REPORT
OF THE EIGHTEENTH ANNUAL
ROUND TABLE MEETING
ON LINGUISTICS
AND LANGUAGE STUDIES

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EDITOR

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FOREWORD

For the past eighteen years, Georgetown University's annual Round Table Meetings have brought together scholars in linguistics and related disciplines to report on their latest research and to discuss current problems. At this year's session, held March seventeenth and eighteenth, 1967, fourteen interesting papers were read. The present volume represents the proceedings of that meeting with one regrettable exception: Dr. Mark Hanna Watkins' paper read at the March eighteenth luncheon meeting was not received in time for publication.

In accordance with the format of its immediate predecessors, the 18th Round Table Meeting consisted of three panels, each with four speakers, and two luncheon addresses. Unlike its predecessors, the 18th Round Table Meeting had one central theme throughout: tagmemics. The discussions which followed each of the three panels were recorded and are included as a part of this volume.

Thanks are due to several graduate and undergraduate students of the School of Languages and Linguistics of Georgetown University for their invaluable voluntary assistance at the 18th Round Table Meeting: Harry Farmer, Judith Farmer, Jay Harris, George Kelly, Philip Miller, Josephine Overholser, and Diane Seavit. Special thanks are due to Louis B. Hillman, who masterfully coordinated the student effort.

Edward L. Blansitt, Jr.
Editor
WELCOMING REMARKS

FRANK FADNER, S.J.

Regent, School of Languages and Linguistics
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Ladies and gentlemen, colleagues, participants and guests at Georgetown University's Eighteenth Annual Round Table Meeting on Linguistics and Language studies:

I don't suppose that in these chaotic days of turmoil and bitter debate a man could win a popularity contest by asserting that humanity owes a debt of gratitude to the advent of Communist ideology.

And yet the historical record shows that since the rise of Bolshevism and its triumph in a large neighbourhood, people in the rest of the world have become more socially aware: we've been put on our toes and made to realize the existence of 'the other man'.

In bygone days when static hierarchy ruled the world of thought philosophers were content with a stress on the static, individual, aspect of that important creature known as man; and they said of him: Man is a rational animal.

Now we have come to realize that an equally essential definition of man stresses his dynamic aspect, his nature—the way he acts, and we say: Man is a social animal—an intelligent, free animal with an inner urge or drive to enter the society of his own kind as a necessary means to his immediate end (life, liberty and the pursuit of happiness)—and his ultimate end.

This means communication—human language. Hence we also come up with a third definition of a man—rather waggish if you
will—Animal sapiens nonnunquam loquax—an intelligent animal who has to talk—now and then!

As I look over the agenda for our Round Table discussions, as a layman floundering in a sea of technicalities, I must sigh with the ancient observer of human nature: omne ignotum pro mirabili—we have to bow down in reverence and awe before the unknown. In fact the only item really comprehensible to me appears in the middle of page two scheduled for six o'clock this afternoon, namely, the Reception!

It occurs to me that today, the 17th of March is also sacred to the Irish. What is more natural, then, than to greet you this morning with the same words that met their great patron, Patrick, as he took up his work on the Emerald Isle.

Cead Milte Failte—a hundred thousand welcomes—and a hundred thousand blessings on your two day venture at Georgetown!

Thank you.
WELCOMING REMARKS

REVEREND FRANCIS P. DINNEEN, S.J.

Acting Dean, School of Languages and Linguistics
Georgetown University

I think we will all agree on an occasion like this that words of welcome should be warm and sincere, but brief. Allow me to extend to you in the name of Dr. Lado, our absent dean in Spain, a warm and sincere welcome.
INTRODUCTORY REMARKS

EDWARD L. BLANSITT, JR.

Georgetown University

Modern linguistics has accomplished much in correcting many of the errors of traditional grammar but not all that has been done in the past two or three decades in the name of linguistic science is worthy of praise. As traditional grammar had established some useful categories, it is only natural that modern linguistics should fall heir to many terms and concepts. Unfortunately, some of the traditional grammatical terms have been arbitrarily redefined with either a more specialized or a more generalized meaning; e.g. defining 'adjective' in such a way that beautiful is not included, or suggesting that be is not a verb, or adopting a contrary position so that be is not only a verb but that good, for example, in this is good is the object of be, or suggesting that all verbs are transitive although some verbs are only constructed with a zero object. Of these new uses, one which does deserve some consideration is the one which implies that good in this is good is functionally analogous to a coat in he wore a coat.

One of the most unfortunate notions inherited from traditional grammar is the notion of sentence—some would say clause—as a subject-predicate construction. This indefensible characterization of the sentence is still frequently encountered today, although sometimes with a new name such as topic-comment or NP-VP. Hans Reichenbach observed the fallacy involved in considering that the sentence has one subject and that the remainder is what is said of that one subject. Peter is taller than Paul tells us just as much about Paul as it does about Peter; it tells us that Paul is shorter than Peter. Reichenbach also rejected the idea that the
grammatical subject and object are of different rank and the idea that the object constitutes a part of the predicate. In language we find different word structures, different phrase structures, and also different sentence structures, not just different types of predicates or objects in one unique sentence type.

None of the preceding criticisms is in general applicable to tagmemics. I do not wish to suggest, however, that tagmemics as at present formulated is beyond reproach. One very controversial point is the manner in which grammatical levels are defined. You can expect problems to arise if you define one grammatical level primarily on phonological grounds, the next primarily on the basis of function, and the next on the basis of internal structure. The loopback phenomenon, which is apparently peculiar to the grammatical hierarchy, does not permit the neat and consistent presentation of grammatical levels which John C. Crawford makes for phonological levels. Application of Crawford’s criteria to grammar, however, would eliminate level skipping.

One decade ago, *International Journal of American Linguistics* published an issue containing only articles on tagmemics, then called grammemics. Some change has occurred in tagmemics in the past ten years in addition to its change of name. But there have been no sudden changes which invalidate previous studies. The notion of the tagmeme itself may be subject to variation. Kenneth L. Pike’s early formulation of the tagmeme was as a slot-class or spot-class correlation. Recently, Robert E. Longacre has preferred to substitute the term 'function' for 'slot' and denies that it refers to a 'point in fixed linear sequence'. Following Longacre, but going a bit further perhaps, I have recently suggested that a tagma is a slot-class correlation—with 'slot' again considered as a point in fixed linear sequence—and that a tagmeme is a family of allotagmas which are functionally analogous and in noncontrastive distribution. Examples of manifestations of different allotagmas of the same tagmeme would be French and several very important languages in John speaks French with no trace of a foreign accent and John speaks with no trace of a foreign accent several very important languages. It is true, of course, that John speaks several very important languages with no trace of a foreign accent is also an English sentence, but *John speaks with no trace of a foreign accent French* is not English. The tagmeme concept is necessary, I believe, in order to account for the functional equivalence of certain different slot-class correlations.
When one is studying phonology from the perspective of phones, phonemes, syllables, and stress groups as in some sense comprising items or units, one is studying phonology as 'particle'. Similarly, grammar is studied as particle when one partitions the universe of discourse into noun phrases, clause types (e.g. transitive), or word classes (e.g. an animate subclass of nouns), and so on. Lexicon is studied as particle when one treats words or specific phrases (e.g. these or this boy or even the boy I know) as in some sense isolates. In each of these instances the particles are segmented from continua and then treated as chunks of structure.

