressions in the Deep Structure Determiner

The element other is introduced in the deep structure as the last element of the determiner. Other is in a deep structure like 4.
There are several facts supporting the structure 4 which introduces other as the last element of the deep structure determiner, i.e. $[SP,N]$.

FACT I: Other always occurs after the article (if one is present) and always precedes any adjectives.

5.a. The other big men liked apples.
   b. * The big other men liked apples.
   c. * The big other tall men liked apples.

6.a. Some other fat men liked oranges.
   b. * Some fat other men liked oranges.

FACT II: Other cannot occur in predicate constructions, and therefore, 8 cannot be derived from relative constructions like 9.

7. * The men were other.
8. The other men came.
9. * The men who were other came.

FACT III: Other does not conjoin with other adjectives, it can only occur first in an adjective string:

10. The tall, dark, and handsome men left.
12. The other tall dark, and handsome men left.

FACT IV: Previous work on pronouns showed that pronouns might best be considered part of the determiner structure. The above analysis correlates with this work, and the mechanisms postulated to derive 14 from 13 and 16 from 15, can derive 18 from 17:

13. I hit them ones.
15. I hit those ones.
16. I hit those.
17. I hit the other ones.
18. I hit the others.

Therefore, by having other in the determiner structure, the pronoun the other(s) is accounted for by the mechanisms which derive he from he one, these from these ones, etc.

The element another is compounded from an other. This is supported by two observations:

First, another and an other are in complementary distribution. Where an other is expected another occurs.

Sentence 21 is ungrammatical but 22 is well formed.
19. Each of the workers must share a locker with one other worker.
20. Each of the workers must share a locker with some other worker.
21. * Each of the workers must share a locker with an other worker.
22. Each of the workers must share a locker with another employee.

Second, a(n) X other does occur if X is not null:

23. Each of the men must share a locker with a single other man.
24. * Each of the men must share a locker with single another man.

Other enters into reciprocal constructions. If a [-tot] quantifier [+ind]
occurs on the antecedent of a noun phrase containing other in the
determiner, the resulting sentence has a reciprocal interpretation.

25. Each of the men would die for any of the other men.
26. Any of the men would die for another man.
27. Either of the men would die for the other man,
28. Neither of the men would die for the other man.

The complement expression can be indefinitely far embedded:

29. Each of the soldiers thought that he heard that the radio
reported the television to have said that the enemy had
captured the other soldiers.
There can also be nested constructions:

30. Each of the captains told each of the generals that the other captains hated the other generals.

31. Each of the boys made each of the girls do things for the other boys that the other girls wouldn't do.

The deep structure of sentence 25 is 32.

(25) Each of the men would die for any of the other men.

32.

The deep structure of sentence 33 is 34.
33. John, Bill, and Tom each mistrusted the others.

34. 

How this deep structure is interpreted will be discussed in section V.1.6.

(2) Partitive Complement Expressions

The rest, the balance, and the remainder are introduced into the deep structure as partitive expressions; i.e. like some, many, a few, etc. The deep structure of sentence 1 is 2.
1. Some of the men separated from the rest of the men.

2. The rest, the balance, and the remainder differ from other in at least two ways:

   First, the rest, etc. cannot occur directly in front of a noun, but other can.

3. Some of the men hate the other men.

4. * Some of the men hate the rest men.

5. * Some of the men hate the balance men.

Second, rest, etc. require the definite article the. Other can occur
with all of the articles:

6. Some of the workers share with one other worker.
7. Some of the workers share with some other worker.
8. Some of the workers share with a few other workers.
9. Some of the workers share with other workers.
10. * Some of the workers share with one rest of the workers.
11. * Some of the workers share with some rest of the workers.
12. * Some of the workers share with a few rest of the workers.
13. Some of the workers share with the rest of the workers. 36

If a [-totality ] quantifier appears on the antecedent of a noun [+individual] phrase containing the rest, the balance, etc. in the [SP, N], then the sentence has a reciprocal interpretation as in the following:

14. Each of the soldiers would die for the rest of the soldiers.
15. Any of the men would die for the rest of the men.
16. None of the men would die for the rest of the men.

The complement expression can be indefinitely far embedded:

17. Each of the men thought that he heard the radio to have reported the newspapers to have printed that the enemy had captured the rest of the men.

There can also be nested constructions:

18. Each of the men said to each of the women that the rest of the men would soon finish with the rest of the women, and then it would be his turn.
The deep structure of sentence 14 is 19.

(14) Each of the men would die for the rest of the men.

19.
(3) Noun Complement Expressions

Nouns with the suffixes -mate, co-, and -fellow can be interpreted as indicating a non-identical coreference with the antecedent, as in the following:

1. Some of the workers spy on their coworkers.
2. One person in the class spies on his classmates.
3. Someone in the bed complained about his bedfellows.

Nouns like brother, sister, sibling, twin, etc. can indicate non-identical coreference with the antecedent:

4. One of Mary's sons killed all of his brothers.
5. Each of Tom's daughters hates her sisters.

The element fellow can precede a noun to indicate non-identical coreference:

6. Some of the prisoners spy on their fellow prisoners.
7. A few of the workers spy on their fellow workers.
8. One of the students spies on his fellow students.

The suffixes co- and mate are quite productive, some forms are listed in 9 and 10.

9. classmate, roommate, teammate, officemate, playmate,
10. coworker, cosigner, compatriot, confederate,

The above constructions have the common property that, in the plural, the article must be a possessive pronoun which agrees in person, number
and gender with the antecedent. The article the is not permitted as the (a) sentences attest:

11.a. * Each of the girls spies on the coworkers.
       b. Each of the girls spies on her coworkers.

12.a. * One of Mary's sons killed the brothers
       b. One of Mary's sons killed his brothers.

13.a. * A few of the prisoners spy on the fellow prisoners.
       b. A few of the prisoners spy on their fellow prisoners.

If a [-totality] quantifier is on the antecedent of one of these [+individual] complement expressions, the result is a construction with a reciprocal interpretation:

14. Each of the workers mistrusts his coworkers.
15. Each of the players on the team spies on his teammates.
16. None of the students had any regard for his classmates.
17. Each of Mary's sons hates his brothers.
18. Any of Tom's daughters would kill her sisters.
19. Each of the prisoners hates his fellow prisoners.
20. Each of the workers hates his fellow workers.

The deep structure of 14 is 21:
Each of the workers mistrusts his coworkers.

The deep structure of sentence 17 is 22:
(17) Each of Mary's sons mistrusts his brothers.

The deep structure of sentence 19 is 23:
Each of the prisoners hates his fellow prisoners.
In this analysis, the nouns coworker, teammate, brother, etc. are considered as deep structure nouns. It is possible however that some of these nouns are not in the lexicon but are derived transformationally by morphological rules of suffixation internal to \( \bar{N} \). Both of these views are consistent with the treatment of reciprocals presented in this thesis.

There are several facts which indicate that fellow is internal to \( \bar{N} \) and is the first element of N or the last element of SP,N.

**FACT I:** Fellow is always the last element of a string of adjectives:

1. John hates his tall, dark, grubby, fellow employees.
2. * John hates his fellow, tall, dark, grubby employees.
3. * John hates his tall, dark, fellow, grubby employees.

**FACT II:** Fellow does not conjoin with adjectives:

4. John hates his tall, dark, and grubby fellow employees.
5. * John hates his tall, dark, grubby, and fellow employees.

**FACT III:** Fellow does not occur as a predicate adjective, nor does it occur as a predicate adjective in relative clauses:

6. * John saw his worker who was fellow.
7. John saw his fellow worker.

**FACT IV:** The element fellow is unlike adjectives in that fellow exhibits cooccurrence restrictions with the article. The article must be possessive if the noun phrase is plural and contains fellow:
8. * Everyone hated the fellow workers.
9. Everyone hated his fellow workers.

FACT V: There is never an intonation break between fellow and the following noun. (/ = intonation break).

12. John saw his tall / fellow workers.

V.1.2 The Pronoun each other

The pronoun each other is a derived form. The deep structure of sentence 1 is 2.
1. The men will speak to each other.

2. 

3. Each of the men will speak to the others.
By the quantifier postposition transformation this becomes 4.

4. The men each will speak to the others.

By the quantifier movement transformation this becomes 5 or 6.

5. The men will each speak to the others.
6. The men will speak each to the others.

The each other formation transformation converts sentence 6 into sentence 7.

7. The men will speak to each other.

The each other formation transformation converts the structure 8 into the structure 9.

8.  
   \[ \text{N} \]
   each (PREP) the other(s)
   one (PREP) another

9.  
   \[ \text{N} \]
   (PREP) each other
   (PREP) one another

The derived form is each other and not each others. This is handled by a general agreement rule which marks the noun following each as syntactically singular as in the examples 10.

10.a. each man  
b. each girl 
c. each book 
d. each other

* each men  
* each girls  
* each books  
* each others

This analysis of each other accounts for the following facts:

FACT I: If the antecedent of the reciprocal is in a higher sentence than the reciprocal element the other, then the reciprocal pronoun
element each other cannot be present; the each must remain in the higher sentence.

11. John, Bill, and Tom each thought that Mary had stopped seeing the others.

12. * John, Bill, and Tom thought that Mary had stopped seeing each other.

13. Each of the men thought that the cop had arrested the others.

14. The men each thought that the cop had arrested the others.

15. The men thought that the cop had arrested each other.

This is a natural consequence of the quantifier movement transformation. The each must stay interior to the simple sentence in which it originates; it cannot be moved across sentence boundaries. This is not a special constraint on the each of reciprocal constructions, but holds in general:

16. Each of the men prays in his own way that God will save him.

17. The men each pray in their own way that God will save them.

18. The men pray each in their own way that God will save them.

19. * The men pray in their own way that God will each save them.

This fact about quantifier movement is in accord with, and is further support for, the universal movement constraint proposed by Chomsky:

...a general condition on transformations, namely that no morphological material can be introduced into a configuration dominated by S once the cycle of transformational rules has already completed its application to this configuration (though items can still be extracted from this constituent of a larger "matrix structure," in the next cycle of transformational rules).
FACT II: If the reciprocal pronoun is *each other*, then no [+exhaustive] quantifier may occur on the antecedent:

20. John and Mary were each surprised at the other's hidden talents.
21. John and Mary were surprised at each other's hidden talents.
22. * John and Mary were each surprised at each other's hidden talents.
23. Neither John nor Mary was surprised at the other's hidden talents.
24. * Neither John nor Mary was surprised at each other's hidden talents.
25. Was either John or Mary surprised at the other's hidden talents?
26. * Was either John or Mary surprised at each other's hidden talents?

This distribution of data is a natural consequence of the following facts about the PSR Hypothesis:

1. The PSR schema is not recursive and inserts only one distributive quantifier per conjunction.

2. The quantifier *each* moves from the antecedent to the complement expression *the others*. The element *each other* is not inserted as a single constituent.

FACT III: Any sentence containing *each other* has a paraphrase in which *each* is on the antecedent.

27. John and Mary were angry with each other.

Sentence 27 implies that sentence 28 exists:

28. John and Mary were each angry with the other.

FACT IV: If *the others* has a predeterminer structure, then the *each* must be on the antecedent (or in the verb phrase).
29. John, Bill, and Tom each hated both of the others.

30. * John, Bill, and Tom hated both of each other.

FACT V: There can be articles and prepositions internal to the reciprocal pronoun:

31. John, Bill, and Tom spoke each in front of the others.

32. The men laughed each at the others.

FACT VI: The conjunction in the antecedent of the reciprocal pronoun each other must be and, it cannot be or or nor. This is treated as a peculiar fact of the reciprocal pronoun each other in one formulation of the transformational Hypothesis.

33. John, Bill, and Tom liked each other.

34. * John, Bill, or Tom liked each other.

35. * John, Bill, nor Tom liked each other.

Sentences 34 and 35 are excluded in the PSR Hypothesis since only the conjunction and can occur with each; or and nor cannot occur with each. This is a general fact about and and each, it is not peculiar to reciprocal constructions. Sentences 36 and 37 are excluded by the same principle:

36. * John, Bill, or Tom each ate soup.

37. * John, Bill, nor Tom each ate soup.

38. John, Bill and Tom each ate soup.
There is no restriction between or and nor and reciprocal constructions since or and nor do occur if the quantifiers on the antecedents are either and neither respectively.

39. Did either the husband or the wife cheat on the other?
40. Neither the husband nor the wife cheated on the other.

This distribution of data follows as a natural consequence of the PSR schema, and no ad hoc restrictions are required for reciprocal formation.

It is not clear how an analysis which derives reciprocals from conjoined sentences can block 34 and 35 but allow 39 and 40 in any non ad hoc way.

FACT VII: No ad hoc rules must be postulated within the PSR Hypothesis to account for the correct distribution of each other. The correct distribution of each other follows as a natural consequence of:

1. The PSR schema insertion of the distributive quantifiers
2. the quantifier postposition transformation
3. the quantifier movement transformation

all of which are motivated by considerations divorced from each other reciprocal sentences.

If each other is introduced as a single constituent and the each is then moved from right to left to account for the sentences 41 - 44,
this will require ad hoc rules which are the reverse of rules (1), (2), and (3), discussed above, which are required for the analysis of conjunction and plural structures.

41. They were in love with each other's bodies.
42. They were each in love with the other's body.
43. They each were in love with the other's body.
44. Each of them was in love with the other's body.

Also this analysis provides no natural way to rule out 45 - 47:

45. * Each of them loved each other's body.
46. * Neither of them loved each other's body.
47. * Either of them loved each other's body.

V.1.3 Reciprocal Constructions with Collective Nouns as Antecedents

The following sentences are interpreted as reciprocal constructions:

1. Each one in the group stole from the others.
2. No one in the group would die for the others.
3. Anyone in the group would die for the others.
4. Everyone in the group would die for the others.
5. Each one in the trio thought that one of the others had brought the music.
6. Each one in the quartet stole from the others.

The deep structure of 1 is 7.
The reciprocal pronoun each other cannot occur if the antecedent is a collective noun:

8. Each one in the group hated the others.
9. * The group hated each other.

Sentence 9 is excluded by the PSR hypothesis as a natural consequence of the fact that each can never postpose if the noun is a collective.

10. Each one in the group liked the show.
11. * The group each liked the show.
This fact requires no modification of the existing rules since the structural description of the quantifier postposition transform mentions that the preposition must be \textit{of}. For collectives the preposition is always \textit{in}.

12. Each one \textit{in} the group hated the others.
13. * Each one \textit{of} the group hated the others.

14. Each one \textit{in} the group liked the show.
15. * Each one \textit{of} the group liked the show.

Sentence 16 is excluded because \textit{each other} cannot be inserted as a single constituent.

16. * Each one \textit{in} the group killed each other.

A grammar which inserts \textit{each other} as a single constituent in the deep structure and then moves the \textit{each} to the left, i.e. derives 18 and 19 from 17, would be required to derive 22 from the ungrammatical 20 via the ungrammatical 21.

17. The men will hit each other.
18. The men will each hit the others.
19. Each of the men will hit the others.

20. * The group hit each other.
21. * The group will each hit the others.
22. Each one \textit{in} the group will hit the others.

It must be stated as an ad hoc fact that the rules are obligatory if the antecedent is a collective noun.
V.1.4 Reciprocal Constructions with Mass Nouns as Antecedents.

The quantifiers each, either, neither, and both only occur with [+integerwise divisible] noun phrases. Since mass nouns are [-integerwise divisible], these quantifiers cannot cooccur with mass nouns.

1.a. * Each of the sugar fell.
b. * Either of the sugar fell.
c. * Neither of the sugar fell.
d. * Both of the sugar fell.

The distributive quantifiers all, any, and none can cooccur with [-integerwise divisible] noun phrases:

2.a. All of the sugar fell.
b. Did any of the sugar fall?
c. None of the sugar fell.

Since any and none are [-totality], they should enter into reciprocal [+individual] constructions with mass nouns. The following sentences have a [-totality] [+individual] quantifier on the mass noun antecedent of a complement expression and do have a reciprocal interpretation.

3. The assumption that any of the beer is representative of the rest of the beer is the basis of beer sampling.
4. To say that a cheese forms as a homogeneous coagulation is to say that none of the cheese forms independently of the rest.
The interpretation of 3 and 4 is the [-integerwise divisible] noun phrase correlate of the [+integerwise divisible] noun phrase examples 5 and 6.

5. Upon learning that any one of the Spartans is a representative of the rest of the Spartans, the Persians reconsidered their battle plans.

6. To say that the men work together is to say that none of the men work independently of the rest.

V.1.5 The Quantifier Every

Within the PSR Hypothesis the quantifier every is introduced by the transformational rule 1.41

1. each one of all of = every one of

This rule will derive sentence 3 from sentence 2.