Much of the best in linguistic analysis has concentrated on language as made up of particles. For hundreds of years, however, the literature has contained indications that language also includes elements which need to be viewed as 'field'. One of the most common of these is the traditional phonetic chart:

```
p   t   k
b   d   g
m   n   ŋ
```

Curiously enough, however, although such materials have a long practical history and have often been utilized by competent
analysts, these same persons speaking as theoreticians have repudiated from their basic theoretical constructs any such field component.

More recently I have attempted to exploit grammar as field, paralleling phonology as field. A minimum table suggesting such a field for clauses might be something as follows:

<table>
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<td>Dependent:</td>
<td>DepTrans</td>
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The present article wishes rather to emphasize that grammar can be viewed as 'wave'. The attention to wave in phonology is not new with me. I have emphasized nucleus and margin (of waves) for syllables and for stress groups on many occasions.

Attention can be directed to the nucleus of a stress-group wave—as in I want the red dress in which attention is on red. The premargin may often be fused—as when Did you enjoy it? becomes /jʌnjoʊ/. Here the phonological nucleus places semantic attention on [en]joy, whereas the premargin did you (out-of-focus) is fused. On the other hand, lexicon as wave has not been treated as extensively, though description of central (= nuclear) and marginal meanings indicates the relevance of this concept here.

In treating grammar as wave, therefore, we are interested in analogous kinds of components of a unit: attention is directed especially to the structural distinction between nucleus and margin; semantic attention may often be directed to the nucleus of the grammar wave; and fusion or loss may occur on morphemes at the periphery.

We begin with data from Kasem of the Grusi subfamily within the larger Gur (Voltaic) languages of northern Ghana. Data are from Mrs. Kathleen Callow. Callow points out that in Kasem a sentence may begin with an optional dependent clause followed by an obligatory independent clause and a further optional dependent clause. Within each of these three sections of a sentence there can be amplification in the detail of the clause structures; each of the three sections may be amplified to a clause cluster (a series of clauses interrelated).

A Kasem clause cluster has various restrictions such that not all clause types can precede or follow one another within such a cluster (which in turn fills one of the slots in a sentence). These particular restrictions are important, but need not concern us
for our present purposes. Rather we are interested in certain of the more general rules by which clauses are combined into a clause cluster within one of the larger slots of the sentence.

When two clauses are combined in Igede, they share the same subject and the same object; the second occurrence of same subject and of same object are deleted:

Igede: ahi hû ôlõ
we take load

plus: ahi chû ôlõ
we put-on-head load

yields: ahi hû ôlõ chû
we take load put-on-head

Similarly, if there is a locative phrase which is repeated in the separate clauses, one of these is deleted in the combination; in this instance, however, it is the first rather than the second element which is lost:

ahi hû ôlõ í-ihi
we take load in-market

ahi chû ôlõ í-ihi
we put-on-head load in-market

ahi hû ôlõ chû í-ihi
we take load put-on-head in-market

The words /alé/ 'today' and /inyînyî/ 'similarly' act comparably. This kind of deletion is by no means pointed out here for the first time—it has long been known. Now, however, we wish to indicate how a specialization developed which can be treated as a kind of grammatical fusion: a loss of freedom of parts of the first clause such that it develops a special function modifying the second part of the clause cluster. Specifically, we find in Vagala that one is unable to say in a single clause 'He cuts meat with a knife'. No single, simple clause allows the requisite tagmemes to state 'He x'd y with z'. This at first appears astonishing. We would have assumed that among the universals of culture is the capacity to speak of something being done with something. Surely we cannot drop our belief in the universality of human
nature to the degree that we would assume that any group of people would be unable to communicate such an element of a cultural situation. How, then, can we account for this situation in much of West Africa, where an instrumental tagmeme does not occur within a simple clause? The cultural solution—finding its way through the linguistic structures available here—is to achieve the same semantic result with a special kind of clause cluster:

\[ u \text{ kpa kiyzéél mông ówl} \]
\[ 'He cut the meat with a knife' \]

Here the meaning of 'with a knife' is covered by the included clause 'he took knife'; and the total meaning of 'He cut the meat with the knife' is covered by the total clause cluster of 'He took knife cut meat'. The cultural universal is therefore satisfied even in the face of the gap in expected tagmemic content of simple clauses.

A crucial question now arises: How can we analyze the semantic relationships which are obviously being communicated within the clause cluster? Our tagmemic solution is to suggest that the first clause is itself, as a whole, filling a newly-developed tagmemic slot: a new tagmemic slot within the old clause cluster. The old clause cluster has developed into a special subcluster of which the first included clause is instrumental, filling a newly developed 'instrumental' slot followed by a new tagmeme which means 'the utilizing act'. This can be diagrammed:

\[ + \text{Instrumental tagmeme} + \text{Utilizing-act tagmeme} \]
\[ + \text{Subject + P}_\text{tr + Object} = \text{P}_\text{tr + Object} \]
\[ \text{NP}_1 \text{kpa NP}_2 \text{V}_\text{tr NP}_3 \]

'He took knife', as the first of the old clusters, has developed an instrumental overtone to be translated 'he, with a knife'; and the old 'cut meat' implies not only the act, but an act by the prescribed instrument. This entire complex can now serve as if it were one of the single clauses of a larger clause cluster. We can call the specialized instrument pair, therefore, a subcluster (within any regular larger clause cluster).

A new problem arises here. At times one cannot be sure whether one is hearing a specific specialized instrumental subcluster or rather the normal nonspecialized clause cluster. This can be restated as follows: Tagmemes may be homophonous in
some of their manifestations; just as two morphemes may be pronounced alike but have different meanings and different functions, so two tagmemes may occasionally be ambiguous if they happen to share the possibility of being manifested by one or more of the same morphemes. The situation here is that the instrumental tagmeme in the specialized subcluster is limited to the word kpå 'take'. Thus if in a normal cluster of two clauses any other verb occurs, we do not have to have any doubt as to whether or not it is instrumental: Since, however, kpå 'take' can also on occasion be used as a regular verb, in the first clause of a regular clause cluster, ambiguity sometimes develops. 8

A second kind of specialization should also be mentioned as illustrative of the probability that many semantically-specialized subclusters may have developed, even though only a few have been studied. Note, for example, that the second clause of a regular cluster may become specialized and modify the first—the reverse of the earlier situation. One can, for example, use the Vagala verb for 'give' in the second slot of a cluster with specialized benefactive meaning:

Benefactive:

\[
\begin{align*}
\text{he came & danced igyo give his village} \\
\end{align*}
\]

'He came and danced the igyo dance for his village'

Here, once more, a clause sequence in a cluster has become specialized as a semantically distinct subcluster—which can in its turn operate as a single unit in still larger clusters. Specialization of particular structures, we conclude, can be synchronically detected as the end product of a historical development.

We now turn to an especially attractive instance related to the clause-cluster problem, and which, in my view, confirms the judgment very strongly. In this latter instance we wish to indicate (1) that a class of auxiliaries can be developed from a class of verbs, by specialization within a clause cluster; and (2) that this class of auxiliary verbs in the single tagmemic slot is synchronically visible as being in a state of change, because of the sharply-different characteristics of the specific members of that class.

Vagala has a clause cluster in which the first verb is of a motion type. Note:

\[
\begin{align*}
\text{he came imperfective pound food} \\
\end{align*}
\]
The verbs for 'come' and 'go'—wa and ga—appear to be the first verbs in a regular clause cluster, if one gives them only a quick glance. Nevertheless, they differ from free verbs (non-auxiliaries, which would come in a regular cluster) in five ways:

1. Neither wa nor ga take suffixes here (but compare ba daalif dozi 'They cooked soup' and ba daalo 'They cooked').
2. They cannot be preceded by the imperfective form ra.
3. They do not occur alone as verbs in a single one-verb clause.
4. They have different tone rules from those occurring on a free verb.
5. They cannot be immediately followed within the first clause by tagmemes of location, etc.

These reasons would at first make one suspect that the auxiliary verbs—as I cam calling them here—could just as well be treated as simple particles, without attempting to relate them to verbs at all. We turn, therefore, to another member of the same distribution class of items (i.e. occurring in the same tagmemic auxiliary slot), but one which is more like a free verb even though still restricted. The verb is kuari 'make, fix'. It has greater freedom:

1. It can occur as the only verb of a simple clause: u kuaro 'It is fixed'.
2. It may be accompanied by a peripheral tagmeme (e.g. a locative element) as can other simple verbs.
3. Verbs after it act like the second verb of a regular cluster rather than like the first one.

Nevertheless, this same verb in spite of the freedom mentioned has several special restrictions as an auxiliary:

1. It has a special meaning in its auxiliary function as over against when it is free. As an auxiliary it means 'again' as in u kuari la dia 'He again went home'.
2. It has no perfective ending in the auxiliary slot (but compare the suffix -o, which is found in an illustration previously given, attached to the main verb of the clause).

As a further member of the same auxiliary distribution class we take the word for 'to turn', seen as bir (in isolation) and as bito (in u bito ba 'he turned came' in a clause cluster where the verb serves as an ordinary full verb, even in the first—primary—slot in the cluster, as evidenced by the perfective suffix -o).
The primary usages contrast with its secondary use (where the two clauses are separated by di 'and'—not relevant to our problem here) as in:

\[ \text{'He got up and turned his back'} \]

In such a 'free' instance the verb for 'to turn' may have a peripheral tagmeme, as can kuari 'make'.

On the other hand, when bir occurs as an auxiliary, it has restrictions:

1. A peripheral tagmeme is not allowed with it.
2. It has the special meaning of 'again' as: bir ngo 'He said again'

The verb is not allowed to occur in isolation—nor as the sole verb in the clause—when it carries this specialized meaning.

We turn to a final set of members of the class, with still further specialization: weyr 'be able'; kuti 'do purposely'; fuuri 'do unintentionally'. In several ways they act like main verbs; e.g. weyr:

1. It takes a perfective ending as in weytō ló kábilá 'he is -able pound food' (note the suffix -o on the verb).
2. The following verb is in its secondary form.
3. It can in fact stand alone as the main verb of a clause as in weytō 'He is -able'.

Nevertheless, in certain senses it acts as specialized when in auxiliary function:

1. Its ability to stand alone as just illustrated above is in turn specially limited and rare. If it occurs in response to a question (such as weytō e’e gung '[Are] you able [to] do that?', to which the reply then may be n weytō ... 'I am-able ...'), the clause in which it occurs by itself as a main verb is a dependent sentence, in the answer slot of a conversation composed of question and answer. Thus even its apparent freedom to occur as a main verb is an exaggeration; it occurs as a main verb only in a response slot in which there is an 'implicit' deletion of a following main verb of an implicit cluster. It continues, therefore, to have certain of the characteristics of an auxiliary.

Our summary of the data about the auxiliary: We can see by the synchronic data that there is an emerging class of auxiliaries. The evidence of the emergence of this class within the clause cluster is grammatical (by restrictive distribution in construction), lexical (by specialization of meaning), and phonological (by
special minor rules for usage of tone, which we have not at-
ttempted to describe here).

Were this direction of change to be completed, with complete
specialization in all instances, we would then end up with the en-
tire class as being made up of particles which could not be iso-
lated like verbs, could not be inflected as verbs, could not take
the peripheral elements of regular predicates, could not be the
head of verb phrases, could occur only in special places in verb
phrases, and had no clear relation to free verbs. They would be
particles.

It would appear, further, that these developed auxiliaries oc-
curring before a verb may in turn be preceded by a further set of
elements which have already arrived at this stage of verbal de-
generacy. We do not cite the data here. Rather we suggest that
a fuller treatment would show that a verbal phrase—developed out
of a clause cluster or clusters—may include three (or more) tag-
memes: (a) a preliminary slot filled by a distribution class of
particles which synchronically are no longer relatable to verbs,
but with a possible guessed-at relation of this type, (b) an auxili-
ary tagmeme with its set of fillers obviously in a state of transi-
tion (and not consistently at the same point in transition), and
(c) the nucleus of the verb phrase, filled by a main verb which
was once a second (or third) verb in a (reconstructed) clause
cluster.

We now return to our main theme: that grammar can be
viewed as a wave. Notice how much the movement from verb to
auxiliary to particle looks like the phonological fusion in which
let us go eat becomes /skuit/: the nuclear morpheme eat is pre-
served, unmodified; other morphemes, in the margin of the
stress group (= syllable cluster), are phonologically changed al-
most beyond recognition. So, also, in the grammar wave the
main verb, at the nuclear point of the clause, remains unchanged
and unrestricted, whereas the peripheral verbs of the clause
undergo successive (phonological) compression (distributional)
restriction, and (semantic) specialization.

It is important to see that these changes are not exclusively
phonological. If phonology alone had been involved, one would
find no need to treat this as a grammatical wave—one could rather
attribute everything to the phonological processes themselves. It
is the fact that special grammatical distributional restrictions,
as well as semantic specialization of the lexemes are involved,
which forces us to treat this as something other than pure phono-
logical process.
The change does not lead exclusively to the first item being specialized (as auxiliary). The second may in certain instances be specialized. The Vagala word hūnzī 'to fail' acts as a post-auxiliary:

1. It does not serve as the sole member of a Vagala clause;
2. It shares with the preceding verb the periphery which follows the two of them. Compare:

\[ u\ k\text{ā}r-\text{ê} hūnzī \]
\[ \text{he fix-it fail} \]

'He wasn't able to fix it'

with:

\[ u\ k\text{ā}r-\text{ê} hūnzī \text{ dēlā} \]
\[ \text{he fix-it fail yesterday} \]

'He wasn't able to fix it yesterday'

in which the periphery ('yesterday') applies both to the auxiliary and to the main verb.

The extraordinary interest of this grammar-wave phenomenon is not that it occurs at one particular point, but that it occurs as a synchronically-living dynamic on various levels of structure of a system. We have already seen it (a) with auxiliaries within verb phrases, developing from clusters of clauses, and (b) with subclusters of clauses as specialized within larger clause clusters. Now (c) we show evidence that sentence clusters themselves may develop in which certain initial sentences have primary (nuclear) function in a sequence, with special marks on these sentences. The end result of this sentence clustering implies the development of emic, structural paragraphs.

A sentence cluster—a paragraph—differs from a clause cluster, inasmuch as any one sentence in a paragraph may have all of the kinds of sequences of clause clusters earlier mentioned for any one sentence: A sentence may have a dependent clause cluster, an independent clause cluster, and a following dependent clause cluster. In the light of these evidences, we conclude that we are not dealing with the same level of structure which we discussed above, but are dealing on a higher level.

The primary, nuclear sentence of the sentence cluster may be specially marked. The marking may be by tone. Compare, for example, the difference between independent:

\[ u\ k\text{yīgō} \text{ nīī bā} \]
\[ \text{she carried water came} \]
in which the verb begins with a low tone and carries a suffix, as over against its high tone when in a dependent sentence (of the same meaning) later in a marginal position of the paragraph:

\[ ò kyí ní bå \]
she carried water came

The difference between independent and dependent sentence (I repeat: we are not talking about dependent and independent clauses here) leads to the contrast between 'topic sentence' (as a term of rhetoric) i.e. a nuclear sentence, versus marginal sentences which are commenting on items which the topic has introduced.