2. If you talked to each one of all of the people here, it would take two hours.

3. If you talked to every one of the people here, it would take two hours.

This derivation accounts for the following facts:

FACT I: Every has the same selection restrictions as all. All is [+totality ] and every is also. Every is more like all than like each. [+individual]
4. * Each one of the plants died at the same time.
5. Every one of the plants died at the same time.
6. All of the plants died at the same time.
7. * I distributed each one of the leaflets.
8. I distributed every one of the leaflets.
9. I distributed all of the leaflets.

10. * Each one of the girls looked alike.
11. Every one of the girls looked alike.
12. All of the girls looked alike.
13. * Each one of the men met in N. Y.
14. Every one of the men met in N. Y.
15. All of the men met in N. Y.

FACT II: Every only occurs with a trinary or greater plural noun phrase. All also only occurs with a trinary or greater plural noun phrase. (Underlying indicates coreferentiality.)

16. * John and Bill came and we shot every one of them.
17. John, Bill, and Tom came and we shot every one of them.
18. * John and Bill came and we shot all of them.
19. John, Bill, and Tom came and we shot all of them.
By deriving **every one of** from **each one of all of**, the same restriction which excludes 18 will exclude 16.

FACT III: The presence of the quantifier **all** is a necessary condition for the adverbs **almost**, **just about**, etc. to occur. The presence of **each**, **both**, **either**, and **neither** is not sufficient or necessary.

20.a. Almost all of the men died in the fire.
   b. * Almost each of the men died in the fire.
   c. * Almost neither of the men died in the fire.
   d. * Almost either of the men died in the fire.
   e. * Almost both of the men died in the fire.

Since **every one of** is derived from **each one of all of**, it is natural that these adverbs also occur with **every one of**.

21.a. Almost every one of the men died in the fire.
   b. Just about every one of the men died in the fire.

The presence of the quantifier **all** seems to be a necessary condition for the adverbs **virtually** and **practically** to occur. Since **every one of** is derived from **each of all of**, it is natural that these adverbs also occur with **every one of**.

21.c. Virtually all of the men were sick.
   d. Virtually every one of the men was sick.
   e. * Virtually each one of the men was sick.
21.f. Practically all of the men were sick.

g. Practically every one of the men was sick.

h. * Practically each one of the men was sick.

FACT IV: The every formation transformation accounts for the correct distribution of the following sentences. Sentence 25 underlies sentences 22, 23, and 24.

22. Every one of us will eat an apple.

23. All of us will each eat an apple.

24. All of us will eat an apple each.

25. Each of all of us will eat an apple.

Before discussing these sentences, it will be shown that the every formation transformation is optional and preceeds the quantifier postposition transformation which is obligatory if each preceeds another quantifier. The following sentences show that the each must be obligatorily postponed if it preceeds a quantifier. The deep structures (a) become the structures (b) obligatorily.

26.a. Each of some of the men will have his own room.

b. Some of the men will each have their own rooms.

27.a. Each of some of the men will give five dollars.

b. Some of the men will each give five dollars.

28.a. Each of some of the men hate the others.

b. Some of the men hate each other.
These sentences indicate that quantifier postposition is obligatory if the *each* precedes another quantifier. Since this rule is obligatory, it must follow *every* formation. If it preceeded *every* formation, *every* would never be formed.

*Every* formation must be optional. If *every* formation were obligatory, sentence 23 could never be formed.

This analysis naturally excludes sentences 29 and 30. If the optional *every* formation transformation applies, then the *each* is no longer present to be postponed.

29. * Every one of us will each eat an apple.
30. * Every one of us will eat an apple each.

We can reconsider sentences 22 - 25. The deep structure sentence 25 becomes 22 if *every* formation applies. If *every* formation does not apply, *each* is obligatory postponed, yielding sentence 23. The quantifier movement transformation can apply to sentence 23 and produce sentence 24.

The same set of operations produces sentences 31 - 34.

**DEEP STRUCTURE SENTENCE:**

31. Each of all of us will give five dollars.

If optional *every* formation applies:

32. Every one of us will give five dollars.

If *every* formation did not apply, *each* is obligatorily postponed by the quantifier postposition transformation since it preceeds a quantifier.
33. All of us will each give five dollars.

The quantifier movement transformation can apply and move the each.

34. All of us will give five dollars each.

Sentences 35 and 36 are excluded just as 29 and 30 are excluded.

35. * Every one of us will each give five dollars.
36. * Every one of us will give five dollars each.

FACT V: This derivation of every accounts for the synonymy of the reciprocal sentences 37, 38, and 39.

37. Every one of the prisoners hates the others.
38. All of the prisoners hate each other.
39. The prisoners all hate each other.

These are derived from the deep structure sentence 40.

40. Each one of all of the prisoners hates the others.

By deriving sentences 37, 38, and 39 from sentence 40, sentence 41 is naturally excluded:

41. * Every one of them hated each other.

There is no way to derive sentence 41 from 40 since if the every formation transformation applies, the each cannot be postponed and each other cannot be formed.

As a further example, consider sentences 42, 43, and 44. The deep structure of 42 and 43 is 44.
42. Every one of the crooks will think that the police have arrested the others.
43. All of the crooks will each think that the police have arrested the others.
44. Each of all of the crooks will think that the police have arrested the others.

FACT VI: *Every* and *all* occur in generic constructions: *each* does not.

The quantifier *each* usually refers to a numerically definite group and is in contrast to the indefinite universality expressed by *every* and *all*. Sentence 1 refers to an understood enumeration of theories, but sentences 2 and 3 are generic and refer to all theories that may exist.

1. Each theory is open to objection.
2. Every theory is open to objection.
3. All theories are open to objection.

If *every* is derived from *each of all*, it is to be expected that *every* will occur in constructions in which *all* can occur. Since sentence 3 is a generic, it is natural that 2 is a generic because it has an *all* on the subject just like 3 does. The same semantic rules can interpret 2 and 3, and the property "generic" can be related to the feature [+totality] or the [+totality] quantifier *all* on the subject.
The treatment of reciprocal constructions within the PSR hypothesis claims that reference is not determined by a single mechanism. Instead, reference is determined by the semantic rules using information from at least five factors:

1. lexical indices assigned in deep structure
2. the structure of the specifier (determiner, etc.)
3. the inherent meaning of the lexical formatives: other, rest, fellow, brother, etc.
4. the relative position of the reference determining elements (other, the rest, etc.) in the derived structure.
5. emphatic and contrastive stress contours.

This theory seems to imply no inherent contradictions and is consistent with the facts concerning reflexive, reciprocal, and respectively constructions.

Under this view of reference, the following "reciprocal" sentences do not all have their sense of "reciprocity" determined in the same way.

1. Each of the workers would die for the other workers.
2. Each of the workers would die for the rest of the workers.
3. Each of Mary's sons hated his brothers.
4. Each of the workers hated his coworkers.
5. Each of the workers hated his fellow workers.
6. Each of the men hated the men that he worked with.
7. Each of the children in the circle hated the children to his right and to his left.
The men pinched each other.
9. Each of the men pinched all of the men who pinched him.
10. The men in the room shot each other.
11. Each of the men in the room shot the men who were in the room with him.
12. The men are related to each other.
13. The men are interrelated.
15. John hit Bill and conversely.
16. Everyone hit everyone else. 45
17. Did anyone hit anyone else?

V.1.6.1 The Deep Structure of the Complement Expressions

The complement expressions are inserted in the base as was discussed in the previous sections. Lexical nouns are indexed for coreference as discussed by Chomsky in Aspects. 46

The following are deep structure sentences:

18. Each of the workers hated the other workers.
19. Each of the workers hated the rest of the workers.
20. Each of the workers hated his fellow workers.
21a. Each of the workers hated his co-workers.
21b. Each of the workers hated his coworkers.
22. Each of Mary's sons hated his brothers.
If *coworker* is derived by a morphological rule from a suffix *co-* plus the noun *worker*, then 21a is the deep structure. If *coworker* is a deep structure noun, i.e. like *brother*, then 21b is the deep structure.

The reference of the complement expressions cannot be determined in the deep structure. The interpretation of a sentence containing a complement expression depends on the relative position of the coreferents in the derived structure. In general, a complement expression must be to the right of its coreferent in a simple sentence:

23. Some of the men_k hate the other men_k.
24. Most of the men_k hate the rest of the men_k.
25. * The other men_k hate some of the men_k.
26. * The rest of the men_k hate many of the men_k.

Furthermore, the following sentences show that the deep structure order of coreferents does not determine grammaticality since an optional transformation may render a grammatical deep structure ungrammatical. The (b) sentences are the passives of the (a) sentences.

27.a. Some of the prisoners spy on others.
    b. * Others of the prisoners are spied on by some of the prisoners.

28.a. * Others of the prisoners spy on some of the prisoners.
    b. Some of the prisoners are spied on by others.

29.a. Each of the men understood the others.
    b. * The others of the men were understood by each of the men.
30.a. * The others of the men understood each of the men.
   b. Each of the men was understood by the others.

31.a. Each of the men understood the rest of the men.
   b. * The rest of the men were understood by each of the men.

32.a. * The rest of the men understood each of the men.
   b. Each of the men was understood by the rest of the men.

33.a. Each of the workers spied on his coworkers.
   b. * His coworkers were spied on by each of the workers.

34.a. * His coworkers spied on each of the workers.
   b. Each of the workers was spied on by his coworkers.

35.a. Each player on the team spied on his teammates.
   b. * His teammates were spied on by each player on the team.

36.a. * His teammates spied on each player on the team.
   b. Each player on the team was spied on by his teammates.

37.a. Each of Mary's sons hates his brothers.
   b. * His brothers are hated by each of Mary's sons.

38.a. * His brothers hate each of Mary's sons.
   b. Each of Mary's sons is hated by his brothers.

These sentences cannot be blocked by movement constraints on coreferential items. The sentences 28b, 30b, 32b, 34b, 36b, and 38b are grammatical and are formed by moving a lexical item over its coreferent.

A phenomenon similar to the above will be discussed when respectively is considered. respectively cannot be interpreted in the deep structure
since an optional transformation may render a grammatical deep structure ungrammatical and vice versa. In the following, (b) is the passive of (a).

39.a. These men hit Mary and Sue respectively.
   b. * Mary and Sue were hit by these men respectively.

40.a. * Mary and Sue hit these men respectively.
   b. These men were hit by Mary and Sue respectively.

41.a. John and Bill hit their respective wives.
   b. * Their respective wives were hit by John and Bill.

42.a. * Their respective wives hit John and Bill.
   b. John and Bill were hit by their respective wives.

This approach to reference is supported by several arguments:

FACT I: Some anaphoric pronouns must be in the base. The analyses thus far presented which transformationally derive pronouns under certain conditions of identity would derive sentence 43b from 43a and 44b from 44a.

43.a. John_k told Mary that John_k was sick.
   b. John told Mary that he was sick.

44.a. John_k lost John_k's pencil.
   b. John lost his pencil.

In each case, the second occurrence of John is structurally and lexically (i.e. indexwise) identical with the antecedent John. For quantified expressions, however, these conditions are not adequate.
The following (b) sentences cannot be derived from the (a) sentences since the (a) and (b) sentences are not synonymous.

45. a. * Each of the men_k said that each of the men_k was the guilty one.
   b. Each of the men said that he was the guilty one.

46. a. Each of the men_k killed each of the men_k.
   b. Each of the men killed himself.

47. a. * Each of the men_k thought that each of the men_k was the new president.
   b. Each of the men thought that he was the new president.

48. a. * Each of Mary_k's son_i hates each of Mary_k's son_i's brothers.
   b. Each of Mary's sons hates his brothers.

This suggests that the underlined pronouns are in the base. If it is true that the pronouns which are in an anaphoric relation with the quantified expressions (i.e. the underlined pronouns) are in the base, their reference cannot be determined until after some optional transformations have applied. Both the grammaticality and the readings of a sentence depend on the quantifier postposition transformation.

Consider the sentences 49 and 50. (Underlining indicates coreferentiality.)

49. Each of the girls scouts swore that she sold only cookies.

If optional each postposing occurs, sentence 50 results.

50. * The girls scouts each swore that she sold only cookies.
Sentences 49 and 50 are not synonymous, the she in 50 is not anaphoric.
A similar example is 51 and 52.

51. Each of the men thought that he was smart.
52. * The men each thought that he was smart.

The he in 52 cannot be in an anaphoric relations with the men each.

The above examples support the hypothesis that some anaphoric pronouns are in the base and that reference is determined after some optional transformations have applied. This correlates with the concepts discussed concerning the deep structure and the interpretation of the complement expressions.

FACT II: A second fact supporting the analysis is that the referential elements former and latter must be inserted in the base since they are meaning bearing elements. They are similar to other in both structure and meaning:

53. John and Bill were reading books, the former "The 120 Days of Sodom", the latter "The Story of O."
54. John and Bill were reading books, the one "The 120 Days of Sodom", the other "The Story of O."

FACT III: A third support for the analysis of reciprocal constructions presented above is that the possible range of combinations of the complement expressions is infinite. Consider the reciprocal sentences 55, 56, and 57 and the complement expressions which can get longer and more complex:
55. Each of the workers will meet his fellow workers today.
56. Each of the workers will meet half of his coworkers today and the rest of his coworkers tomorrow.
57. Each of the workers will meet some of his fellow workers on Monday, more of his fellow workers on Tuesday, and the balance of his fellow workers on Wednesday.

These examples are generated directly in the base by the PSR hypothesis. It is not clear how (or even if) they could be derived by any transformational devices.

FACT IV: A fourth support for the concepts of reference discussed within the PSR hypothesis is that the approach is consistent with other facts about English. The PSR hypothesis states that reference is determined by the interplay of several factors, including:

1. The structure of the specifier (determiner)
2. The meaning of the lexical formatives.

The following data supports this hypothesis. The type of reference (identical or non-identical) and the character of the reference seem to be a function of the determiner structure. The underlined elements in sentences 58, 59, and 60 indicate a non-identical coreference with the antecedent. The underlined elements in sentences 61, 62, and 63 indicate an identical coreference with the antecedent.

58. I shot a man yesterday and will shoot another man today.
59. I shot a man yesterday and will shoot a different man today.
60. I shot a man yesterday and will shoot a new man today.
61. I shot a man yesterday and will shoot the same man today.
62. I shot a man yesterday and will shoot the very same men today.
63. I shot a man yesterday and will shoot the same old man today.

These underlined elements are not typical adjectives in that:

I. They exhibit cooccurrence restrictions with articles:

64.a. I shot a man yesterday and will shoot a different man today.
64.b. * I shot a man yesterday and will shoot the different man today.

II. They do not occur in predicate position:

65. * I shot a man yesterday and will shoot a man who is different today.

III. They do not conjoin with adjectives:

66. * I shot a man yesterday and will shoot a new and fat man today.

IV. The elements same, different, and new are like other, they must precede any adjective:

67.a. I shot a fat man yesterday and will shoot a new fat man today.
67.b. * I shot a fat man yesterday and will shoot a fat new man today.

V. These elements have no comparative or superlative:

68.a. I shot a man yesterday and will shoot a different man today.
68.b. * I shot a man yesterday and will shoot a more different man today.
c. * I shot a man yesterday and will shoot the most different man today.

The prenominal elements also specify the "character" or type of the reference. The element same indicates identical coreference of two types, sentence 69 is ambiguous.

69. This is the same ashtray we saw in New York.

This has the two readings 70 and 71.

70. This ashtray is just like the ashtray we saw in New York, but it is not the ashtray we saw in New York.

71. This is the ashtray we saw in New York, someone must have brought it here.

In both readings same determines identical coreference, but the character of the reference is different. On reading 70 same is like such. Such means identity of properties, as in sentence 72.

72. John is an honest boy and I think such a boy should be rewarded.

Here the reference is to a boy like John but not to John. Sentence 73 is perfectly well formed and interpretable.

73. John is an honest boy and I think such a boy should be rewarded, but I wouldn't give John a nickle.
Section 

V. 2 THE REFLEXIVE CONSTRUCTION

discussed the properties shared by reciprocal pronouns, reflexive pronouns, and respectively constructions. In particular, two facts were brought forth to show that a reflexive pronoun differs from a simple anaphoric pronoun.

First, a reflexive pronoun differs from a simple anaphoric pronoun in that anaphoric pronouns can be quantified, as in 1 and 2, but reflexive pronouns cannot be quantified, as in 3, 4, 5, and 6.

1. They said that all of them were sick.
2. They said that Bill tickled each of them.
3. * The socialists elected some of themselves into office.
4. * We hurt some of ourselves.
5. * They hurt all of themselves.
6. * They hurt each of themselves.

Section discussed the general constraint which prohibits quantifiers on reciprocal pronouns, on reflexive pronouns, and on the second element of a respectively construction. This general constraint prohibits the distributional quantifiers (each, all, etc.) from appearing on a plural reflexive, although the plural reflexive may be marked for the deep structure features [+individual] and [+totality]. The reflexive objects in 7 are [+individual], the reflexive objects in 8 are [-individual].
7.a. The men behaved themselves.
b. The men perjured themselves.