A second marker (i.e. other than tone) of the first sentence only (of the topic sentence of the sentence cluster) is sometimes the occurrence of a tense morpheme in the first but not in later sentences:

\[ ñ níy n háång né dé rá \]
I and my wife emphatically yesterday imperfective
\[ náâ n háång kyåg n kyågá bél. \]
fight. my wife insult me insult one.
'Yesterday I and my wife had a quarrel. She insulted me
with a certain insult.'

Note that the imperfective form occurred only in the first of the two sentences of the paragraph.

Sentences within a paragraph, then—within sentence clusters—may be formally differentiated as to whether they are at the nuclear or post-margin points.

It is also true, however, that sentences of a paragraph may form certain subclusters of sentences which fill special tagmemic slots in paragraphs. This is similar to the semantic specialization of subclusters of clause clusters (see the specialization of instrumental and benefactive above). It would appear, that, in general, many of the paragraphs of Vagala could be treated as beginning with a proclamation tagmeme (filled by the topic sentence) followed by a commentary class of tagmemes (in which a sequence of sentences manifests the commentary). It is quite possible furthermore, that the commentary section will have to be further subdivided.

The proclamation section, however, is by no means uniform. There are contrastive tagmemes within this class of tagmemes.
As one example, notice a 'request' tagmeme of the proclamation followed by a 'carrying out' tagmeme of the commentary:

Request: ń dā nyīngi 1 kuārl ń diá 1te ĭ
'I want you to fix my house for me'

Carried out: u kuārl u diá té ŭ
'[So] he fixed it for himl'

Yet still a higher wave element than the paragraph can be seen in Vagala. This includes—among other possible structures—a story viewed as a grammatical wave. It begins with an opening tagmeme and ends with a closing one:

Opener: ń múr té kěng
my story emph. this
'This is my story!'

End: ń tú nô
'I finish'

In the Vagala we do not yet have a further breakdown of the wave structure within the discourse itself. For this I turn to Sisala.11

Rowland in attempting to study tagmeme sequences within clauses observed first of all that the time element sometimes came early and sometimes came late. He wishes to determine the specific situation which might control the (apparently optional) occurrence of the time tagmeme. Since he had available concordance12 material, he was able to take specific temporal words and find their sources in contexts of the larger narratives in which they occurred.

To his surprise he found that the discourse itself seemed to have topic paragraphs (nuclear paragraphs). These outlined the special settings for the narrative. Once delineated, they were more or less ignored. Specifically, early in the discourse the temporal setting might be given—and thereafter time would scarcely be mentioned (either overtly or through affixes) unless a change in episode (a further grammatical level?) demanded it. Thus a narrative as a whole could be viewed as a sequence of the following tagmemes:

± preview, ± narrative setting, ± sequential,
± focus change, ... ± climax, ± comment by narrator,
± summary application.
It is within the narrative setting that certain of the temporal matters are mentioned. The dots suggest possible change, especially, perhaps, through episode change.

In order to show the time position within the narrative, we now give two further formulas. The first of these is an expansion of the filler of the second slot indicated above for the narrative as a whole—the narrative setting:

\[(a) \pm f_{TP_1} + S:NP \pm f_{Part} + Pr_tr \ [?] O:NP \pm f_{LP} \pm [?] AdvP \]

The time particle occurs at the beginning of the sentences produced according to that formula, (in which the superscript \( f \) implies fixed order in this discourse slot; subscript \( \_ \) labels the subclass of expressions allowed here; other symbols refer to time phrases, nominal phrases, particular particles, transitive predicates, locative and adverbial phrases, etc.).

In contrast, if the time must be mentioned in a sequential slot—that is in a paragraph which follows up the sequence of discussion but is not setting the topic of the discourse—a different allo-construction of the transitive clause occurs. Note, therefore, the following transitive-clause allo-formula as it might be found in a sequential slot:

\[(b) + S:NP \pm O:NP \pm f_{LP} \pm [?] AdvP \pm f_{Part/TP_{1/3}} \]

In this instance the time phrase occurs at the end of the clause—and has certain other restrictions indicated by the subscripts (whose details do not interest us here).

In sum, grammatical constructions may be viewed as waves. The nucleus of the wave often suggests the point of attention elicited by the speaker from the hearer. Wave characteristics may appear throughout the whole hierarchical sequence of units of the grammar. They occur not only within the word (stem versus affix), but within the phrase (auxiliary versus head), the clause cluster (with specialized instrumental tagmemes modifying the nuclear tagmeme of the developed subcluster) within the paragraph—the sentence cluster—level, and on the level of discourse itself.
NOTES

1 For references to very early treatment of phonetic charts, and to the utilization but theoretical repudiation of them by Bloomfield (versus my insistence upon treating such elements as structurally relevant to linguistic theory) see my Language in Relation to a Unified Theory of the Structure of Human Behavior 8.623, 8.82, 8.61 (Mouton and Co., 1967).

Lexicon has also been treated as field. One can, as with phonetics, note intersecting vectors (or distinctive features) as in the following:

- tiger  tigress
- king   queen

Studies of Kinship systems have vigorously exploited this area recently; for references to Lounsbury, Goodenough, and others see my Language 16.825. For other references to field in semantics, see 16.81.


3 For theoretical discussions, see my Language 3.2, 9.312, 11.51. For pedagogy, see 'Practical Phonetics of Rhythm Waves', Phonetica 8.9-30 (1962). For extensive discussion of English, in which the nucleus is marked with a degree sign and various pre-contours and post-contours (i.e. margins) are described, see The Intonation of American English (Ann Arbor, 1945). For annotated bibliography of recent materials, see Guide.

4 See my handling of orbiting, in 16.13 of my Language ...


6 Data from Igede gathered by Richard Bergman; from Vagala by Miss Marjorie Crouch. These investigators, like Callow, are members of the Summer Institute of Linguistics. For fuller details on certain of these materials, see the report referred to in the previous footnote.

8 Here, also, for the data indicating how this is ambiguous we refer the reader to the fuller report.

9 Defined, of course, for one language at a time, as any empirical term must be in language.

10 For the data supporting this argument, we must refer the reader to the fuller report.

11 Closely related to Vagala; data from Ron Rowland.

12 Produced from Rowland's texts at the University of Oklahoma by the linguistic retrieval project for aboriginal languages, partially supported by the National Science Foundation grants GS-270 and GS-934. Input data on magnetic tape are archived at the University of Oklahoma.

13 Since this material was prepared, I have seen Richard Watson's 'Clause to Sentence Gradations in Pacoh', *Lingua* 16.166-89 (1966). There appear to be a number of interesting points of contact with his data from Vietnam.
THE NOTION OF SENTENCE

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Sentence is distinct from clause with which it is often confounded. The latter is a string of such functional units as subject, verb, object, location, time, frequency, manner. Thus the rewrite formulation S→NP, VP is more appropriate of the clause. In distinction, sentence is the level on which clauses combine into larger units. A sentence consists of such functional units as sentence base, coordinated base, protasis, apodosis, thesis, antithesis, etc.

Sentence formation in natural languages is similar to the combining of simple propositions into complex propositions in logic by means of conjunction, alternation, implication (and negation, which is not so likely to be a sentence-forming device in natural languages, but rather an element on the phrase or clause level). Thus, we can expect one or more sorts of coordinated sentences in a natural language. While logic gets by with one coordinator and, natural languages often have a variety of coordinators some of which determine separate sentence types. In English, for example, the functions of and and but are sufficiently distinct that we do well to posit a 'coordinate' sentence type versus an 'antithetical' sentence type. Possibly most natural languages have also an 'alternative' sentence type which employs such connectors as the English or. Implication in natural languages determines conditional sentence types. While a language could conceivably have only one type of conditional sentence, several contrasting types are frequently found—e.g. a 'general' or 'nothing
implied' condition versus a 'contrary to fact' condition. Classical Greek with its distinct use of characteristic particles, moods (indicative, subjunctive, optative), and tenses (with past tense required in one conditional sentence type) is a good example of the elaboration of implication in a natural language.

Natural languages elaborate further devices not found in the comparatively simple apparatus of logic. Thus, languages have in addition to such sentence types as those already mentioned at least one quotation sentence type. Typically at least two such types are encountered: the 'direct' and the 'indirect' quotation. In addition, the form of a quoted indirect statement may be different from that of a quoted indirect question (cf. Latin rogant quis sit with subjunctive mood), or quoted indirect command. Quotations are of peculiar interest in that they embody an act of speech which reports an act of speech—and thus serve as an everyman's metalanguage.

Furthermore, natural languages also contain devices for creating sentences by joining clauses without conjunction or particle of any kind. Several such contrasting types of juxtaposition sentences may occur in a language. Such types should not be confused, however, with variants of other types which may under given conditions delete a medial conjunction. Thus, the English sentence I came home, I came to see what was going on is a 'recapitulation' sentence. As such it not only needs no medial and, but, on the contrary, scarcely sounds natural if such a conjunction is inserted. Other juxtaposed sentence types express such relations as paraphrase (the same thing said twice in two similar but differing ways) and sequence (Latin, veni, vidi, vici). Trique, which this writer has studied for some time in Mexico, contains no less than twelve such contrasting varieties of juxtaposed sentences which express a number of relations commonly expressed on the clause level in Indo-European languages. Thus, where English says Ferdinand said to Isabela, Trique says something on the order of Ferdinand said Isabela heard. Again, where English says Ferdinand brought it to town, Trique says the equivalent of Ferdinand had it he came to town.¹

Traditional classification of sentence types is not of much relevance. Gleason has, in a recent volume on English,² justly criticized the classification of sentences into simple, compound, and complex and into declarative, interrogative, imperative, and exclamatory. Our criticisms here somewhat parallel his.

The traditional classification into simple, compound, and complex divides sentences that contain one independent clause
from those that contain two or more such clauses and from those that contain one independent clause and at least one dependent clause. But the whole notion of independent versus dependent clause needs reexamination. An if clause is not dependent in the same sense that a when clause is. In such a conditional sentence as If he comes it will be well, the if clause and the main clause are delicately balanced in the structure of the sentence itself. A different balancing (with different implication) is seen in If he had come it would have been well. A when clause, however, may fill a temporal slot within another clause. Cf. the following one-clause sentences:

(1) I'll go tomorrow.
(2) I'll go when he comes.
(3) I'll go over there whenever he seems to be intruding where prudence dictates that he should stay away.

All three of the above clauses have basically a three-slot structure: subject, predicate, temporal. The fact that the temporal is filled by a temporal noun in example (1), by a single clause in example (2), and by a nest of clauses in example (3) is interesting and needs to be mentioned in the grammar under the description of clause-level temporal tagmeme. As sentences, however, all three examples have the same overall framework, that of the one-clause sentence, in spite of the possibly complex manifestation of temporal. Little seems to be gained by calling example (1) a 'simple' sentence and examples (2) and (3) 'complex'. Furthermore, what of the relatively greater complexity of (3) as opposed to (2)? It is more plausible to call all three examples 'simple' sentences with the understanding that a simple sentence is any sentence with the overall structure of a single clause (plus or minus imbedded clauses).

With simple sentence defined as here suggested, the 'complex' sentence is eliminated. 'Compound' sentence, the remaining category of the traditional threefold classification, is too broad a category to be useful. As we see elsewhere in this paper a variety of differing relations may be expressed by sentences containing more than one independent clause—while independent clause is not in itself too clear a notion.

Nor is the traditional classification of sentences into declarative, interrogative, imperative, and exclamatory a useful categorization of sentences. The first three categories are more appropriate in relation to clauses. The clause systems of most languages have a mood parameter where such distinctions have their place. On the other hand, neither an exclamatory clause
type or sentence type is needed. Although it has been customary since Bloomfield to set up exclamatory sentences as a minor sentence pattern, another solution of the problem is possible. In many languages it is necessary to set up an exclamatory tag-meme in the common periphery of the various sentence types, e.g. Phooey, I'm going home. Perhaps exclamatory sentences are sentences in which the balance of the sentence has been deleted and only the exclamatory work remains, e.g. Phooey. On the other hand, to call such a sentence as I'm going home right now! an exclamatory sentence is to give undue weight to a punctuation mark or to the intonation contour that it crudely represents.

Both traditional classifications fail to grapple with the realities of the sentence as a layer of clause combination. Something more is needed than extrapolation of clause-level distinctions to the sentence level along with gross distributional observations regarding independent and dependent clauses. That something more is the recognition of functional proportion among sentences which may or may not have superficially similar constituents. We must look for samenesses and differences of a different sort than have been traditionally south.

Take, for example, English sentences containing a medial and versus those containing a medial but. An indefinite number of clauses may be concatenated into one sentence by means of and—although it is regarded as bad style to produce an excessively long concatenation of this sort and it is possible to delete some nonfinal and's. By contrast, but separates two halves of a sentence, the thesis and the antithesis (the halves may be clauses or imbedded sentences). These initial observations enable us to separate two sentence types: a 'coordinate' sentence which contains and and an indefinite number of coordinated heads; and an 'antithetical' sentence which contains a thesis, but, and an antithesis.

Close inspection of certain subtypes of the antithetical sentence further strengthens the contrast with the coordinate. Two noticeable subtypes of the antithetical sentence are: (1) those containing a pair of antonyms; and (2) those containing a pair of pseudo-antonyms, i.e. gradients of a variable. For subtype (1) the following rules apply: (a) the negative regularly goes in the thesis (not dead ... alive; not white ... black; not a saint ... a sinner; not God ... the devil), (b) if no part of the second clause which manifests antithesis is deleted, either delete the adversative but or strengthen it (He's not dead; he's alive. He's not
dead; but, on the contrary, he's alive.), (c) every part of the second clause may be deleted except the antonym, but the adversative is retained (He's not dead, but alive), (d) the although paraphrase is not applicable (Although he's not dead, he's alive.), (e) the thesis, which contains the negative, may be permuted with the antithesis and undergo deletion; the adversative but is deleted in all occurrences of the permuted order. Thus, He's not a sinner; he's a saint may be permuted to: He's a saint; he's not a sinner. Neither but nor but, on the contrary may occur between the permuted antithesis and thesis.

For subtype (2) the following rules apply: (a) the negative occurs regularly in the thesis where it negates the gradient of higher degree: not hot ... warm, not a paragon of virtue ... a good man, not the best ... acceptable. (b) The adversative is retained whether or not portions of the second clause which manifests antithesis are deleted: It's not hot, but it's warm. It's not hot, but warm. (c) Every part of the second clause may be deleted except the pseudo-antonymn, but the adversative is retained. (d) The although paraphrase is applicable; either thesis or antithesis may be transformed to the although clause: Although it's not hot, it's warm. Although it's warm, it's not hot. (e) The thesis, which contains the negative, may be permuted with the antithesis and undergo deletion; but the adversative is retained: It's warm, but it's not hot. He's a good man, but not a paragon of virtue. (f) Attachment of the negative to the gradient of lower degree requires some such qualifier as just and shifts the sentence to subtype (1). Thus, not just warm and hot pattern not as a pair of gradients but as antonymns. According to rule (b) under subtype (1) we can have It's not just warm, it's hot, as well as It's not just warm; but, on the contrary it's hot; and It's not just warm but hot; we cannot, however, have It's not just warm but it's hot. Furthermore, according to rule (d) under subtype (1), the although paraphrase is not applicable; Although it's not just warm it's hot and Although it's hot it's not just warm.