8.a. The Walbiri govern themselves.
b. Organisms reproduce themselves.51

The second way in which a plural reflexive differs from a plural anaphoric pronoun is that the antecedent of a plural reflexive must be a single node. Sentences 9 and 10 are ungrammatical:

9. * John told Mary about themselves.
10. * John, along with Mary, killed themselves.

Since the antecedent of a plural anaphoric pronoun can be separated constituents, as in 11 and 12, it seems that a plural reflexive is not just a simple anaphoric pronoun constrained to a single simple sentence.

11. Mary told John that they would soon be parents.
12. Mary, together with John, knew that the druggist had cheated them.

The PSR formulation suggests an explanation for this single antecedent node constraint. It seems to be a fact that the distributive quantifier on the plural reflexive must be the same as the distributive quantifier on the antecedent. Therefore, the conditions for reflexivization must specify identity of distributive quantifiers between the coreferents. If this is the case, it is a natural consequence of this identity condition that the antecedent of a plural reflexive must be a single node.
The evidence to support this identity constraint is the following.

Consider sentences 13 and 14.

13. John and Bill keep to themselves.
14. John and Bill take care of themselves.

Sentences 13 has the readings 15 and 16.

15. John keeps to himself and Bill keeps to himself.
16. John and Bill stay together and don't go near anyone else.

The deep structure of sentence 13 with reading 15 is 17. The deep structure of sentence 13 with reading 16 is 18.

17. John and Bill keep to themselves.
   [+ind]  [+ind]
18. John and Bill keep to themselves.
   [-ind]  [-ind]

The reflexive pronoun must bear the same distributional features as the antecedent. A deep structure which had a [+individual] antecedent and a [-individual] reflexive would cross the two readings and be ungrammatical. The deep structure 19 would have the reading 20.

19. * John and Bill keep to themselves.
   [+ind]  [-ind]
20. * John keeps to John and Bill and Bill keeps to John and Bill.

The deep structure 21 would have the reading 22.

21. John and Bill keep to themselves.
   [-ind]  [+ind]
22. * John and Bill keep to John and John and Bill keep to Bill.

The same analysis holds for sentences 14 with the predicate take care of.

We will now discuss a constraint of reflexivization which has implications for respectively conjunction.

In a transformational framework, sentence 2 will be derived from sentence 1 and sentence 4 from sentence 3.

1. John paid for Mary and Bill paid for Mary.
2. John and Bill paid for Mary.
4. John paid for Mary and himself. 52

Although the conjoined subject in 2 may be derived from 1, and the conjoined object in 4 may be derived from 3, the respectively conjunction in 6 is ungrammatical.

5. John paid for Mary and Bill paid for himself.
6. * John and Bill paid for Mary and himself respectively.

The ungrammaticality of 6 is not due to the conjunction of a reflexive and a non-reflexive noun phrase since this structure is grammatical in 4.

The transformational hypothesis might be made consistent with the facts by imposing restrictions on the conjunction transformation, but it would have to be shown that these were motivated and not ad hoc.
The above distribution of sentences follows naturally from the PSR schema formulation. One must constrain the pronominalization and reflexivization transformations to block derivation if the antecedent is a conjunct of a conjoined noun phrase. This would rule out 7, 8, and 9, but allow 10, 11, and 12. ( _____ = coreferentiality)

7. * Bill and John wanted Jack to hit him.
8. * John, Bill, and Tom knew that Mary had seen them.
9. * Bill and Mary hit himself and Bill.
10. Bill wanted Jack and Mary to hit him.
11. Bill hit himself and Mary.
12. Bill and John knew that Mary had seen them.

Sentence 6 would be generated in the base by the PSR schema as sentence 13.

13. John and Bill paid for Mary and Bill respectively.

In its transformational development, the sentence is marked as deviant by the same constraint on pronominalization which excludes 7, 8, and 9.
V.3 RESPECTIVELY CONSTRUCTIONS

The element respectively is a sentence adverb. A respectively construction is a property of a sentence and is marked in the deep structure by a feature on the sentence node. This feature is then written on all nodes which are dominated by that sentence node but by no other lower sentence node, that is, respectively is constrained to a single sentence. The feature \([\pm\text{respectively}]\) is constrained to a single sentence. The feature \([\pm\text{respectively}]\) is entered by the phrase structure rule 1.

1. \[ S = \left\{ \begin{array}{l} [\pm\text{negative}] \\ [\pm\text{respectively}] \\ [\pm\text{imperative}] \\ [\pm\text{question}] \end{array} \right\} \]

The deep structure of sentence 2 is 3; the deep structure of sentence 4 is 5.

2. John and Bill hit Mary and Sue respectively.
3.

\[ \text{S} \]
\[ [+\text{respectively}] \]
\[ \text{S} \]
\[ [+\text{respectively}] \]
\[ \text{S} \]
\[ [+\text{respectively}] \]
\[ \text{S} \]
\[ [+\text{respectively}] \]
\[ \text{N} \]
\[ [+\text{res}] \]
\[ [+\text{ind}] \]
\[ [-\text{dis}] \]
\[ [-\text{neg}] \]
\[ \text{N} \]
\[ [+\text{res}] \]
\[ \text{N} \]
\[ [+\text{res}] \]
\[ \text{V} \]
\[ [+\text{res}] \]
\[ \text{V} \]
\[ [+\text{res}] \]
\[ \text{V} \]
\[ [+\text{res}] \]
\[ \text{V} \]
\[ [+\text{res}] \]
\[ \text{N} \]
\[ [+\text{res}] \]
\[ \text{N} \]
\[ [+\text{res}] \]

John

Bill

past

hit

Mary

Sue
4. John and Bill hit their respective wives.

5.

\[
\begin{array}{c}
\text{S} \\
[\text{+respectively}] \\
\text{S} \\
[\text{+respectively}] \\
\text{S} \\
[\text{+respectively}] \\
\text{S}
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}] \\
[\text{+ind}] \\
[\text{-dis}] \\
[\text{-neg}]
\end{array}
\]

\[
\begin{array}{c}
\text{V} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{V} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{V} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{V} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{V} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{V} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]

\[
\begin{array}{c}
\text{N} \\
[\text{+res}]
\end{array}
\]
There are several facts to support the introduction of the sentence feature $[\pm \text{respectively}]$ by phrase structure rule 1.

First, a respectively construction cannot be negative (sentence negation), imperative, or a question.\(^5\)

**IMPERATIVES**
6. * Go to New York and Chicago respectively!
7. * Put down the book and the pencil respectively!
8. * Put down the book and the pencil on the table and the floor respectively!

**QUESTIONS**
9. * Did John and Bill hit Mary and Sue respectively?
10. * When and why did John and Bill leave respectively?
11. * Did the men like cake and pie respectively?

**SENTENCE NEGATION**
12. * John and Bill didn't go to New York and Chicago respectively.
13. * John and Bill will not eat eggs and cake respectively.
14. * John will and will not go to New York and Chicago respectively.

Respectively and negation are not mutually exclusive. Respectively does occur if the negative is in the auxiliary.

15. John and Bill will go to New York and will not go to New York respectively.
16. John and Bill will and will not go to New York respectively.
17. * John will and will not go to New York and Chicago respectively.
A second fact accounted for in the above analysis is that \textit{respectively} is constrained to a single sentence. It is a fact that the sentence features introduced by rule 1 do not go into lower sentences. That is, if the matrix sentence is an imperative, a negative, or a question, this does not imply that, correspondingly, the embedded sentence must be an imperative, a negative, or a question. The features [+negative], [+imperative], [+question], and [+respectively] are all constrained to a single sentence.

The following sentences show that [+respectively] is constrained to a single sentence:

18. Mary and Sue liked men who were tall and men who were thin respectively.
19. * Mary and Sue liked men who were tall and thin respectively.
20. John and Bill hit their respective wives.
21. * John and Bill told me to hit their respective wives.

Either the element \textit{possessive respective} or the demonstratives \textit{these, those, etc.} can be inserted as the [SP,N] if there is no conjunction but only a plural noun phrase. Consider the sentence pairs:

22.a. John and Bill loved their respective wives.
   b. * Their respective wives were loved by John and Bill.
23.a. * Their respective wives loved John and Bill.
   b. John and Bill were loved by their respective wives.

Both 22a and 23a are well-formed deep structures. Sentences 22b and 23a are marked as deviant by the surface structure rule which interprets
respective. These sentences are like 24 which were discussed in conjunction with the analysis of reciprocals.

24.a. Each of the men loved his coworkers.
   b. * His coworkers were loved by each of the men.
   c. * His coworkers loved each of the men.
   d. Each of the men was loved by his coworkers.

Consider the sentence pairs 25 and 26:

25.a. These men hit Mary and Sue respectively.
   b. * Mary and Sue were hit by these men respectively.
26.a. * Mary and Sue hit these men respectively.
   b. These men were hit by Mary and Sue respectively.

Both 25a and 26a are well formed deep structures. Sentences 25b and 26a are marked as deviant by the mechanism which interprets respectively. This interpretation occurs after the passive transformation.

The related noun phrases are marked [-disjunctive] since only the [-negative ] conjunction and can occur; the conjunctions or and nor cannot.

27. John and Bill hit Mary and Sue respectively.
28. * John or Bill hit Mary or Sue respectively.
29. * John nor Bill hit Mary nor Sue respectively.

The related nodes are [+ individual] since the [+ individual] quantifiers can cooccur.
30. Each number in the set is smaller than its respective square.
31. Any number in the set is smaller than its respective square.
32. All of the numbers in the set are smaller than their respective squares.
33. None of the numbers in the set is smaller than its respective square.
34. John, Bill, and Tom each hit their respective targets.
35. John, Bill, and Tom all went to their respective places.

For some speakers, the [+individual] adverbs can occur:

36. In a BMW motorcycle, the two pistons move up and down simultaneously but fire alternately in their respective cylinders.

The nodes are not [+ totality] since sentence 37 is ungrammatical:

37. * John and Bill met in New York and Chicago respectively.

The nodes are not [- totality] since sentence 39 is ungrammatical:

38. John and Bill were sick yesterday and today respectively.
39. * John and Bill were a motley crew yesterday and today respectively.

Sentence 37 is ungrammatical since meet requires a [+tot] subject and [-ind]

the respectively construction requires the subject to be [+ind]. Sentence 39 is ungrammatical because motley crew requires a [-tot] subject [-ind]

and the respectively construction requires the subject is 39 to be [+ind].
If a [+ individual] quantifier is on the antecedent, the head noun of the antecedent can be a collective noun:

40. Each one in the squad knew his respective task.
41. Each number in the set is larger than its respective square.

It is also possible to have the element between on the conjuncts in a respectively construction:

42. We must distinguish between monisms and pluralisms as represented by Protagoras and Socrates respectively.
43. We studied the difference between John's ideas and acts as represented by his words and deeds respectively.
44. The relative sizes of the small cell on the lower right and the portion of the large one on the left illustrate the difference between the ordinary light microscope and the electron microscope respectively.
45. The relative sizes of the large horny owl and the small white faced owl reflect the difference between a poor sex life and a good sex life respectively.

The presence of between causes no problems for the PSR formulation. The between is present in the deep structure, and it does not have to be introduced by a transformation. We will discuss these sentences again when we compare the PSR hypothesis with the transformational formulation.
Further Support for the PSR Formulation of respectively.

The PSR hypothesis generates respectively constructions in the base and interprets them in the surface structure. This is in accord with the following facts about English.

There exists a large range of "respectively like" constructions which must be generated in the base. Sentences 1 to 18 contain noun phrases which depend on one another just as the coreferents in a respectively construction do. There is one "ordered" noun phrase in correspondence with another "ordered" noun phrase. The coordinate conjunction or can occur in these constructions as in sentences 3, 4, 6, 7, 12, and 13.

We do not claim that all of these constructions are described and generated by the same syntactic mechanism; nor do we claim that they are all interpreted in the same way. The only claim made is that these sentences contain structures similar to respectively constructions, and that they must be generated in the base and not "reduced" from conjoined sentences. There are no conjoined sentence paraphrases for most of them.

Instead of simply presenting a list of sentences, the data is organized into five classes to make it easier to judge how productive each class is. No significance should be assigned to the classification, this is merely for ease of exposition.

CLASS I: Constructions involving the morphemes respective and respectively.
1. \( p_1 \) and \( p_2 \) are respectively, the reading of \( S_1 \) with the negative element and the reading of \( S_1 \) without the negative.

2. Each man in the group knew his respective task.

CLASS II: Constructions involving \textit{correspond} and its morphological variations: \textit{corresponding}, \textit{correspondance}, etc. Also constructions involving \textit{equivalent} and semantically related words: \textit{analogous}, etc.

3. The boys and the beards are in a one to one correspondance.

4. If the matrix sentence is an imperative, a question, or a negative, this does not imply that, correspondingly, the embedded sentence must be an imperative, a question, or a negative. 62

5. If you turn A or B, there is a corresponding increase in X or Y.

6. The six charts and the corresponding examples are listed next.

7. The six charts and the examples corresponding to each are listed next.

8. If you turn A or B, there is an equivalent movement at X or Y.

9. For us to attack Equador or Iceland would be equivalent to their attacking Ethiopia or Antactica.

10. A small movement at A or B is amplified greatly and appears at X or Y.

CLASS III: Words indicating proportions and ratios.

11. The ratio of men to women is two to one.
12. The men and women are in a proportion of two to seven.

CLASS IV: Constructions involving the morpheme *as* and frequently the element *between*.

13. The difference between Hitler and Ghandi is the same as the difference between John and Bill.

14. The difference between Hitler and Ghandi is analogous to the difference between John and Bill.

15. John is to Harry as Sam is to Bill.

CLASS V: Verbs like *express*, etc. Sentences 16 and 17 are synonymous for some speakers.

16. What is expressed by a verbal or a nominal element in one language might not be expressible by a verbal or a nominal element in a second language.

17. What is expressed by a verb or a noun in one language might not correspond to a verbal or a nominal element in a second language.

18. Simply because some concept is expressed by a noun or a verb in Kibardian does not mean it is expressed by a noun or a verb in English.
VI. A Comparison of the PSR Hypothesis and the Transformational Hypothesis

It is an empirical question as to whether conjoined structures are generated directly in the base or are transformationally derived from conjoined structures. Each of these alternatives represents a different view of language and makes different predictions about the types of conjoined structures that will be found in languages. The following discussion compares the two hypotheses with respect to (1) the class of coordinate conjoined structures generated, (2) the class of reciprocal sentences, and (3) respectively constructions.

VI.1 Coordinate Conjoined Structures

FACT I: We will first compare the two hypotheses by considering their treatment of derived constituent structure.

It has been proposed that conjoined constituents of the sentence conjunction type be derived by a transformational rule called Node Raising. This rule can form conjunctions which cross constituent boundaries - it would derive 2 from 1.

1. John hit Mary and Bill shot Mary. (same Mary)
2. ? John hit and Bill shot Mary.

The proposal to generate conjunction in the base by a PSR schema cannot generate sentence 2. But, as is shown in sentences 3, 4, and 5, sentences with conjunctions crossing constituent boundaries do not form reflexive, reciprocal, and respectively constructions as do the sentences containing conjunctions which preserve the constituent boundaries.
3.a. John hit himself and Bill shot himself.
   b. * John hit and Bill shot themselves.
   b. * John hit and Bill shot each other.
5.a. John shot a cow and Bill turned on the radio.
   b. * John shot and Bill turned on a cow and the radio respectively.

By imposing restrictions on the transformation, or by other adjustments, the Node Raising rule might be made to derive 2 from 1 while excluding 3b, 4b, and 5b. The power of transformational grammar is great enough that the Node Raising rule could be made consistent with the data. This solution however would miss the main point of the above examples, that is, that sentences such as 2 which cross constituent boundaries are not to be included in the same class as those conjunctions that do not cross constituent boundaries. As Chomsky pointed out in *Syntactic Structures:* 63 ...

... it is obvious that "John enjoyed the book and liked the play" (a string of the form NP - VP + and + VP) is a perfectly good sentence, but many would question the grammaticality of, e.g., "John enjoyed and my friend liked the play." (a string of the form NP + Verb + and + NP + Verb - NP). The latter sentence, in which conjunction crosses over constituent boundaries, is much less natural than the alternative "John enjoyed the play and my friend liked it", but there is no preferable alternative to the former. Such sentences with conjunction crossing constituent boundaries are also, in general, marked by special phonemic features such as extra long pauses (in our example, between "liked" and "the"), contrastive stress and intonation, failure to reduce vowels and drop final consonants in rapid speech, etc. Such features normally mark the reading of non-grammatical strings. ... It is immaterial to our discussion, however, whether we decide to exclude such sentences as "John enjoyed and my friend liked the play" as ungrammatical, whether we include them as semi-grammatical, or whether we include them as fully grammatical but with special phonemic features. In any event they form a class of utterances distinct from John enjoyed the play and
liked the book", etc., where constituent structure is preserved perfectly; and our conclusion that the rule for conjunction must make explicit reference to constituent structure still stands, since this distinction will have to be pointed out in the grammar.