Finally, according to rule (e) under subtype (1), permutation of antithesis and thesis requires deletion of the adversative but: It's not hot, it's just warm.

In subtype (1) above and is not substitutable for but: He's not alive and on the contrary he's dead. He's not alive and dead. In subtype (2) with no deletions in the second clause (which manifests antithesis) and could conceivably be substituted for but provided that special intonational devices were used: He's not a paragon on virtue and he's a good man. (With high contrastive pointing
contour on paragon and perhaps on good man as well). It would be more normal, however, to shift such a sentence into the although paraphrase: Although he's a good man, he's not a paragon of virtue. With deletions in the second clause and may not be substituted: He's not a paragon of virtue and a good man. These details—and more could be added—emphasize that and and but are by no means mutually substitutable everywhere. They belong, in fact, to separate sentence patterns as here argued.  

A characteristic deletion in both coordinate and antithetical sentences is the deletion of the subject of the second clause when identical with that of the first clause. This gives us the so-called 'compound' predicate of traditional grammar: I went out and bought a hamburger. I went downtown but didn't see the man. It is, of course, an accident of English structure that this deletion is possible. In a language with verbs inflected to indicate person or person-number of subject it is not possible to delete all reference to the subject from the second clause. It is obvious in such languages that the second element is a clause coordinate with the first.

It is useful to set up a sentence periphery as opposed to the sentence nucleus. Such items as exclamations and vocatives certainly occur in the periphery of the sentence in general rather than in only one specific type. Thus, in the sentences below, Phooey manifests 'exclamation' tagmeme and Mary manifests 'vocative'. Sentence types are labeled as suggested in the last paragraph of this paper.

Phooey, Mary, I'm going. (simple)
Phooey, Mary, I'm going downtown and Jim can cook his own supper. (coordinate)
Phooey, Mary, he deserved better treatment, but that's how he fared. (antithetical)
Phooey, Mary, if he comes, count me out. (conditional)

But while the peripheral tagmemes characteristically occur with all sentence types, the nuclear tagmemes are contrastive from type to type. Thus, while the simple sentence has its 'sentence base' tagmeme, the coordinate sentence has 'sentence head'\(^1\) and 'sentence head'\(^2\), the antithetical has 'thesis' and 'antithesis', and the conditional has 'protasis' and 'apodosis'—to name a few.

Introductory particles and conjunctions play varied roles in sentence structure. The coordinator and and the adversative but certainly belong to the fundamental framework of their sentence.
types. Neither of these conjunctions can be assigned to the preceding of to the following clause as a constituent of that clause. In every case the and or but implies something occurring both before and after itself. On the other extreme words like when, where, how and the like when used as relatives very definitely belong to the structure of the clause that they introduce. They are, in fact, substitutes for such tagmemes as temporal, location, and manner. Clauses introduced by such words are therefore properly called subordinate or dependent. At first glance, if clauses would seem to lie somewhere between the two extremes. In many languages if clauses are not subordinated in the same sense that when and where clauses are subordinated. As already mentioned, the if particle belongs to the delicate balancing of the implication expressed in the conditional type. In many languages, therefore, the if must be assigned a fundamental place in its sentence type, just as such place is assigned to and and to but in their sentence types. Sentences which are not initial in a discourse often have an introductory slot (peripheral) which signifies their place in narrative or expository sequence.

One frequently encountered peripheral tagmeme is the 'sentence topic'. In substandard English this is not uncommon: John, he did it. In standard English, when such a construction is used, it is likely to be introduced with as for: As for John, his horse came in last. The sentence topic may cross-reference to any noun in any role in the clause which follows (e.g. subject, direct object, indirect object, etc. and to the noun functioning as possessor in a noun phrase in any such function). The sentence topic is common in Semitic structure and in such Mesoamerican languages as Totonac and Otomi—to cite a few languages widely separated geographically.

Certain subordinate clauses may occur in the periphery of the sentence where they modify the sentence nucleus as a whole but do not imbed within any part of it. Temporal, circumstantial, cause, and purpose clauses occur thus in the sentence periphery of Totonac. In English similar clauses occur in the sentence periphery as does also the concessive clause:

(1) When water is scarce some take sponge baths but others stop bathing entirely. (preposed temporal clause)
(2) In that water is scarce some take sponge baths but others have stopped bathing entirely. (preposed circumstantial clause)
(3) Because water is scarce some take sponge baths but others have stopped bathing entirely. (preposed causal clause)

(4) In order to save water some take sponge baths but others have stopped bathing entirely. (preposed purpose clause)

(5) Although water is now plentiful some take sponge baths but others have stopped bathing entirely.

All five of the above sentences are antithetical sentences whose nuclei consist of the three tagmemes characteristic of that sentence type: 'thesis', 'adversative' (but), 'antithesis'. They differ solely in their preposed peripheries where five contrasting sentence-level tagmemes occur: 'temporal margin', 'circumstantial margin', 'causal margin', 'purpose margin', and 'concessive margin'.

Not only may all five margins occur in the periphery of the same sentence type, but the same margin may occur in the periphery of various contrasting types. In the following, purpose margin tagmeme occurs in the periphery of contrasting sentence types: general condition, contrary to fact condition, alternative, direct quote, and echo question.

(1) In order to save water I'll stop bathing entirely if you'll be content with a sponge bath.

(2) In order to save water he would have gone without bathing entirely if she had been content with a sponge bath.

(3) In order to save water we'll either have to take sponge baths or stop bathing entirely.

(4) In order to save water I told them, "Either take sponge baths or stop bathing entirely".

(5) In order to save water you'll be willing to take sponge baths, won't you?

A sentence margin tagmeme need not be manifested by a single clause but may be manifested by one of the sentence types subordinated by means of a preposed relator: When she won't go unless he goes too, things look interesting. I don't want to marry her because she's rich but I'm poor. In order that he might say "I'm innocent" many men had to die. In the first example the relator when subordinates a general conditional sentence which functions as temporal margin. In the second example because subordinates an antithetical sentence which then functions as
causal margin. In the third example in order that subordinates a direct quotation sentence which functions as purpose margin.

Considerable nesting of sentence type within sentence type may occur as in the following: "If either he comes to tell you or you find out for yourself then you cannot justly complain that you've not been treated fairly", said General Brown. The whole sentence is a direct quotation, whose quoted tagmeme is manifested by a conditional sentence. The protasis tagmeme of the conditional sentence is manifested by an alternative sentence. The apodosis tagmeme is manifested by an indirect quotation sentence. So marked is this tendency for sentence type to nest within sentence type that this may be considered to be a basic characteristic of the sentence level in many languages.

Paragraph and discourse may imbed within a sentence as backlooping exponents of sentence-level tagmemes—noticably of the quoted tagmeme in direct and indirect quotation sentences. When such a quote includes several paragraphs it is by definition a discourse.