Conjoined structures which do not cross constituent boundaries form a natural class of sentences both in the intuitive sense Chomsky discusses and with respect to the reflexive, reciprocal, and respectively constructions. Conjoined structures which cross constituent boundaries might best be generated by some type of topicalization rule or by some gapping rule.

The above distribution of sentences follows naturally from the formulation that generates conjoined structures in the base by a PSR schema. The PSR schema always preserves constituent structure and would require no ad hoc adjustments to rule out 3b, 4b, and 5b. Sentence 2 would not be generated by the rule for conjunction and would not be in the same class as the conjunctions which preserve constituent boundaries.

FACT II: Advocates of the transformational hypothesis have argued that the grammar must contain semantic rules to interpret singular sentences, such as 1, and that by deriving the sentence 3 from the deep structure conjoined sentences 2, the semantic apparatus which interprets 1 can be used to interpret 2 and, consequently, 3. Therefore, by deriving conjoined structures from deep structure conjoined sentences, no additional semantic machinery is necessary.

1. John died.
2. John died and Bill died.
3. John and Bill died.
The PSR hypothesis will need a semantic rule to interpret the singular subject in sentence 1 and a semantic rule to interpret the plural subject in sentence 3.

The facts concerning collective nouns and plural nouns support the PSR hypothesis and the contention that a semantic rule is needed to interpret [+individual] semantic plurals in the base.

First, a collective noun can have the same interpretation as a conjoined subject:

4. John and Mary perjured themselves.
5. John and Mary behaved themselves in public.
6. The pair perjured themselves.
7. The pair behaved themselves in public.

The semantic rule which interprets the semantically plural [+individual] subjects in 4 and 5 can also interpret the subjects in 3, 6, and 7.

Second, a plural noun phrase can have the same interpretation as a conjoined noun phrase:

8. The lovers perjured themselves.
9. The lovers behaved themselves in public.

The semantic rule which interprets the semantically plural [+individual] subjects in 3, 4, 5, 6, and 7 also interprets 8 and 9.
The above two facts count against the transformational hypothesis. Sentences 6 and 7 cannot be assigned a deep structure within the transformational formulation, in fact, no mechanism has ever been suggested within the transformational hypothesis to generate collective constructions. The discussion in section I.1 showed that plurals cannot be derived from conjoined noun phrases, therefore, sentences 8 and 9 cannot be assigned a deep structure within the transformational hypothesis.

FACT III: The transformational hypothesis, as it has been presented in the literature, is only a grammar of binary conjunction, it is not a general theory of coordinate conjunction. The transformational hypothesis is also observationally inadequate as was shown in section I.1.

The PSR hypothesis is a general theory of coordinate conjunction. Section VII, The Structure of the Lexicon, will show the deep structure of the predicates collide, swarm, identical, etc. The grammar is not restricted to binary conjoined subjects.

FACT IV: The transformational hypothesis makes no claims about:

1. the distributional quantifiers: each, all, either, both, neither, and none.
2. the distributional adverbs: simultaneously, alone, independently, etc.
3. together with and along with phrases

The PSR hypothesis provides an internally coherent grammar of these constructions that is consistent with other facts about English, i.e. reciprocal constructions, respectively constructions, plural reslexives, etc.
FACT V: The two notions fundamental to the transformational hypothesis are **sentence conjunction** and **phrasal conjunction**. As was shown in section II.2, this division has no syntactic correlates. The distinction between sentence and phrasal conjunction rests only on the fact that a conjunction of the sentence conjunction type implies a conjoined sentence paraphrase. The term phrasal conjunction is a catch-all category which includes all conjoined structures which do not have a conjoined sentence paraphrase.

The classification of conjoined structures within the PSR hypothesis is determined by the syntactic features:

\[
\begin{align*}
\text{[+ exhaustive]} \\
\pm \text{ totality} \\
\pm \text{ individual} \\
\pm \text{ disjunctive} \\
\pm \text{ negative}
\end{align*}
\]

These features correspond to intuitively meaningful notions, i.e. the feature [+]individual on a conjoined node implies that a conjoined sentence paraphrase exists; but the features are also operationally defined in terms of the rule they play in the grammar, specifically:

1. adverb, verb, adjective, and predicate noun cooccurrence restrictions
2. pronoun cooccurrence restrictions
3. the grammatical constructions in which the features are relevant
4. transformations which refer to the features
5. the surface structure quantifiers the feature complexes represent.

In the above senses, the features integral to the PSR hypothesis have many syntactic correlates.
It is not clear how the transformational hypothesis can derive 2 from 1, but block deriving 4 from 3.

1. The men met at my house and the women met at my house.
2. The men and the women met at my house.
3. The men are similar and the women are similar.
4. * The men and the women are similar.

The PSR hypothesis accounts for the correct distribution of sentences 1, 2, 3, and 4; and also the following sentences:

5. The men and the women met in New York and Chicago respectively.
6. * The men and the women are similar by this criterion and by that criterion respectively.
7. The men and the women both met at my house.
8. * The men and the women are both similar.
9. The men and the women, together with the children, met at my house.
10. * The men and the women, together with the children, are similar.

See section IV.4.1 for details of the PSR formulation.
VI.2 Reciprocal Constructions

FACT I; The transformational hypothesis derives reciprocal constructions from conjoined sentences. For example, sentence 3 would be derived from sentence 1 with sentence 2 as an intermediate step.

1. John hit Bill and Bill hit John.
2. John and Bill hit Bill and John.
3. John and Bill hit each other.

This solution overlooks an important point, namely, that when there are more than two conjuncts in the antecedent of each other, the conjoined sentence deep structure is not the only reading of the reciprocal sentence. Sentence 5 is not the only reading of the reciprocal sentence. Sentence 5 is not the only reading of sentence 4, sentence 4 would still be grammatical if Bill did not hit John.

4. John, Bill, and Tom hit each other.
5. John hit Bill and John hit Tom and Bill hit John and Bill hit Tom and Tom hit John and Tom hit Bill.

Sometimes the conjoined sentence paraphrase which must be postulated as the deep structure is semantically deviant although the reciprocal sentence is well formed and non-deviant. Sentence 6 must have a deep structure conjoined sentence like 7, but given that a person can die only once, sentence 7 is semantically deviant.

6. John, Bill, and Tom killed each other.
7. * John killed Bill and John killed Tom and Bill killed John and
Bill killed Tom and Tom killed John and Tom killed Bill.

FACT II: The reciprocal sentences with collectives as antecedents
cannot be generated within the transformational hypothesis by deriving
the reciprocal sentence from conjoined sentences.

8. Each one in the group hated the others.
9. Each one in the group was hated by the others.

These are generated by the PSR Hypothesis. See section V.1.3.

FACT III: It is not clear how (or even if) the transformational hypo-
thesis can generate nested reciprocal constructions such as 10 and 11.

10. Each of the men told each of the women that the other men
would soon finish with the other women.
11. Each of the boys told each of the girls that the other boys
hated the other girls.

These are generated in the deep structure by the PSR hypothesis.
See section V.1.

FACT IV: The second coreferent in a reciprocal construction can be an
indefinitely complex concatenation of complement expressions. It is
not clear how (or even if) the transformational hypothesis could
account for these structures by deriving them from conjoined sentences.

12. Each of the workers will meet his fellow workers today.
13. Each of the workers will meet half of his coworkers today and the other half of his coworkers tomorrow.

14. Each of the workers will meet some of his fellow workers today, more of his fellow workers on Tuesday, and the balance of his fellow workers on Saturday.

These are generated in the base by the PSR hypothesis. See section V.1.

FACT V: The transformational hypothesis makes no claims about the full class of reciprocal constructions:

15.a. Each of the men would die for the others.
    b. Any of the men would die for the others.
    c. None of the men would die for the others.
    d. Every one of the men would die for the others.
    e. Either of the men would die for the other.
    f. Neither of the men would die for the other.

16.a. The husband and the wife would each cheat on the other.
    b. Neither the husband nor the wife would cheat on the other.
    c. Did either the husband or the wife cheat on the other?

17.a. Each of the men shot the others.
    b. The men shot each other.
    c. Each of the men thought that the cop had shot the others.
    d. * The men thought that the cop had shot each other.
18.a. Each of the workers hated his coworkers.

b. Each of the workers hated the rest of the workers.

c. Each of the workers hated the other workers.

d. Each of the workers hated his fellow workers.

19.a. Each one on the team spied on the others.

b. Each one on the team spied on his teammates.

c. Each one on the team spied on the rest of the team.

20.a. Each one in the group hated the others.

b. Each one in the group was hated by the others.

These are all discussed within the PSR hypothesis. The features [± individual] and [± totality] provide a convenient and simple means of classifying the entire class of reciprocals listed above. A reciprocal sentence results if a [+individual] quantifier is on the antecedent of a complement expression. See section V.1 for details.
VI.3 Respectively Constructions

The transformational hypothesis would derive respectively constructions from conjoined sentences. Sentence 2 is underlain by sentence 1.

1. John hit Mary and Bill hit Sue.
2. John and Bill hit Mary and Sue respectively.

The following facts present difficulties for such a proposed analysis:

FACT I: There is a class of respectively conjunctions, such as 3 and 4 typify, which must be excluded because they violate semantic constraints.

3. * John knew and raised the answer and his hand respectively.
4. * John saw and ate a movie and the pie respectively.

These sentences are not out on syntactic grounds because the construction is permitted if the conjuncts are closely enough related in some semantic sense:

5. John boiled and fried the eggs and the bacon respectively.
6. John washed and soaked the shirts and the pants respectively.

The transformational hypothesis would require semantic constraints on the transformation to be able to generate 5 and 6 while excluding 3 and 4. Perhaps these can be stated in a coherent and non ad hoc way, but again, the burden of proof lies with those who advocate the transformational derivation of respectively constructions.

The PSR Hypothesis would generate 3, 4, 5, and 6 in the base and consider them all well-formed. Sentences 3 and 4 would be ruled out by the semantic component. The PSR schema approach does not require any
modification to account for sentences 3, 4, 5, and 6, and coincides with the intuition that 3 and 4 are semantically excluded because the conjuncts are not "similar enough".

FACT II: Sentences 7 and 8 cannot be derived from conjoined sentences because of the between on the conjuncts. There is no conjoined sentence paraphrase for either 7 or 8.

7. We must distinguish between monisms and pluralisms as represented by Protagoras and Socrates respectively.

8. We studied the distinction between John's ideas and acts as represented by his words and deeds respectively.

These are generated in the PSR Hypothesis as discussed in section V.3.

FACT III: respectively constructions can have a collective noun as an antecedent. These cannot be derived from conjoined sentences since collectives do not have conjoined sentence paraphrases.

9. Each number in the set is smaller than its respective square.

10. Any number in the set is smaller than its respective square.

11. None of the numbers in the set is smaller than its respective square.

12. All of the numbers in the set are smaller than their respective squares.

These examples are generated by the PSR hypothesis and are discussed in section V.3.
FACT IV: Respectively constructions are constrained to a single sentence and are mutually exclusive of imperatives, sentence negation, and questions.  

single sentence:
13. John and Bill like girls who are tall and girls who are thin respectively.
14. * John and Bill like girls who are tall and thin respectively.

imperatives:
15. * Put the book and the pencil on the table and on the floor respectively!

sentence negation:
16. * John and Bill didn't hit Mary and Sue respectively.

questions:
17. * Did John and Bill hit Mary and Sue respectively?

To date, this fact has not been incorporated into any statement of the transformational hypothesis. It remains to be seen if this constraint can be incorporated into the transformational hypothesis in a non ad hoc way.

These facts are accounted for within the PSR hypothesis by introducing the feature \([\pm \text{respectively}]\) by the phrase structure rule 18.

18. \( S = \begin{cases} \pm \text{respectively} \\ \pm \text{question} \\ \pm \text{negative} \\ \pm \text{imperative} \end{cases} \)
All of these features relate to constructions constrained to a single sentence. This analysis also explains why respectively constructions are incompatible with questions, imperatives, and sentence negation. See section V.3.

FACT V: The PSR analysis of respectively constructions ties in with the analysis of distributional quantifiers and adverbs. Sentences such as 19, 20, and 21 are generated in the base by the phrase structure rules.

19. Each of the men kissed his respective wife.
20. Each man in the squad knew his respective task.
21. In a BMW motorcycle, the two pistons move up and down simultaneously but fire alternately in their respective cylinders.

The transformational hypothesis makes no claims about the distributional quantifiers and adverbs. It is not clear how sentences 19, 20, and 21 could be derived from conjoined sentences.

FACT VI: It is not clear how the transformational hypothesis can derive sentence 23 from sentence 22 and sentence 25 from 24 but block deriving sentence 27 from 26:

22. John paid for Mary and Bill paid for Mary.
23. John and Bill paid for Mary.

27. * John and Bill paid for Mary and himself respectively.

This distribution of data is accounted for by the PSR hypothesis in a coherent way by restrictions on reflexivization which are motivated by constructions independently of respectively conjunction. See section V.2.
VII. THE STRUCTURE OF THE LEXICON

Within the framework of the PSR hypothesis, it is possible to make definite claims about the form of a lexical entry. This section develops a coherent set of lexical mechanisms, consistent with the PSR formulation for coordinate conjunction, in three steps.

First, the subject-object dependency of certain verbs will be discussed and a means for stating this dependency in terms of strict subcategorization restrictions and selection features will be presented. Lexical redundancy rules will be discussed and the concept of transformations as filters will be developed.

Second, a class of predicates will be presented, the members of which occur in two syntactic environments - one transitive and one intransitive - and the two syntactic environments cannot be related transformationally. These predicates must have two lexical subcategorizations mentioned in their lexical entry. The possibility of a branching lexical entry will be discussed.

Third, the formal lexical mechanisms developed in the first and second cases will be generalized and extended to cover predicate constructions in general. The PSR - Lexical analysis groups the predicates into linguistically significant natural classes which are syntactically meaningful; no arbitrary semantic divisions are employed.

The lexical specifications which are relevant to:

(1) classifying the diversity of predicate types
(2) subcategorizing the predicates for the possible deep structure complement constructions
indicating the relevant semantic and phonologic information
accounting for the surface structure distribution of the
predicates; i.e. the range of syntactic constructions in
which the predicates can take part
are given in a conventional lexical representation in terms of strict
subcategorization features and selection restrictions. These lexical
mechanisms are independently motivated by studies divorced from
the class of predicates discussed here.
VII.1 Subject - Verb - Complement Dependency

The theory of grammar presented by Chomsky in Aspects allows transitive verbs to be subcategorized for the features (66) or (67).

\[(66)\]
\[
(i) \quad [+V] \rightarrow \text{C.S.} / \quad \alpha \text{ Aux } \beta
\]
\[
(ii) \quad \alpha \text{ Aux }
\]

\[(67)\]
\[
(i) \quad [+V] \rightarrow \text{C.S.} / \quad \alpha \text{ Aux }
\]
\[
(ii) \quad \beta \text{ Det }
\]

By examining the verb command, Chomsky presented evidence to select (66) over (67). The subcategorization restriction of a verb must indicate the interdependency of the subject, the verb, and the verbal complement structure. The following examples support Chomsky's observations and show that verbs must be subcategorized to indicate the three way subject-verb-object dependency. The subject and the verbal complements cannot be selected independently.

Fact I: The predicate exceed must be subcategorized for the feature 1 to indicate that the subject and object must agree in the property \(\alpha\).

Consider sentences 2, 3, 4, and 5:
2. The Empire State building exceeds the Woolworth building.
3. A mother's love exceeds a father's love.
4. * The Empire State building exceeds a father's love.
5. * A mother's love exceeds the Woolworth building.

Sentences 2 and 3 show that if the subject and object agree with respect to the features physical object and abstract, the sentences are well formed. Sentences 4 and 5 are ungrammatical because the subject and object do not agree in feature specifications.

If the subject and object in sentence 4 were selected independently, then sentence 4 would be grammatical because the subject of 4 is grammatical in 2 and the object of 4 is grammatical in 3. Sentence 4 is ill-formed because the subject and object cannot be selected independently; in sentence 4, the subject-object dependency is not satisfied.

The subject of sentence 5 is grammatical as the subject of sentence 3. The object of sentence 5 is grammatical as the object of sentence 2. Sentence 5 is ill-formed because it violates the subject-object cooccurrence restriction.

Predicates like exceed which must be subcategorized for feature 6 to indicate the three way subject-verb-object dependency are listed in 7.

6. + [ NP Aux (PREP) NP ]
   \alpha \beta

\alpha, \beta = selection features; not independent

7. surpass
   rival
equal
   resemble
dwarf
tower over
dwarf
   clash
   be inferior to
FACT II: The predicates mix and intersperse must be subcategorized for the feature 1 to indicate the subject-object dependency:

1. + [ NP Aux (PREP) NP ]
   \( \alpha \)
   \( \alpha \)
   \( \alpha = \) selection features: \( [+\text{abstract}] \)
   \( [+\text{plural}] \)

Consider the sentences:

2. Joy was mixed with sorrow at the LSA meeting.
3. The transformationalists were mixed with the taxonomists at the LSA meeting.
4. * Joy was mixed with the taxonomists at the LSA meeting.
5. * The transformationalists were mixed with sorrow at the LSA meeting.
6. Joy was interspersed with sorrow.
7. The transformationalists were interspersed with the taxonomists.
8. * Joy was interspersed with the taxonomists.
9. * The transformationalists were interspersed with sorrow.

The subject of 4 is grammatical in 2; the object of 4 is grammatical in 3. Sentence 4 is ill-formed because it violates a subject-object restriction. Similar analyses explain the ungrammaticality of 5, 8, and 9.

FACT III: The complements of the verbs increase, decrease, swell, double, etc. depend on the subject. This indicates that these predicates are subcategorized for feature 10.
10. \( + [ \text{NP} \quad \text{Aux} \quad \text{PREP} \quad \text{NP} ] \)

\( \alpha \quad \beta \)

\( \alpha, \beta = \text{selection features; not independent.} \)

11. The men decreased in number.
12. The group decreased in size.
14. The group decreased in number.
15. The men doubled in number.
16. The group doubled in size.
18. The group doubled in number.

The subject of 13 is grammatical as the subject of 11; the complement of 13 is grammatical as the complement of 12. Sentence 13 is ill-formed because it violates the subject-complement cooccurrence restrictions.
VII.1.1 The Filtering Effect of Transformations

The previous section showed that there is a three way "if and only if" condition which must be satisfied for the lexical insertion rule to insert the predicate exceed, etc. There is no "selectional dominance" between the subject and object, there is simply a three way biconditional selectional dependency. The following three characterizations are logically equivalent in descriptive power:

(1) There is a three way if-and-only-if condition between the subject, the verb, and the verbal complement.

(2) The subject is selected with respect to the verb and verbal complement, i.e. the subcategorization is between the subject and the verb phrase.

(3) The verbal complement is selected with respect to the subject and the verb.

The filtering function of the transformational component will now be discussed. Consider the deep structure phrase markers 1, 2, 3, and 4. These phrase markers are all generated in the base by the phrase structure rules and are all well formed with respect to the base rules. The lexical insertion rule has inserted the nouns but not the verbs. As will now be shown, they do not all underlie surface structure sentences. Some of these base phrase markers are "passed" and become grammatical surface structures; others are "filtered out" by the lexical insertion transformation.
1.

S
   NP [+phys obj]
   the Empire State building
   VP
   V
   Δ
   NP [+phys obj]
   the Woolworth building

2.

S
   NP [+abstr obj]
   a mother's love
   VP
   V
   Δ
   NP [+abstr obj]
   a father's love

3.

S
   NP [+phys obj]
   the Empire State building
   VP
   V
   Δ
   NP [+abstr obj]
   a father's love

4.

S
   NP [+abstr obj]
   a mother's love
   VP
   V
   Δ
   NP [+phys obj]
   the Woolworth building
The predicate exceed bears the strict subcategorization restriction 5 which is an abbreviation for the features 6 and 7.

5. exceed: + [ NP Aux __ NP ]
   \[ \alpha \quad \beta \]

   \[ \alpha, \beta = selection \ features: \{ [+phys \ obj] \} \]

6. exceed: + [ NP Aux __ NP ]
   \[ [+phys \ obj] \quad [+phys \ obj] \]

7. exceed: + [ NP Aux __ NP ]
   \[ [+abs \ obj] \quad [+abs \ obj] \]

The transformational lexical insertion rule can insert exceed into phrase marker 1 because the structure of phrase marker 1 matches the strict subcategorization restriction 6. The transformational lexical insertion rule can insert exceed into phrase marker 2 because the structure of phrase marker 2 matches the strict subcategorization restriction 7.

The structure of deep structure phrase marker 3 does not match either strict subcategorization feature 6 or strict subcategorization feature 7. Therefore the lexical insertion transformation cannot insert the predicate exceed into this deep structure phrase marker. Similarly, exceed cannot be inserted into phrase marker 4 because the structure of 4 does not match the feature 6 or the feature 7.

Only base phrase markers 1 and 2 underlie well formed surface structure
sentences with the predicate *exceed*. The transformational lexical insertion rule has passed deep structure phrase markers 1 and 2, but excluded deep structure phrase markers 3 and 4.
VII.2 Lexical Entries

In each of the following examples, the intransitive (a) sentence is not synonymous with the transitive sentences listed:

1.a. John, Bill, and Tom collided.
    b. John and Bill collided with Tom.
    c. John collided with Bill and Tom.

2.a. The car and the truck bumped.
    b. The car bumped into the truck.
    c. The car bumped against the truck.
    d. The car bumped with the truck.
    e. The car bumped the truck.

3.a. John, Bill, and Tom are similar.
    b. John and Bill are similar to Tom.
    c. John is similar to Bill and Tom.

4.a. A, B, and C are touching.
    b. A and B are touching C.
    c. A is touching B and C.
    d. A and B are touching against C.
    e. A and B are touching on C.

The linguistic theory on which this thesis is based states that transformations cannot change meaning. Therefore, the (a) sentences cannot be related with the (b), (c), etc. sentences transformationally.
In addition to the semantic difference existing between the (a) sentence and the (b), (c), etc. sentences, there are several syntactic facts which militate against relating the (a), (b), (c), etc. sentences transformationally. These will be discussed next.

VII.2.1 Two Strict Subcategorization Features

In the lexicon which is compatible with the PSR hypothesis, the predicates in 1 - 4, together with the predicates in 5, are subcategorized for the two features 6 and 7.

5. collide be interchangeable trade places be brothers
   bump touch switch places permute
   hit rhyme clash mix
   meet be sisters bang be similar

6. \[+ NP \quad \text{Aux} \quad \]
   \[\text{[+tot]} \quad \text{[-ind]} \]

7. \[+ NP \quad \text{Aux} \quad (\text{PREP}) \quad NP \]
   \[\alpha \quad \beta \]
   \[\alpha, \beta = \text{selection features}; \text{perhaps not independent.} \]

Feature 6 states that when the predicates in 5 occur intransitively, the subject must be \[ [+\text{totality} ] \]. \[ [+\text{individual} ] \]

Feature 7 states that the subject of the transitive predicate is not
restricted to the distributional feature complex \([+\text{totality } \land -\text{individual}]\) could be \([+\text{individual}]\).

By subcategorizing the predicates in 5 for the features 6 and 7, the following facts are a consequence of the PSR formulation of coordinate conjunction (et al.) presented in earlier sections. The verbs \textit{collide} and \textit{meet} are used as examples, but the facts hold for all of the predicates listed in 5.

**FACT I:** The \([+\text{individual}]\) quantifiers \textit{each} and \textit{both} cannot occur on the subject of the intransitive \textit{collide}, etc., but can occur on the transitive \textit{collide}, etc.

8. * John and Bill each collided.
9. * John and Bill both collided.
10. John and Bill each collided with Tom.
11. John and Bill both collided with Tom.
12. * John and Bill each met.
13. * John and Bill both met.
14. John and Bill each met with Tom.
15. John and Bill both met with Tom.

Sentences 8, 9, 12, and 13 are blocked since they violate the quantifier insertion conditions discussed in section IV.5. The quantifiers \textit{each} and \textit{both} are \([+\text{individual}]\) and the \([\text{SP}, \overline{N}]\) of the subject is \([+\text{totality }]\).  \([-\text{individual}]\)
FACT II: The [+individual] distributive adverbs cannot be introduced on the conjoined subject of the intransitive collide, but can be introduced on the conjoined subject of the transitive collide.

16. * John and Bill collided simultaneously.
17. John and Bill collided with Harry simultaneously.
18. * John and Bill met simultaneously.
19. John and Bill met with Harry simultaneously.

Sentences 16 and 18 are excluded because they violate the distributional adverb insertion conditions discussed in section IV.5. The distributive adverb simultaneously is [+ind], the [CPL,N] is [-ind].

FACT III: together with and along with phrases do not occur on the intransitive predicates but do occur on the transitive predicate.

20. * John and Bill, together with Harry, collided.
21. John and Bill, together with Harry, collided with the tree.
22. * John and Bill, along with Harry, met.
23. Along with Harry, John and Bill met with Sam.

As was shown in section III.8, together with can only originate in the distributional adverb of a [+individual] conjoined node. Sentences 20 and 22 are excluded because they are [-individual] conjoined subjects.

FACT IV: As was shown in section V.3, respectively constructions require the feature [+individual] on each of the coreferents. The intransitive predicates in 24 and 26 require a [+tot] subject, and,
therefore, cannot be the antecedent of a respectively construction.

24. * John and Bill collided yesterday and today respectively.
25. John and Bill collided with a tree yesterday and today respectively.
26. * John and Bill met yesterday and today respectively.
27. John and Bill met with Harry yesterday and today respectively.

FACT V: The intransitive predicates cannot occur with the conjunctions or or nor, the conjunction must be and. The intransitive predicates can occur with and, or, and nor.

29.a. * John, Bill, or Tom collided.
    b. * Either John, Bill, or Tom collided.
30. * Neither John, Bill, nor Tom collided.

31. John, Bill, and Tom collided with Sam.
32.a. John, Bill, or Tom collided with Sam.
    b. Either John, Bill, or Tom collided with Sam.
33. Neither John, Bill, nor Tom collided with Sam.

34. John, Bill, and Tom met.
35.a. * John, Bill, or Tom met.
    b. * Either John, Bill, or Tom met.
36. * Neither John, Bill, nor Tom met.

37. John, Bill, and Tom met with Sam.
38.a. John, Bill, or Tom met with Sam.
    b. Either John, Bill, or Tom met with Sam.
39. Neither John, Bill, nor Tom met with Sam.

The subject of the intransitive collide (and meet) must be [+totality]. The conjunction and can be [+tot], and so and can be [-individual] [-ind] inserted into 28 and 34. The conjunctions or and nor and the quantifiers either and neither are [-tot], therefore, they cannot occur on the subject [+ind] of the intransitive predicates collide and meet.

The intransitive predicates do not require a [+tot] subject and can be [-ind] [-tot], therefore, either, neither, or, and nor can occur on the subjects [+ind] of the intransitive predicates.72
The PSR hypothesis would assign the following lexical entry to \textit{collide}:

1. Phonological information / Syntactic information / Semantic information \\
common to 1 and 2 common to 1 and 2 common to 1 and 2

\texttt{/collide/}

This branching lexical entry expresses the following facts:

I. There is some phonologic, syntactic, and semantic information common to both the transitive and intransitive occurrences of the verb \textit{collide}.

II. The (1) branch indicates that the verb \textit{collide} can be inserted into an intransitive environment if and only if the subject of the base phrase marker is marked for the features [\texttt{+tot}, \texttt{-ind}].

The (2) branch indicates that the verb \textit{collide} can be inserted into a transitive environment for any specification of distributional features on the subject.

Therefore, FACTS I \rightarrow V of the previous section are accounted for.

III. Any cooccurrence restrictions which may exist between the subject
and object in subcategorization (2), i.e. between the feature specifications $\alpha$ and $\beta$, can be indicated by the same lexical mechanism which indicates the subject-object dependency of exceed.

VII.2.2.1 The Prepositional Complement of the Transitive Subcategorization.

There are two observations to be made: (1) there is a wide variety of prepositions which may occur in the transitive subcategorization, and (2) some predicates, like touch, bump, etc., can occur with a variety of prepositional complements. These two facts are easily accounted for by the PSR-Lexical approach.

The branching lexical entry formulation treats the preposition that occurs with a lexical item as an idiosyncratic fact about that item. Any regularities which do exist can be captured by lexical redundancy rules. As the following shows, there are a large number of prepositions associated with the transitive subcategorization restriction 2.

2. $+$ [ NP Aux ____ (PREP) NP ]

   PREP = with, to, of, against, into, on, from, as, for

3.a. X is connected with Y.

   b. X is associated with Y.

4.a. X is parallel to Y.

   b. X is identical to Y.
5.a. X is a relative of Y.
   b. X is a brother of Y.

6.a. X touched against Y.
   b. X bumped against Y.

7.a. X crashed into Y.
   b. X bumped into Y.

8.a. X borders on Y.
   b. X touches on Y.

9.a. X differs from Y.
   b. X diverges from Y.

10.a. X is a dead ringer for Y.
     b. X is a substitute for Y.

11. X is the same as Y.

Some predicates are purely transitive with no preposition; this can be very easily stated in the subcategorization. These items will be subcategorized for the feature:

\[ 11. + [ \begin{array}{c} \text{NP} & \text{Aux} & \text{NP} \\ \alpha & \beta \end{array} ] \]

\[ \alpha, \beta = \text{selection features; perhaps interdependent} \]

Some examples are:

12. X equals Y.
13. X parallels Y.
14. X resembles Y.
A list of verbs that can occur with no preposition is 15:

15. equal resemble match parallel touch
bump look like duplicate be near marry
divorce be like exceed surpass embrace

Some verbs, like those in 16 and 17, can have a variety of transitive prepositional complements and also a transitive complement with no preposition.

16.a. France touches on Germany in the west.
    b. France touches against Germany in the west.
    c. France touches Germany in the west.

17.a. John bumped into Mary.
    b. John bumped against Mary.
    c. John bumped with Mary.
    d. John bumped Mary.

This distribution of data can be accommodated by a branching lexical entry such as 18.
The lexical entry for **touch** would be:

<table>
<thead>
<tr>
<th>Phonetic Information</th>
<th>Syntactic Information</th>
<th>Semantic Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>common to 1 and 2</td>
<td>common to 1 and 2</td>
<td>common to 1 and 2</td>
</tr>
</tbody>
</table>

/touch/

1. **NP Aux**

   1. **[+tot]**
   2. **[-ind]**

2. **NP Aux** (PREP) **NP**

2.1 **Phonetic**

   **info.**

   **P = /into/**

2.2 **Phonetic**

   **info.**

   **P = /against/**

2.3 **Phonetic**

   **info.**

   **P = /with/**

2.4 **Phonetic**

   **info.**

   **P = /∅/**
VII.3 The Lexicon Compatible with the PSR Hypothesis.

The lexical formulation permits an item to be subcategorized for the features:

1. $\pm$ NP Aux _____
   [+tot] [-ind]

2. $\pm$ NP Aux _____ NP
   $\alpha$ $\beta$

$\alpha, \beta =$ selection restrictions; perhaps not independent

The lexical redundancy rule which specifies the subject-object dependency of exceed, etc. can specify the cooccurrence restrictions that may exist between the $\alpha$ and $\beta$ in subcategorization 2.

We will now analyze the lexical entries for the following three classes of predicates:

CLASS I: Predicates that occur transitively and intransitively.

be identical meet collide be in love with
mix trade places kiss embrace
match be similar bump touch

CLASS II: Predicates that occur intransitively but not transitively.

be far apart be birds of a feather add up to 2.
scatter be mutually independent spread out
be a team be three of a kind be uniform
CLASS III: Predicates that occur transitively and not intransitively.

resemble    be near    equal    dwarf
exceed      run counter to    live with    reside with
be with     surpass   be superior to    be inferior to

These three classes are handled as follows by the PSR hypothesis:

CLASS I: The predicates which occur both transitively and intransitively are subcategorized for the two strict subcategorization features 1 and 2.

1. + NP    Aux    
    [+tot]    
    [-ind]

2. + NP    Aux    NP
    \alpha
    \beta

The data is organized into three subgroups to facilitate the exposition and in order to help the reader judge the productivity of this class.

I.1 The lexical item is subcategorized for 1 and 2, and the two subcategorizations have the same phonologic entry and virtually the same semantic entry. Examples are:

3.a. John, Bill, and Tom are brothers.
    b. John and Bill are brothers of Tom's.
    c. John is a brother of Bill's and of Tom's.

4.a. X, Y, and Z are identical.
    b. X and Y are identical to Z.
    c. X is identical to Y and Z.
5.a. X, Y, and Z are parallel.
b. X and Y are parallel to Z.
c. X is parallel to Y and to Z.

The lexical entry for identical would be:

<table>
<thead>
<tr>
<th>Phonological information</th>
<th>Syntactic information</th>
<th>Semantic information</th>
</tr>
</thead>
<tbody>
<tr>
<td>common to 1 and 2</td>
<td>common to 1 and 2</td>
<td>common to 1 and 2</td>
</tr>
<tr>
<td>/identical/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. NP Aux ___ Phonological Syntactic Semantic
   [+tot] information information information
   [-ind]

2. NP Aux ___ P NP Phonological Syntactic Semantic
   \alpha \rho information information information
   P = /to/

Other lexical items in this group are:

7. be brothers               be sisters               be parallel
   be equal                  be congruent             be blood relatives

I.2 The item is subcategorized for 1 and 2, and each subcategorization
has the same phonetic form, but the semantic reading of the intransitive
predicate is not the same as the reading of the transitive predicate.
This is the largest group, much larger than I.1 and I.3, as reference to
any thesaurus will show. Examples are:
8.a. John, Bill, and Tom are friends.
b. John and Bill are friends of Tom's.
c. John is a friend of Bill's and of Tom's.