In approaching the sentence structure of a given language a major problem is that of segmentation between sentences within connected discourse. This cannot usually be done via mechanical rule-of-thumb procedures. Ultimately we isolate as sentences whatever stretches have the structures characteristic of sentence types according to the theory of sentence in a given language. In practice this means that segmentation and analysis go hand in hand. All that is required is that the whole be consistent and plausible when we have completed our task. Nor should we be greatly disturbed if we encounter an occasional example which is ambiguous as to sentence type or even as to one sentence versus two. Our tagmemic formulas enable us to generate all possible sentences but do not enable us to unambiguously analyze all sentences encountered in a corpus. Nevertheless, a significantly large residue may indicate that the theory of sentence structure posited for a given language is inadequate and needs to be revamped.

One thing is certain: neither punctuation nor the intonation that it crudely represents is an adequate guide to sentence boundaries. Thus, some writers apparently start many sentences with and or but, as in the following example: But most of his exercising consists of meaningless, uncoordinated movements of arms, hands, and legs. The previous 'sentence' (in terms of punctuation) is, however: The newborn baby exercises almost constantly when he is awake. We have here, then, taking both
'sentences' together the familiar thesis, adversative, and antithesis of the antithetical sentence—in spite of the period and capital letter found on the written page. The whole can be cast into the although paraphrase: Although the newborn baby exercises almost constantly when he is awake, most of his exercising consists of meaningless, uncoordinated movements of arms, hands, and legs. The punctuation as two sentences is not, however, purely an arbitrary convention unrelated to the spoken language. The whole sequence may be spoken spontaneously or read aloud as two 'phonological' sentences. This does not, however, change its status as one grammatical sentence. For just as the stress groups sometimes only imperfectly correlate with the grammatical word, so the phonological sentence need not be in one-to-one correspondence with the grammatical sentence. Phonology and grammar are frequently congruent, but need not be.

A tentative sentence scheme for English distinguishes 'juxtaposition' (without conjunction), 'concatenation' (with conjunction), 'implication', and 'quotation'. Juxtaposition is a label covering not only 'recapitulation', 'paraphrase', 'sequence', and 'echo question' but also the 'simple' sentence (having the overall framework of one clause). Concatenation includes 'coordinate', 'antithetical', and 'alternative'. Implication includes 'general', 'contrary to fact', and 'correlative' (as... so; and just as... so). Quotation includes 'direct' and 'indirect'.

NOTES

1 Use of juxtaposition as a sentence-forming device may be comparatively widespread. Contrasting systems of juxtaposed sentence structures with considerable complexity and variety seem to me to be indicated by data which I have seen from certain languages of West Africa, Southeast Asia, and New Guinea. In some languages certain types of juxtaposed sentences permit deletions of parts of one of the juxtaposed clauses. Until one recognizes sentences that have undergone such deletions as simply variants of their respective types, one is likely to feel that the line between clause and sentence or even sentence and phrase has blurred.


3 Other subtypes of the adversative sentence do not turn on a pair of antonymns or gradients as above exemplified but have
verbs of contrasting meanings or express more diffuse oppositions. These varieties are more similar to subtype (2): Mary went downtown but I stayed home. Although Mary went downtown I stayed home. Semantically either of the opposed ideas may be expressed as thesis or antithesis: I stayed home but Mary went downtown. The member that occurs first may be considered to manifest the thesis and the following member the antithesis; there seems to be no way to detect permuted from unpermuted examples in this subtype of the adversative sentence.

In still another subtype the subjects contrast but the verbs are identical. In this case post-predicate complements may be deleted in the second clause or a pro-verb may be used: He's not a saint but she is. John didn't come but his grandmother did. John came but his grandmother didn't. In these as well as in the subtype mentioned in the above paragraph, the negative may occur in either thesis or antithesis while in the two subtypes described in the body of the paper the negative occurs in the thesis.

4 It is sometimes advantageous to consider that a clause functions simultaneously both as manifestation of a clause level tagmeme and a sentence-level tagmeme. Such portmanteau functioning—one string simultaneously manifesting a clause-level and a sentence-level tagmeme—is described in my article, 'Hierarchy and Methodology' to appear in the volume containing papers read at the Linguistic Institute Conference on Methodology, Los Angeles, 1966.

5 See a forthcoming volume by Bishop, Buttons, Reid, and Longacre: 'Totonac: From Clause to Discourse'.

6 It would be possible to argue that the above exemplify further sentence patterns, e.g. (1) temporal-event, (2) circumstance-action, (3) cause-effect, etc. Such taxonomic elaboration is unnecessary for the reasons described above. In that these various temporal, circumstantial, causal, etc. elements may all be proposed to the same string and to contrasting strings, they appear as marginal elements occurring with various nuclei. The present analysis was first suggested to me by my colleague Barbara Erickson Hollenbach.

7 See 'Hierarchy and Methodology', section 8, methodological suggestion (7) with its accompanying discussion.


9 Not only is if used in English implications but also unless which is equivalent to if . . . not.
THE GENERATIVE POWER OF A TAGMEMIC GRAMMAR

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Introduction. Tagmemic analysis is a theory of language which results in the production of tagmemic grammars. This theory contains a well developed set of discovery procedures for determining the units and constructions of language and a well developed notational system for formulating the results of this discovery. The results of these procedures for any particular language or sublanguage is a tagmemic grammar. But once formulated, the tagmemic grammar is a formal statement of the underlying competence of the native speaker based upon his actual performance.\(^1\) This model is a generative machine, which must generate at least all of the original data, and which may generate new data—data which can, in turn, be verified or rejected.

Although it is true, as Kenneth L. Pike suggests in his latest work, that 'tagmemics has had, on the whole, a much greater contribution to the making explicit of heuristic procedures than to the deductive generative ones',\(^2\) nevertheless, the discovery procedures must be balanced by verification procedures. In this 'guess-and-check method',\(^3\) as it is characterized by Robert E. Longacre, we not only 'guess', but 'check'. The guesswork is not mechanical; it proceeds by a series of insightful steps, or analytic leaps. The presentation of results, however, is strictly formalized, and then subjected to verification tests.
This 'inductive method'\(^4\) may be characterized by four steps: (1) observation of the data, (2) insight into the structure of the given data, (3) formalization of the hypothesis, and (4) verification of the hypothesis. In the first two steps, we observe-and-guess, a regressive argument from consequent to antecedent. In the next two steps we formulate-and-check, a progressive argument from antecedent to consequent.

Applying this theory to language, we first observe performance, and guess at the underlying competence. We then formulate our statement of the underlying competence, and check this statement against the native speaker's performance as reflected in the original data. Without the observe-and-guess procedures, we run the risk of producing mathematical models which are perfectly exact, but which are not applicable to natural languages. Without the formulate-and-check procedures, we run the risk of producing models that are empirically based upon the data, but are not very exact. To be objective in the full sense of the word,\(^5\) the model must be both empirical and exact; that is, (1) it must be founded on the data of natural languages, and (2) it must be objectively verifiable as a generative machine. That tagmemic grammars are empirically based is, I think, a point beyond dispute. What must be demonstrated is that these same tagmemic models are objectively verifiable as generative machines. For this purpose, we propose a triple verification: (1) the generation of the original data, (2) the generation of some new utterances, and (3) the generation of the full generative potential of the machine.

First verification. The grammar must generate all of the original data. If the grammar does not meet this minimum requirement, it is not a grammar of the given language or sub-language.

Testing tagmemic grammars with groups of 40 to 50 graduate students, we have found that groups previously trained in tagmemics can almost infallibly reproduce the original data, given the tagmemic grammar, lexicon, and the original set of glosses. Margin of error for carelessness in these experiments is about 1%. One student taught his wife, who was otherwise untrained in linguistics, how to verify solutions in this way. His solutions reflected the value of this first verification.

Second verification. The grammar should generate some new utterances, over and above the sentences of the original data. Some of these so-called 'trial utterances' can be generated at random, and tested with a native speaker. This type of
verification is suggested by Merrifield in his Laboratory Manual for Morphology and Syntax, where utterances are glossed, but the forms are omitted.

Testing with students from many countries and with various language backgrounds, we have found that the normal sentences which are generated by the grammar, and which we should expect to be acceptable to the native speaker, are, in fact, acceptable. Even some of the cooccurrence restrictions have been verified in this way.

Third verification. The total output of the grammar should be calculated, and, wherever possible, some or all of the output should be generated on a computer. For a complete natural language, with a finite grammar and an infinite output, total verification is impossible. But for limited language problems, with a fixed grammar and limited lexicon, generation of the complete output is possible.

Testing with various student groups, we have found that students can calculate the maximum generation potential of a tagmemic solution, impose controlled restrictions on this potential, and calculate the restricted generation potential of the solution. This does not mean that every student comes up with the right answer on the first attempt, nor that every problem must be solved in exactly the same way. But after correction and discussion, we have been able to produce a set of solutions that show a remarkable conformity; and we are now in a position to formulate a mathematical answer book for a manual of language problems, such as Merrifield’s volume. This third verification is illustrated in Figures 1 to 5.

1. The Data and Tagmemic Solution

The data in a tagmemic problem (Figure 1) consists of a set of sentences given in phonemic script, together with their gloss. The present illustration is a problem in Vietnamese, adapted from Problem 99 of Merrifield’s laboratory manual. By comparing recurring partials—forms which recur with the same meaning—the morphs of the language are isolated; and their interrelationships are then defined by a grammatical statement in tagmemic terms.

The tagmemic solution (Figure 2) consists of a grammar, or set of formulas, and a lexicon, a list of the morphs discovered in the data. The formulas of the tagmemic grammar are read as follows:
Sent = + Base: tCl + Into: ICF

Read: A sentence consists of a base slot filled by a transitive clause, and an intonation slot filled by final intonation contour. (Final intonation is labelled ICF, pending further research.)

tCl = + S: N + P: tV ± O: N

Read: A transitive clause consists of a subject slot filled by a noun phrase, a predicate slot filled by a transitive verb phrase, and an optional object slot filled by a noun phrase.

N = + H: n ± Mod: aj

Read: A noun phrase consists of a head slot filled by a noun, and an optional modifier slot filled by an adjective.

tV = ± Mod: av + H: tv

Read: A transitive verb phrase consists of an optional modifier slot filled by an adverb, and a head slot filled by a transitive verb.

The tagmemic grammar, as given, is a closed finite system, with formulas at the sentence, clause, and phrase levels. In the present example, since the words are simple monomorphic forms, there is no word level construction. This grammar is a sentence generator, with a finite and well determined generative output.

2. Maximum Generation Potential

The maximum generation potential (MGP) is the maximum number of utterances which can be generated by a particular grammar with a finite morpheme inventory. It includes all combinations, manifestations, and substitutions possible, but excludes all permutation possibilities. Calculation of permutations may be introduced later, as required.

The MGP of a given tagmemic solution is calculated as follows:

1) Count the number of morphemes belonging to each class, and enter this number below the morpheme class symbol, e.g. enter 2 under n.
(2) Where there are multiple fillers for a single slot, enter the sum of all morphemes belonging to all filler classes. (Not applicable here.)

(3) Where the tagmeme is optional, add +1 to the number of fillers in the slot to account for the possibility of zero occurrence, e.g. 2 + 1, aj

(4) Multiply the resulting figures to obtain the MGP of each construction, and enter this total under the construction symbol, e.g. 2 x (2 + 1) = 6, N.

(5) Where the construction fills a higher level slot, carry this total for the construction to the next level where the construction symbol appears.

(6) The resulting total, which appears under the symbol sent will be the MGP, the maximum number of sentences generated by the grammar.

The MGP of a solution answers the question: How many sentences are generated by the grammar? In the present illustration (Figure 2), the MGP of the Vietnamese grammar is 252 sentences, formed from a morpheme inventory of 8 morphemes. However, we are not only interested in how many sentences can be generated, we are also interested in what kind of sentences are generated. The machine should generate all grammatical sentences, and no ungrammatical ones. To fulfill this 'all and only' requirement, we must introduce the notions of 'assumption', which goes beyond the data, and 'restriction', which restricts the output.

'Assumptions' are statements which indicate a guess, on the part of the analyst, which goes beyond the evidence of the given data. First the assumption is stated, and then the solution is corrected to conform to the stated assumption. Only those assumptions must be stated which require some change in the solution. By changing the solution to conform to an assumption, the assumption is built into the grammar. The only reason for stating the assumption is to check on the validity of procedures, e.g. in a given problem, all verbs occurred in the present tense except the verb 'drink'. The assumption was made: The verb 'drink' may also occur in the present tense. The solution was corrected accordingly.

'Restrictions' are statements of limitation imposed on the generative power of the grammar. Within the syntactic component, only strictly formal restrictions are imposed, not lexical restrictions. For example, (1) morph A excludes morph B, or (2) morph A requires morph B. These restrictions are then built
into the grammar, by concord ties, either/or notation, or cover statements. Once the restrictions have been built into the grammar, the MGP of the grammar is reduced. Restricted forms are excluded from the grammatical output.

The 'restricted generation potential (RGP) of a grammar is the number of sentences which can be generated, after all formal syntactic restrictions have been imposed on the grammar. The RGP of the given grammar equals the MGP minus the number of restricted forms. This restricted output represents what the analyst considers to be the real total of grammatical forms which can be produced by the machine. The output is grammatical, not necessarily acceptable or sensible. In order to eliminate 'Jabberwocky', lexical restrictions must be imposed. Where there are no syntactic restrictions, as in the present example, the RGP and MGP of the solution are identical.

3. Structural Descriptions

The calculation of the MGP and RGP of a tagmemic solution will tell us exactly how many sentences are generated by the model; with built in restrictions and assumptions, it generates all and only the grammatical sentences of the language. And yet more is required of a grammar; it should assign a structural description to each sentence. We should like to know how many 'patterns' are generated, and, of the total number of sentences generated, how many fall into each pattern. Structural descriptions of this type are implicit in the tagmemic model.

A tagmemic grammar consists of a series of syntactic statements at the sentence, clause, phrase, and word levels. Each formula consists of (1) a construction name, (2) an equals sign, and (3) a string of units marked as obligatory or optional to the construction. Such a model is a closed system beginning with the symbol Sentence and proceeding as far as the ultimate constituents of the grammar, the morphemes.

A simple formula is a formula which consists of all obligatory units. A conflated formula is a formula which contains at least one optional unit. By definition, a conflated formula represents a set of simple formulas. When a series of formulas from sentence to morpheme is assembled in an ordered way, this series contains an underlying structural description or tree diagram (Figure 3). If any of the formulas are conflated formulas, then the resulting tree is a conflated tree and it contains optional elements. Conflated trees represent a set of simple trees, a set
FIGURE 1 Vietnamese Data

1 Cho sem chim to
'The dog sees the big bird.'
2 Cho to xawng sem cho nyo
'The big dog does not see the little dog.'
3 Cho nyo thay chim nyo
'The little dog perceives the little bird.'
4 Chim ku?ng sem cho
'The bird also sees the dog.'
5 Chim ku?ng thay
'The bird also perceives.'
6 Chim xawng thay
'The bird does not perceive.'
7 Cho thay chim