9.a. A, B, and C are perpendicular.
b. A and B are perpendicular to C.
c. A is perpendicular to B and C.

10.a. X, Y, and Z are similar.
b. X is similar to Y and Z.
c. X and Y are similar to Z.

11.a. John and Mary are in love.
b. John is in love with Mary.

12.a. John and Mary kissed.
b. John kissed Mary.

Predicates in this group are:

13. meet collide touch trade places
kiss embrace bump hug
clash exchange seats mix differ
switch combine compare favorably confer
join discuss be interchangeable conflict
diverge disagree be independent be cronies
be related be opposed be coworkers be a buddy
be similar be separated be fellow workers be friends
be cousins be perpendicular be dead ringers be equivalent
The lexical entry for *meet* (and all of the predicates in 13) would be 14.

14. Phonetic Syntactic Semantic
    information information information
   common to 1 and 2 common to 1 and 2 common to 1 and 2

/meet/

   1. NP Aux ___ Phonetic Syntactic Semantic
      [+tot] information information information
      [-ind]

   2. NP Aux ___ P NP Phonetic Syntactic Semantic
      $\alpha$ information information information
      $\beta$ P = /with/

1.3 The lexical item is subcategorized for 1 and 2 and has very similar semantic readings for 1 and 2. The phonetic form of subcategorization 1, however, is different than the phonetic form of subcategorization 2. This group of predicates has a branching phonologic entry. An example is *like/alike*:

15.a. John and Bill look alike.

    b. *John and Bill look like.


    b. John looks like Bill.

The items *like* and *alike* are very similar semantically, syntactically, and phonetically. They are also in complementary distribution and can be represented by the same lexical entry. The lexical entry for *like/alike* could be:
17. Phonological information      Syntactic information      Semantic information
                 common to 1 and 2   common to 1 and 2   common to 1 and 2

/like/

1. NP Aux ___ Phonetic information      Syntactic information      Semantic information
     [+tot] [ -ind] /a-.../

2. NP Aux ___ NP Phonetic information
     α     β /Ø-.../

CLASS II: This class includes predicates which occur intransitively but not transitively. They are subcategorized:

+ NP Aux ___
     [+tot] [ -ind]

- NP Aux ___ (P) NP
     α     β

Examples are:

18.a. John and Bill are birds of a feather.

   b. * John is birds of a feather (prep) John.

19.a. John, Bill, Tom, and Mary spread out.

   b. * John, Bill, and Tom spread out (prep) Mary.
20.a. John and Bill are far apart.
   b. *John is far apart (prep) Bill.

21.a. One and one add up to two.
   b. *One adds up to two (prep) one.

The lexical entry for apart (and all the verbs of this class) is 22.

22. Phonological Syntactic Semantic
    information information information
    /be apart/ + NP Aux ___
               [+tot]
               [-ind]

Other predicates in this class are:

23. be far apart be close together scatter
   be of uniform size be mutually independent be a nice couple
   be birds of a feather be mutually substitutable spread out
   be three of a kind be like peas in a pod be a team

CLASS III: This class includes predicates which occur only transitively and not intransitively. They are subcategorized:

- NP Aux ___
  [+tot]
  [-ind]

+ NP Aux ___ (PREP) NP
  α ___ β
Examples are:

24.a. * John and Bill resemble.
   b. John resembles Bill.

25.a. * A and B equal.
   b. A equals B.

   b. A exceeds B.

27.a. * A and B deviate.
   b. A deviates from B.

The lexical entry for resemble (and all of the predicates of this class) is:

28. Phonologic       Syntactic            Semantic
    information      information      information
/resemble/ + NP Aux (F) NP
            \alpha \beta

Other predicates in this class are:

29. exceed         run counter to       parallel
   equal          dwarf               run contrary to
   deviate from   be distinct from    be a living picture of
   be substitutable for be a different thing from be the spouse of
   surpass        live with           reside with
   be with         be superior to     be inferior to
VII.4 The Transformational Conjunct Movement Formulation vs. The PSR Lexical Formulation.

The transformational conjunct movement formulation and the PSR lexical formulation differ considerably in their definition of what is and what is not a kernel sentence. It is an empirical question as to which hypothesis is correct. The following discussion compares the two formulations on several syntactic issues, and the data clearly supports the PSR lexical hypothesis over the transformational hypothesis.

FACT I: As was shown in section II.2.2, the conjunct movement formulation derives sentence 1 from the deep structure 2.

1. John tried to leave with Bill.
2. * John tried for John and Bill to leave.

This analysis violates the deep structure identity constraint which requires the subject of the complement sentence to be identical to the subject of the verb try in the matrix sentence.

The PSR lexical formulation derives sentence 1 from the deep structure 3.
3.a. John tried for John to leave with Bill.

Within the PSR lexical formulation, the deep structure of sentence 1 (i.e. 3) does not violate the deep structure identity condition required by the verb try.
FACT II: The conjunct movement formulation is observationally inadequate and cannot generate sentences 4 and 5. See section II.2.2 for details.

4. John and Bill shared the cake equally with the blind man.

5.a. Gasoline and water mix with alcohol, but gasoline and water do not mix.

b. Gasoline and water mix with alcohol.

These sentences are generated within the PSR formulation. The deep structure of sentence 4 is 6, the deep structure of sentence 5b is 7.
FACT III: The conjunct movement formulation cannot generate sentences 8, 9, and 10 because the conjunct movement transformation is ordered after the passive transformation. See section II.2.2 for details.

8. Bill's wisdom is matched by his understanding.
9. Bill's wisdom is equalled by his understanding.
10. Bill's wisdom is paralleled by his understanding.

These sentences are generated by the PSR lexical formulation as follows. The deep structure of sentence 8 is 11.
The passive rule applies and this generates sentence 8. Sentences 9 and 10 are generated in a similar fashion.

FACT IV: The conjunct movement formulation derives 13 from 12 and must derive sentence 15 from the ill-formed deep structure 14.

12. John and Bill are brothers.
13. John is a brother of Bill's.
14. * John and Mary are brothers.
15. John is a brother of Mary's.

In the PSR lexical formulation, sentences 14 and 15 have different
deep structures. Therefore, the well-formed sentence 15 is not derived from the ill-formed deep structure sentence 14. As was discussed in section VII.3, brother is a CLASS I predicate noun and is subcategorized for both a transitive and an intransitive deep structure insertion. The deep structure of 14 is 16. The deep structure of 15 is 17.

16.

\[
S \\
S \\
S \\
S \\
S
\]

\[
\begin{array}{c}
N \\
V \\
N \\
N \\
\end{array}
\]

\[
[+e,+t,-i,-d,-n]
\]

\[
\begin{array}{c}
N \\
V \\
pres \\
V \\
N \\
N \\
N \\
\end{array}
\]

Sentence 16 is then marked as deviant since the subject must be all [+masculine people].
FACT V: In the conjunct movement formulation, the well-formed (b) and (c) sentences must be derived from the ill-formed (a) sentence:

18.a. * Nobody and John disagreed.
   c. John disagreed with nobody.

   b. John argued with anybody.
   c. ? Anybody argued with John.

This is another case in which the transformational formulation derives a
well-formed sentence from an ill-formed deep structure. The transformational formulation also changes the meaning of the sentence since the (b) and (c) sentences are not synonymous.

The PSR lexical formulation subcategorizes the predicates disagree and argue for a transitive and an intransitive deep structure occurrence. The deep structure of 18a and 18b are 20 and 21 respectively:

20.

This sentence is marked in the base as ill-formed.
FACT VI: The PSR formulation covers a much larger class of predicates than does the conjunct movement formulation.

(1) The conjunct movement formulation makes no claims about the predicates exceed, surpass, etc. See section VII.1.

(2) The predicates collide, be in love, etc. are exceptions to conjunct movement. Although they require an NP subject and have a with-phrase complement, the conjunct movement transformation must be blocked. The with-phrase occurring with
these predicates cannot be transformationally related with the subject. See section 11.2.2 for details.

(3) As was discussed in section 11.2.1, the class of "symmetric predicates is ill defined and it is not clear what predicates are ammenable to the conjunct movement formulation. For example live with, reside with, be with, etc.

(4) Nothing is said within the transformational formulation about the restrictions on the subject of the intransitive predicate for: distributive quantifiers, distributive adverbs, together with phrases, and coordinate conjunction constraints. As was discussed in section VII.2, these restrictions are not on the subject of the transitive predicate.

(5) It is not clear how the conjunct movement formulation could be extended to incorporate: (a) the diversity of prepositions that can occur on the subject of the intransitive subcategorization, and (b) the fact that some predicates (touch, etc.) can occur with more than one prepositional complement (touch on, touch, touch against, etc.); these complements all differ in meaning and cannot be derived from the same deep structure.

The PSR lexical formulation accounts for the above facts in the sections mentioned. The facts are accounted for (1) by positing branching lexical entries in which each branch represents a strict subcategorization feature, and (2) by employing the features [±individual] and [±totality]
to indicate subject-verb selection restrictions in the strict subcategorization of the predicates. These features were independently motivated in the previous sections from a study of coordinate conjoined structures, distributive adverbs, reciprocal constructions, etc.
FOOTNOTES TO THE INTRODUCTION:

1. I am indebted to Lila Gleitman for this information.
1. A feature grammar reflects the fact that two lexical items may be alike in certain respects and distinct in others, and that there are a fixed number of such dimensions of sameness and difference.

2. The incorporation of features into a grammar is discussed by Chomsky in *Aspects*, pages 79-83, and in *Aspects*, Chapter II, footnote 13.

3. FACT III was presented by Chomsky in a lecture, Fall, 1967.

4. FACT IV was suggested to me by Sylvan Bromberger.

5. Sentence 12a is grammatical if John and Bill team up to kill a dog. It cannot however be synonymous with 11, and this is the only point of concern.


7. Although the elements both and together are proposed as diagnostics within the Lakoff-Peters formulation, no deep structures are proposed for both or together.

8. FACT I was first presented by Perlmutter. The deep structure identity condition that exists for the verbs try, learn, etc. was first discussed by Perlmutter in his paper: *Two Verbs "begin"*, Brandeis University.

9. Jespersen discusses this data in several works. Jespersen felt that all and both were in apposition with the constituent they quantified, i.e. all and both were not involved in partitive constructions. See footnote 12 for an analysis of Jespersen's analysis of the distributive quantifiers and for references to Jespersen's works.

10. The [-exhaustive] quantifiers most and part are not exceptions to this formulation. The (b) sentences below are not relevant to the discussion of the appositional occurrence of the distributive quantifiers.
1. a. Most of the women were pregnant.
   b. The women were mostly pregnant.

2. a. Part of the cake was eaten.
   b. The cake was partly eaten.

   It is not clear that the (a) and (b) sentences can be transformationally related. Notice that 3a and 3b are not synonymous.

3. a. Most of the women hit the men.
   b. The women mostly hit the men.

11. These features have been discussed previously in Dougherty, (1, 2, 3, 4).

12. The features \([\pm\text{ totality}] \) and \([\pm\text{ exhaustive}] \) relate directly to Jespersen's classification of the quantifiers.

   In Essentials of English, Jespersen divides the quantifiers into two groups: quantifiers of totality, (my \([\text{+exhaustive}] \)), and quantifiers of unspecified amount, (my \([-\text{exhaustive}] \)). My division is essentially the same as his, but I will not adhere to his terminology for two reasons:

   First: In an earlier paper, I have used the feature \([\pm\text{totality}] \). My feature \([\pm\text{totality}] \) is almost equivalent to Jespersen's notion complete.

   Second: Jespersen's terminology seems intuitively unclear. He calls the quantifiers all and both quantifiers of complete totality. He calls the quantifiers each, any, either, etc. the quantifiers of incomplete totality. The term incomplete totality seems inherently contradictory and intuitively unclear.

   Where Jespersen calls all, each, both, either, any, none, and neither the quantifiers of totality (his term), I call them \([\text{+exhaustive}] \) quantifiers
since they refer exhaustively to all the elements of a set. The quantifiers some, few, etc. do not refer exhaustively to a set and are [-exhaustive].

**All and both** are [+exhaustive] since they refer exhaustively to [+totality]

all of the elements of the set as a totality, i.e. all at once.

**Each, any, either, neither, and none** are [+exhaustive] since [-totality]

they refer exhaustively to all of the elements of the set but not as a totality, i.e. not all at once.

(a) **All** and **both** were in appositional constructions.

Jespersen considered the [+totality] quantifiers, i.e. **all** and **both**, to be different from other quantifiers. **All** and **both** were not in partitive constructions, they entered into appositional constructions.

Jespersen differentiated between "partitive" and "appositional" quantifier constructions. He distinguishes between a partitive use and an appositional use of the preposition of and considers the partitive of to be the equivalent of a genitive. Under the category of partitive of, Jespersen lists the following examples among others:

1. One of his daughters
2. The rest of the party

In section 9.6, Vol. VII, Jespersen states:

In the preceding parts of this chapter [examples 1 and 2, RCD] we have considered uses of of-combinations more or less equivalents of a genitive...

It will be found that in the following sections we have not infrequently cases in which of may, or may not, be used, so that the combination may often be considered a kind of apposition.

Jespersen then states that the of occurring with all and both is not a partitive of, but an appositional of, i.e. Jespersen does not think that
all and both are involved in partitive constructions in Modern English. The following states his views and offers evidence to further Hall's claim. (See footnote 13) The following is from Vol. VIII, section 9.91, Appositional of:

9.91 I use this term in cases when the two words connected by of are coextensive and in which, therefore, the term partitive is not applicable, though the NED (of 42c) says, "Under the partitive form the whole may be included." The combination all of was, if not directly produced, at any rate helped on by such instances as: this is found in some, but not in all, of the books on the subject/ Spencer A 1.398 I saw in her many, if not all of the needful qualifications/ Henderson Sc Lit 323 he shared in some, though not in all, of the superstitions of the ecclesiastic/ Wells T 32 slip off some or all of your clothes/ Galsw Sw 261 If anything should happen to either or both of us, things would soon be in Queer Street.

9.9, According to Baldwin #86, neither all of them nor both of them is found in Malory; but from Elizabethan times these expressions become frequent.

13. As the text shows, the quantifiers all and both are similar syntactically and both can be considered the dual of all [+tot].

[+ind]

There is also historical evidence to show that all and both were in similar non-partitive constructions in Old and Middle English. All and both have had similar historical developments.

In her termpaper for Professor Klima, Jan. 7, 1962, 23.785, Barbara Hall says that in Old English all was not involved in partitive genitive constructions: (page 16)

In Old English the "prearticles" [this includes what I call quantifiers, RCD] could be used with nouns in two ways: either with the prearticle agreeing in case with the noun or with the prearticle having the case required by the syntactic position of the noun phrase and the noun having the genitive case (genitive plural for count nouns, genitive singular for mass nouns and collectives). Almost all prearticles had both possibilities; all was a notable exception, being used always with the noun in the same case as the prearticle.

In a later paper, A Preliminary Attempt at a Historical Approach to Modern English Predeterminers, term paper for Prof. Klima, 23.732, May 25, 1962, Hall mentions since all and both in O.E. were not used with an
inflected noun (i.e. in the genitive case) that when prepositional expressions using of replaced genitive constructions, the expressions with all and both did not require the preposition of: (section 5.7)

So far it has been considered coincidence that all and both are the only predeterminers of modern English which can be used before the without an intervening of; however, their Old English counterparts, eall and begun, are the only predeterminers of Old English which are never used with the noun in the genitive case. This opens up the possibility that "all of the boys" and "both of the boys" are derived from the primary forms "all the boys" and "both the boys" by extension of the of-insertion transformation from other predeterminers to these two, rather than the latter pair being derived from the former by an unexplained optional deletion. If this is correct, I would expect that when the change is first made from genitive inflection to the use of of, that all and both will not be found occurring with of.

In a later paper, Prearticles in English: Their Contemporary Grammar and Historical Development, Jan. 7, 1963, term paper for Prof. Klima, Hall indicates that her intuition was substantiated:

(page 24) The prediction I made in my earlier historical paper, May 25, 1962, that all would not be used with of in Chaucer was correct, there are many, many instances of all in the Canterbury Tales, and I have not found a single one using of.

(page 29) As in Chaucer's period, the Elizabethian usage of all is never with an of.

This is further substantiated by the last quotation from Jespersen in footnote 12.

14. Some speakers do not like simple example sentences like 47. By choosing more complex examples, however, speakers will agree to the wellformedness of a sentence in which both and simultaneously cooccur. Well-formed examples can easily be found. The following example is from The Sound Pattern of English, page 7:

Thus, if A, B, C are formatives, the surface structure of the string ABC cannot specify AB as a phrase and BC as a phrase, for the string may be bracketed either as ((AB)C) or as (A(BC)), but not in both ways simultaneously.
15. Insertion conditions are discussed in section IV.5, page 145.

16. It must be mentioned in the lexicon that the object must be interpreted as having an indefinite reference. This is a property of the verb and not of the object.

Notice that although the object is syntactically singular, i.e. a girl, it is semantically a plural. Any pronoun referring to the object, i.e. a girl, must be plural:

1.a. John and Bill each deflowered a girl and I knew them both.

b.* John and Bill each deflowered a girl and I knew her.

17. Sentences 115 and 116 were suggested to me by Richard Kayne.

18. Some predicates which are subcategorized for a [-totality ] subject [-individual] have the peculiarity that they sound strange if the conjoined subject does not have "enough" conjuncts. For example, the following (a), (b), etc. sentences sound peculiar, but as the number of conjuncts increases, i.e. (e), (f), etc., they sound better:

2.a. John and Bill dispersed.

b. John, Bill, and Tom dispersed.

c. John, Bill, Tom, and Harry dispersed.

d. John, Bill, Tom, Harry, and Joe dispersed.

e. John, Bill, Tom, Harry, Joe, and Sgt. Shriver dispersed.

f. John, Bill, Tom, Harry, Joe, Sgt Shriver, and King Kong dispersed.

2.a. John and Bill scattered.

b. John, Bill, and Tom scattered.

c. John, Bill, Tom, and Harry scattered.

d. John, Bill, Tom, Harry, and Lulu scattered.

e. John, Bill, Tom, Harry, Lulu, and LBJ scattered.

f. John, Bill, Tom, Harry, Lulu, LBJ, and Rusk scattered.
3. a. A and B make a pile. (assume A, etc. are matches, etc.)
   b. A, B, and C make a pile.
   c. A, B, C, and D make a pile.
   d. A, B, C, D, and E make a pile.
   e. A, B, C, D, E, and F make a pile.
   f. A, B, C, D, E, F, and LBJ make a pile.

All of the above sentences are grammatical. It is a semantic fact that a pile generally consists of more than two or three matches.

These predicates are fundamentally different from those predicates which can never have conjoined subjects. No amount of conjoined singulars will make 4, 5, and 6 grammatical:

4. * John, Bill, and Tom are numerous.
5. * John, Bill, and Tom are abundant.
6. * John, Bill, and Tom doubled in number. (or, halved in number).

These predicates require a plural, a collective, or (sometimes) a mass noun:

7. The men were numerous.
8. Sugar was abundant.
9. The group doubled in number. (or, halved in number).

See pages 9 and 10 for a discussion of these latter predicates.

19. Notice that in sentence 2a, the pronoun is his, but in 2b the pronoun is our. That is, the pronoun apparently changes person after Quantifier Postposition.

2. a. Each of us prays in his own way.
   b. We each pray in our own way.

Now consider sentences A and B.
A. Each of us prays in our own way.
B. We each pray in our own way.

What is the difference between 2a and A? In my dialect sentence 2a is an exclusive we - a preacher would say this to someone outside of his fold. Sentence A is an inclusive we - the preacher says this to his own flock.

There is no sentence D.
C. Each of us prays in his own way.
D. WE each pray in their own way.

This distribution of data might be interpreted as indicating that the semantic feature \[±\text{inclusive we}\] has syntactic correlates, specifically, with respect to pronoun- antecedent agreement.

20. This section is based on the suggestion made by Chomsky in footnote 7 of Chapter III of Aspects: (page 224)

... rule schemata need not be stated in the grammar at all. Rather, by a general convention we can associate such a schema with each major category. This approach to coordination relies heavily on the filtering effect of transformations, discussed later. Thus whenever we have coordination, some category is coordinated n times in the matrix sentence, and n occurrences of matched sentences are independently generated by the base rules.

21. Within the PSR formulation, there are two deep structures for sentence A.

A. John both ate and drank.

One deep structure is B. The other deep structure is C.

B.

```
S
   /\  
  NP VP
     /\   \ [+e, +i, +t, -d, -n]
    John Q VP VP
          /\    /
         both ate drank
```
The transformational conjunction rule would then convert C to A.

The PSR formulation states that sentence A is structurally ambiguous between two synonymous deep structures. There is no empirical evidence to indicate that this formulation leads to difficulties. Although two derivations are given for sentence A, the PSR Hypothesis:

1. predicts the correct range of semantic interpretations
2. assigns structural descriptions in a correct and motivated way
3. generates only the set of grammatical sentences
4. embodies no inherent contradictions.

There is no apriori reason to exclude the possibility that a grammar will derive a semantically unambiguous surface structure from two (or more) synonymous deep structures. This is, in fact, an empirical issue and must be decided by empirical arguments.

The PSR Hypothesis supports the contention that a semantically unambiguous surface structure may be derived from two or more synonymous deep structures.

At present no factual arguments are known to support the contention that a semantically unambiguous surface structure may not be derived from two or more synonymous deep structures.

22. Sentence 10 has two entirely different intonations which disambiguate the sentence in normal discourse.
23. This hypothesis was first discussed by Chomsky in *Nominalizations* where he introduced the bar notation. The bar notation will be discussed in detail in *The Structure of the Base*, Dougherty, (forthcoming).

24. The feature complex 1 will be written as 2.

\[
\begin{array}{ll}
1. & [\text{ inexh}] \\
& [\text{ tot}] \\
& [\text{ ind}] \\
& [\text{ dis}] \\
& [\text{ neg}] \\
2. & [\pm e, \pm t, \pm i, \pm d, \pm n]
\end{array}
\]

The features will be abbreviated to their first letter, and the complex will be listed horizontally and not vertically. This has no empirical significance and is solely to simplify the task of typing.

25. There are constraints to block many of the possible combinations, such as those listed in 1:

1. *each of each, each of either, neither of all, etc.*

These constraints are statable and are needed to block sentences 2-4.

2. *Each of the men and each of the women hit each other.*

3. *All of the men and all of the women like cake and pie respectively.*

4. *John and Bill and the men hit Mary and Sue respectively and their respective wives respectively.*

The constraints necessary to block the above constructions are motivated and presented in Dougherty, (forthcoming).

26. The optional specifier deletion transformation is stated on page 135.

27. *each* is obligatorily postposed in this sentence. See section V.I.5 on page 206 for the motivation and analysis behind this derivation.

28. In this thesis no transformational mechanism is presented which will derive 5b from 5a. The derivation of 5b from 5a by a deletion transformation will be discussed in Dougherty, (forthcoming). The Appendix on recoverable deletions, at the end of this thesis, discusses
29. These facts indicate that feature percolation functions in the surface structure, or, at least, after the passive transformation. Feature percolation is probably a general mechanism that functions both in the deep and surface structure. It may be an "everywhere" mechanism.

30. Sentences like 1 are not an exception to this.

1. Come here and I'll give you a dollar.

This is not the type of conjunction discussed in this thesis. Notice that if the order of conjuncts is reversed, the conjunction cannot be and:

2. * I'll give you a dollar and come here!

3. I'll give you a dollar if you come here.

It seems that the most likely analysis of sentences like 1, 2, and 3 involves a study of conditional coordinations and the element if.

31. These examples are due to Ron Hoffman.

32. A counterexample to this claim has been presented by Ray Jackendoff. The reflexive pronoun in sentence 1 is in a higher sentence than its referent.

1. The picture of himself that John saw in the postoffice was not a good likeness.

33. This was pointed out to me by David Perlmutter.

34. This was pointed out to me by David Perlmutter.

35. See Postal, Paul, "On So-called Pronouns in English".

36. A third fact is that the rest can precede the other in the same determiner. The following show that the rest is similar to the partitives,
i.e. the rest is like lots of:
1. lots of the strange men.
2. lots of the other men
3. the rest of the strange men
4. the rest of the other men

37. The element fellow is a nominal prefix and it is not analyzed in detail in this thesis. Compound nouns and nominal prefixes are outside of the scope of this thesis. fellow is discussed only in-so-far as it is involved in reciprocal constructions; the exact location of fellow in the deep structure noun phrase is unknown at present.

38. The definite article is mentioned in the transformation because of the following example. The fact that 1, 2, and 3, are false is of no concern. The important fact is that 2 and 3 are synonymous with each other and that 1 is not synonymous with either 2 or 3. These sentences indicate that each other forms only if the definite article is on others.
1. Each of the integers is a multiple of other integers.
2. Each of the integers is a multiple of the other integers.
3. The integers are multiples of each other.

39. Chomsky, Aspects, page 146. This fact is also support for a cyclic grammar. That is, the facts concerning quantifier movement are accounted for by Chomsky's universal movement constraint, and this constraint requires a transformational cycle.

40. Many of the above facts also hold in French, German, and Russian. This suggests that in these languages, reciprocal constructions might be generated by mechanisms similar to those operating in English.

For example, just as 2 is derived from 1 in the grammar of English,
4 might be derived from 3 in the grammar of French:

1. We each talked to the other.
2. We talked to each other.
3. L'un parle à l'autre.
4. Ils se parlent l'un à l'autre.

In Russian and in French the preposition is "internal" to the reciprocal pronoun in the surface structure. The French sentence 6 and the Russian sentence 7 correspond to the English sentence 5.

5. We spoke each to the other.
6. Nous parlons l'un à l'autre.
7. Мы говорим друг с другом.

The German sentence 9 corresponds to the English sentence 8 both in syntactic structure and in semantic interpretation.

8. Each of them spoke to the other.

These cross-language observations are only intended to suggest a direction for further research. As they are stated above, these observations have very little empirical weight. It would require language internal evidence to justify the acceptance or rejection of the PSR hypothesis to describe the grammar of reciprocal constructions in German, Russian, French, etc.

41. Another quantifier introduced transformationally is a few. Chomsky suggested a transformation to derive a few from not many, i.e. as in 1.

1. not many $\rightarrow$ a few

Barbara Hall discusses this derivation in her papers.

It has also been suggested by Klima (in lectures, Spring, 1966) that any can be derived from some in certain environments, i.e. as in 2.
2. some $\Rightarrow$ any / negative question etc.

42. That is, the adverbs almost, etc. cannot cooccur with any distributive adverb except all, as the examples in 20 show. These adverbs can, of course, occur with numbers, such as in A, but this is not relevant to the discussion of the distributive adverbs.

A. Almost seven men came.

The adverb virtually seems only to occur if all is present. Virtually does not occur with numbers; sentence B is ill-formed.

B. * Virtually seven men came.

43. Sentence 25 is obligatorily changed to 23 if every formation does not apply.

44. This FACT was taken from the Oxford English Dictionary, the entry for every.

45. Further examples of sentences with a reciprocal interpretation are:

A. John hit Bill and Bill hit John in return.
B. John and Mary exchanged back-rubs.
C. John hit Mary and Mary hit John back.
D. John hit Mary and Mary reciprocated in kind.
E. John hated Bill, and the feeling was mutual.


47. There has been discussion of a "crossover constraint", suggested by Postal, which might be invoked to block the ill-formed sentences, but no exact formulation of this rule is known to me. It would seem that a crossover constraint would block all of the (b) sentences, including the well-formed sentences.

48. Perhaps this statement is too strong. The evidence presented in this section shows only that surface structure information must be
considered in determining the grammaticality of a sentence. A well-formed deep structure may undergo transformational development and then be blocked in the surface structure by surface structure considerations. This point will be discussed in Dougherty, *The Structure of the Base*, (forthcoming).

49. The PSR hypothesis claims that the correct distribution of grammatical sentences is accounted for by generating the (a) sentences in the base and determining reference from the relative position of the reference determining elements in the derived structure (b) sentences.

An alternative view might contend that the ungrammatical sentences are excluded by the prohibition against backward pronominalization.

There are several arguments to support the PSR hypothesis:

ARG I: Sentences 39b and 40a contain no anaphoric pronouns. Therefore, the constraint against backward pronominalization cannot exclude these sentences.

ARG II: If sentence 37b is excluded by backward pronominalization, this implies that a grammatical sentence would be formed if foreward pronominalization had applied. But what would by the result of foreward pronominalization? Not sentence 1 or 2.

37.b. * His brothers are hated by each of Mary's sons.
1. * Each of Mary's son's brothers hates him.
2. * Each of Mary's son's brothers hates them.

The concepts "foreward pronominalization" and "backward pronominalization" do not seem meaningful in regard to the above example.

This thesis maintains that the anaphoric pronoun *his* in sentence 37a is inserted in the deep structure and interpreted in the surface structure:
37.a. Each of Mary's sons hates his brothers.

ARG III: Sentences 27b, 28a, 29b, 30a, 31b, and 32a are not excluded by backward pronominalization since the others, the rest, the balance, fellow worker, etc. cannot be inserted by a pronominalization rule. These are meaning bearing elements and must be present in the base. (see FACT III in the text, this section).

50. Sentence 50 is, of course, well-formed if the she does not refer to the girls scouts, but refers to some third person. The relevant point is that 49 and 50 are not synonymous.

51. This example is from Lees and Klima, Rules for English Pronominalization.

Other examples which could be listed under 7, i.e. as requiring a [+individual] reflexive pronoun, are:

- enjoy oneself, lose oneself (in a book), absent oneself, collect oneself, conduct oneself, better oneself, comport oneself, compose oneself

Examples which could be listed under 8, i.e. as requiring a [-individual] reflexive pronoun, are underlined in the sentences:

A. The leaves scattered themselves across the field.
B. The children spread themselves out on the lawn.
C. We grouped ourselves under one flag.

52. This argument would be invalidated if there were a general constraint in the grammar to prohibit the conjunction of a reflexive and a non-reflexive noun. There is no empirical evidence to support such a constraint. There is, however, much evidence to show that such a general constraint cannot exist. The following sentences contain a conjunction of a reflexive and a non-reflexive element:

A. John paid for Mary and himself out of his own pocket.
B. John discussed himself and his future plans with his wife.
C. John discussed his plans for himself and his wife with the minister.

D. Did you name the little bugger after yourself or someone else?

E. I didn't name the little bugger after myself or anyone else, I just gave him a number.

53. This constraint is analagous to the A over A movement constraint proposed by Chomsky in Current Issues in Linguistic Theory. Chomsky suggests that the evidence in this section indicates that an interpretive rule for pronouns must apply to the highest node. [personal communication] This would generalize the A over A principle to interpretive rules for pronouns.

For a thorough analysis of the A over A principle and movement constraints in general, see Ross, Constraints on Variables in Syntax.

54. In-so-far as I have been able to determine, this analysis was first proposed by Chomsky.

55. The independently motivated feature percolation mechanism duplicates the features on all lower nodes. (see section IV.5, page 145)

56. It is only crucial to the PSR hypothesis that [respectively] be a sentence feature; it is irrelevant if it is disjunctive with the other sentence features mentioned in rule 1.

57. The element respective is not an adjective, but is a part of the nominal specifier. This is supported by the following facts:

FACT I: respective does not occur in predicate position.

1. John and Bill hit their respective wives.

2.* John and Bill hit their wives who were respective.

FACT II: respective exhibits cooccurrence restrictions with the articles. respective, like fellow, only occurs with a possessive pronoun; the, a,
etc. cannot occur.

3.a. John and Bill hit their respective wives.
   b. * John and Bill hit the respective wives.
   c. * John and Bill hit respective wives.
   d. * John and Bill hit these respective wives.

FACT III: No adjectives can occur before or after respective.

4.a. * John and Bill hit their fat respective wives.
   b. * John and Bill hit their respective fat wives.

FACT IV: No adjectives can conjoin with respective:

5.a. * John and Bill hit their fat and respective wives.
   b. * John and Bill hit their respective and fat wives.

FACT V: respective has no comparative or superlative degree:

6.a. * John and Bill hit their more respective wives.
   b. * John and Bill hit their most respective wives.

58. Sentence 36 is from a BMW owners manual. Sentences like 36 occur frequently in technical journals.

For some speakers, [+totality ] adverbs can occur freely in [+individual]

respectively constructions:

1. John and Bill simultaneously hit Mary and Sue respectively.
2. John and Bill simultaneously hit their respective wives.

Some dialects permit both to occur on the antecedent constituent. (Sentence 5 is from the American Rifleman, April, 1968)

3. John and Bill both left in their respective cars.
4. John and Bill were both shot by their respective wives.
5. They both left in their respective cars.
6. They both were shot by their respective wives.
To the extent that these sentences are grammatical, this is further support that the feature [+individual] is on the related constituents of a respectively construction.

59. Although sentence 37 is ungrammatical, sentences 1 and 2 are grammatical:

37. *John and Bill met in New York and Chicago respectively.
1. The men and the women met in New York and Chicago respectively.
2. My club and his club met in New York and Chicago respectively.

See page 128 for the deep structure and derivation of sentence 1.

60. The expression the difference between X and Y behaves differently from the distance between X and Y with respect to respectively constructions. There are no examples of respectively constructions which have the distance between X and Y as one of the related elements, that is, there is no example like 2:

1.a. We studied the difference between John's words and deeds as represented by his ideas and acts respectively.
   b. ...the difference between X and Y ... P and Q respectively.

2. *...the distance between X and Y ... P and Q respectively.

This was pointed out to me by Chomsky and is stated here as an unexplained fact.

61. Chomsky has pointed out to me that sentences 44 and 45 are stronger examples that 42 and 43 in choosing between the PSR hypothesis and the transformational hypothesis. A transformationalist might postulate sentence A as the deep structure of sentence 42.

A. We must distinguish between monisms and pluralisms as monisms and pluralisms are represented by Socrates and Protagoras respectively.
A transformational rule could then delete the underlined elements of sentence A and derive sentence 42.

Sentences 42 and 43 are complex sentences joined by the element as and permit derivation from a conjoined sentence deep structure. This analysis, however, would not be possible in sentences 44 and 45 since these are simple sentences.

62. Another example is sentence 1.

1. As the grammatical relations are varied, the semantic interpretation varies correspondingly.


64. This same argument applies to reciprocal constructions which have a plural head noun in the antecedent. Section 1.1 (page 9) shows that plural noun phrases cannot be derived from conjoined singular noun phrases by any coherent analysis. Therefore sentence A is beyond the transformational hypothesis:

A. Each one of the goats butted the others.

65. These sentences were pointed out to me by John Ross.

66. See footnote 61 for a point relevant to this discussion.

67. It is crucial to the PSR formulation that respectively constructions are constrained to a single sentence. It is irrelevant to the PSR Hypothesis, but not to my particular formulation of this hypothesis, if respectively, imperatives, negatives, and questions are or aren't mutually exclusive. If these constructions are not mutually exclusive, then eliminate the disjunctive bracketing around the features in PS rule 18. See footnote 56.

68. Chomsky, Aspects, page 118.
69. Some speakers do not accept sentences 2 and 3; for these speakers, the verb *exceed* requires a complement. Sentences A and B should be well-formed for all speakers.

A. The Empire State Building exceeds the Woolworth Building in height by fifty feet.

B. A mother's love exceeds a father's love in intensity and duration.

The argument proposed in the text can be expanded to accommodate the above facts.

Cooccurrence restrictions are not simply between the subject, the verb, and the object - they are between the subject, the verb, and the verbal complement. That is, in addition to the subject-object dependency, the strict subcategorization of the verb *exceed* must express the dependence of the complements on the selection features common to the subject and the object. The particular nouns which may be the objects of the prepositional phrases in the verbal complement structure of *exceed* depend on the selectional feature which is shared by the subject and object. For example:

1. The Empire State building exceeds the Woolworth building in height by fifty feet.
2. A mother's love exceeds a father's love in intensity and duration.

The verbal complements in 1 indicate that physical objects were compared; the verbal complements in 2 indicate that abstract objects were compared. The complements of 1 and 2 cannot be interchanged:

3.* The Empire State building exceeds the Woolworth building in intensity and duration.
4.* A mother's love exceeds a father's love in height by fifty feet.
This indicates that strict subcategorization restrictions are more complex than discussed in the text. The lexical mechanisms discussed in the text must be extended to subcategorization restrictions like 5:

```
5. NP AUX (PREP) NP (PREP NP) (PREP NP)
   a    b       c       d
```

\( \alpha, \beta, \delta, \theta = \text{selection restrictions, not independent.} \)

70. This mechanism accounts for those predicates which undergo conjunct movement in the Transformational Hypothesis. It also accounts for those predicates which cannot undergo conjunct movement, i.e. collide, crash, bump, touch, etc.

71. Sentences 13 and 17 are well-formed if each man is shrinking or expanding. It is only relevant however, that 13 and 11 are not synonymous. Nor are 15 and 17 interpreted the same.

72. It seems to be a fact that a [-individual] noun phrase cannot consist of a singular noun. If a singular noun is considered [+ individual], and there seems to be much motivation for this, then it is a consequence of the subcategorization of intransitive predicates (meet, etc.) that no singular noun phrase can occur as the subject. That is sentence A cannot be generated because meet requires a [-ind]

\ [+tot] subject when it occurs intransitively, and a singular noun phrase is [+individual].

A.* A boy met.
73. The possibility of branching lexical entries was mentioned by Chomsky in *Aspects*, page 214, footnote 15:

... such relationships can be expressed by taking a lexical entry to be a Boolean function of features.

Perlmutter mentions that the verb *begin* requires two subcategorizations. This is discussed in Perlmutter, *Two Verbs "begin"*

74. This is discussed in Klima, *Negation in English*.

75. It is only relevant that 8 cannot be interpreted in the sense of sentence 3. This cannot be the *may* of possibility.

76. Sentences 9 and 10 can be interpreted with the *may* of permission or the *may* of possibility, i.e. in the sense of 3 and 4.

77. The feature \[ \text{+mod.feat.} \] would, of course, have to be motivated; in particular, it would have to have syntactic correlates and be operationally defined in terms of the role it plays in the grammar.

This seems possible - notice that the *may* of permission and the *may* of possibility have different syntactic properties. They differ in (I) adverb cooccurrence restrictions, (II) application of transforms, and (III) morphological forms.

**FACT I:** The two adverbs have different adverb cooccurrence restrictions. The *may* of permission cannot have *very well* in the verb phrase, the *may* of possibility can. The *may* of possibility cannot have *certainly* in the verb phrase, the *may* of permission can:

\[ \text{may of possibility} \]

1. There is a chance that John may *very well* go to New York.
2. * There is a chance that John may *certainly* go to New York.

\[ \text{may of permission} \]

3. * John may very well go to New York.
4. John may *certainly* go to New York.
Sentence 3 is not grammatical if the *may* is interpreted to mean permission.

FACT II: The *may* of permission can occur in questions, the *may* of possibility cannot.

1. John may go to New York.
2. May John go to New York?

Sentence 1 is ambiguous, but sentence 2 is unambiguous. Sentence 2 can only mean a request for permission.

FACT III: The *may* of possibility has a morphologically related term *might*, the *may* of permission does not. Sentence 1 is unambiguous and can only mean 2.

1. John might go to New York.
2. It is possible that John will go to New York.

Sentence 1 cannot mean 3.

3. John is allowed to go to New York.

78. This transformation uses the \((\ ))^*\ notation as discussed on page 344 of *The Sound Pattern of English*.

79. The linguistic theory underlying the Transformational hypothesis states that all meaning is determined in the base, and a transformation may not alter the semantic interpretation as it is determined in the base.

The linguistic theory underlying the PSR hypothesis states that some of the semantic interpretation, such as grammatical relations, meaning of lexical formatives, etc., is determined in the base. Other aspects of the semantic interpretation of a sentence, such as reference of pronouns, the interpretation of *respectively*, and perhaps aspects of quantification, are determined from surface
structure considerations. A transformation may not alter those aspects of the semantic interpretation that are determined in the base, i.e. a transformation may not alter the grammatical relations, etc.

80. In fact, this would have to be a prior to surface structure constraint because sentence 1 is also ill-formed.

1. * Is John?

The constraint must exist prior to the question transformation and hence be an "intermediate constraint". This seems to be a very unpromising dilemma for the transformational hypothesis.

81. This is not only impossible, this is a contradiction of the terms Phrasal Conjunction and Sentence Conjunction.

82. Lakoff and Peters present the following argument to show that the order of transformations must be:

Passive Transformation

Conjunct Movement Transformation.

This is from pages VI-10 to VI-13, Phrasal Conjunction and Symmetric Predicates:

We suggested above that sentences like

50. John killed a man with Bill.

were to be derived from structures underlying sentences like (51),

51. John and Bill killed a man (together).

where "John and Bill" forms a phrasally conjoined NP in the deep structure. ...

So far, we have only asserted that sentences like (50) should be derived from structures underlying sentences like (51), and that the with-phrase of accompanyment ("with Bill" in (50)) is derived and not basic. Let us now consider some evidence for this assertion. Consider (53).

53. John was killed with Bill.
(53) is synonymous with (54).

54. John and Bill were killed (together).

"Bill" in (53) is understood as part of the superficial subject of "be killed", which is to say, it is understood as part of the underlying object of "kill". In (53) we know that someone or something has killed Bill. Now compare the phrase "with Bill" in (53) to the same phrase in (50). In (50) "Bill" is understood again as part of the superficial subject of "kill", but it is also understood as part of the underlying subject of "kill". In (50), Bill does the killing, he doesn't get killed.

These examples show that the underlying grammatical relations that the object of "with" bears to the other elements in the sentence is not fixed, but depends at least on whether or not passivization has applied. But, by definition of underlying structure, grammatical relations are fixed in the base and cannot depend on transformations. Unless such a conception of grammar is incorrect, the "with"-phrases cannot be introduced in the base.

Moreover, the objects of "with" do not enter into any grammatical relations which are different from those already defined in the base component; in fact, they are limited exactly to grammatical subjects and grammatical objects. This fact lends credence to our claim that they are actually derived from real subjects and objects.

We can account for the way we understand (50) and (53) by hypothesizing that in each case the underlying structure contains the phrasally conjoined NP "John and Bill" and by hypothesizing that rules such as Preposition Adjunction and Conjugt Movement apply after the application of the passive transformation. This would account for the fact that in both cases the object of "with" is understood as part of the superficial subject of the sentence and that in passive constructions it is understood as part of the underlying object.

As is discussed in the text, the above data and generalizations are questionable. Consider two counterexamples:

First, notice that "with"-phrases of accompanyment can occur in surface structure object position as in sentence 2.

1. Simon Legree would sell a slave and his wife (together) for slightly less than twice the price of the male slave alone.

2. Simon Legree would sell a slave with his wife for slightly less than twice the price of the male slave alone.

Second, notice that the "with"-phrase of accompanyment in 3 is
ambiguous between 4 and 5:

3. Simon Legree killed the slave with his wife.
4. Simon Legree killed the slave with his wife because he didn't want to let the poor man die alone.
5. Simon Legree and his wife killed the slave.

Third, notice that 6 is ambiguous between 7 and 8.

6. John killed Bill with Harry.
7. John killed Bill with Harry because he didn't want to kill just Harry.
8. John and Harry killed Bill.

One might now ask why 53 is not ambiguous. Notice that the deep structure of 53 has a dummy symbol, \( \Delta \), as a deep structure subject. One might propose the constraint that with--phrases cannot originate in a deep structure noun phrase that contains a delta as one of the conjuncts.

The above distribution of data is correctly accounted for by the PSR hypothesis. All of the with-phrases discussed above are together with-phrases as discussed in section III.8 of the thesis. There is a constraint which prohibits distributional adverbs from occurring with a dummy symbol, \( \Delta \). Notice that the following are all ill-formed:

9. * \( \Delta \) alone killed John by Passive.
10. * \( \Delta \) simultaneously killed John by Passive.
11. * \( \Delta \) along with Bill killed John.

It is for this reason that (53) is unambiguous.
APPENDIX I: Diachronic Aspects of the Reciprocal Pronoun each other and the Quantifiers all, both, each, and every.

The text of this thesis presents a synchronic grammar of the reciprocal pronoun each other and of the distributive quantifiers each, all, both, and every.

We will now examine some diachronic aspects of the reciprocal construction and of the distributive quantifiers. This section is not presented to defend any particular theory of language change, nor is it intended to be an empirical defense of the synchronic grammar in the text. The purpose of this section is twofold: first, to lend an air or plausibility to the grammar presented in the text, and second, to present some data that might encourage more thought in the area of diachronic syntactic analysis and, eventually, lead to a theory of language change.

A. Reciprocal Constructions:

Concerning the pronoun each other, the Oxford English Dictionary says the following:

```
each other: used as a reciprocal pronoun in accusative, dative, or genitive case; = one another.
```

Originally this was a phrase construed as in 4 [irrelevant to this discussion, RCD], each being the subject, and other (inflected in Old English: othere, othres, othrum, etc.) being governed in accusative, genitive, or dative by a verb, preposition, or a substantive. This use still occurs arch. or poet. (each to other, etc.). The words have however long become a compound (cf. Du. elkander), so that we can say to each other, of each other, etc. To use the word as a nom. ('We know what each other are doing') is a vulgarism occasionally heard.
In *Syntax*, Curme says the following about the history of the reciprocal pronouns:

2

**a. Older Use of 'Each Other' and 'One Another.'**

Each other and one another are now felt as compound plural nouns, but each element in the present compounds was originally a separate word with its own grammatical function, each and one being in the nominative singular and other and another being in the accusative, dative, or genitive according to the structure of the sentence. Other could be singular or plural. Either the newer form others or the older form other could serve as plural. Another could serve as singular or plural. A peculiarity of this older usage was the absence of the definite article before other for definite reference, as still observed in the case of proper names and such abstract nouns as justice, honesty, youth, etc. In this old time, as illustrated also in 7 VII b, the an in another could have the definite force of the, referring to a definite single individual. ...

... [some examples are]: 'Eche of them fersly regarded other' (Lord Berners, *Huon*, I, p.41, A.D. 1534), now the other. 'So aprochyd eche to other (now the other) and so fought eche with another' (ib., p.42), now the other. 'They wer so nere togyder that eche of them understode others (now the other's) language' (id., *Froyssart*, I, LXI, 83, A.D. 1523). ...

...'Pages blush'd at him, and men of heart look'd wond'ring each at others' (Shakespeare, *Coriolanus*, V, vi, 100, First Folio, A.D. 1623). Later editions often have here other, the older plural. ...

...'A plague upon it when thieves cannot be true one to another' (Shakespeare, *I Henry the Fourth*, II, ii, 28).

In *Accidence*, Curme says the following about reciprocal pronouns: 3

In older English, the components of each of these compound forms [each other and one another, RCD] were felt as distinct words and hence were often separated. This older usage persists: 'Each looked at the other' instead of 'They looked at each other.' 'The roosters of the neighborhood are calling one to the other' (or to one another). This older usage is most common, as in these examples, when the pronoun is the object of a preposition.
B. The Distributive Quantifiers *all, both, each, and every*.

The history of *all* and *both* is discussed in detail in footnotes 12 and 13 to Section II of the text.

The modern quantifier *every* evolved from two quantifiers in Old English: 'ever' and 'each'. Considered in outline, the evolution of *every* proceeded as follows: (Quotations from the Oxford English Dictionary are cited to justify each step in the argument.)

*Every* evolved from two elements in Old English, specifically: 'ever' and 'each'. The element 'each' did not have the same meaning as modern day *each*, but was closer to the modern day *all* in meaning:

The early use of 'each' corresponded closely to the modern use of its compound *every* (=ever each), the only difference being that it has always been possible to use 'each' when only two things are referred to. Thus a sentence with a singular subject preceded by 'each' would (formerly) have been but slightly if at all altered in meaning by the substitution of a plural subject preceded by *all*.

The element 'ever' was a distributive particle and when prefixed to the subject "implied a distribution of the predicate or object parallel with the distribution of the subject." That is, the Old English element 'ever' corresponded closely in meaning with present day *each*:

[In Old English 'ever' was] prefixed to indefinite pronouns or adverbs to impart to them a distributive sense; also, to distributive words in order to emphasize this function ...

... for (obsolete) *ever each, ever ywhere*, see their modern forms *every, everywhere*.

These two elements 'ever' and 'each' were written as a compound in Old English, i.e. as 'ever each'. The Oxford English Dictionary says:
Although the phrase ['ever each', RCD] was always written in O.E. (as sometimes in M.E.) as two words, it had in 10th century already come to be felt as a compound, and when it is governed by a preposition, this is placed before the first of the two words.

Under the entry for every, the Oxford English Dictionary says the following about every and each: 7

When every had ceased to be recognizable as a compound of 'each', the two words were at first used somewhat indiscriminately, but their functions were gradually differentiated. In modern usage, every directs attention chiefly to the totality, each chiefly to the individuals composing it. It may also be observed that each usually refers to a numerically definite group, in contrast to the indefinite universality expressed by every; thus: 'Each theory is open to objection' relates to an understood enumeration of theories, but 'Every theory is open to objection' refers to all theories that may exist.

Footnotes:

2. Curme, Syntax, p159, Section 37.a.
3. Curme, Accidence, p. 101, Section 11.2.e
7. OED, Vol. III, p. E-343, Section I.1
BIBLIOGRAPHY OF WORKS REFERED TO IN THE THESIS


---

---

---

---
Remarks on Nominalizations, 1968,


---


---

---

---
Reciprocal Pronouns and the Concept of Coreferentiality, 1967d, Unpublished Paper, M.I.T.

---
Coordinate Conjunction, 1967e, Unpublished Paper, M.I.T.

---
The Structure of the Base, (in preparation).
Fidelholtz, J., Coordination in Sentences: Universals (i.e. English extrapolated), or The case for the schem(a)ing linguist, 1964, Unpublished Paper, M.I.T.


---


---


---

On So-called Pronouns in English, 1966, Monographs on Languages and Linguistics No. 19, Georgetown University.

---


---


REFERENCE WORKS:

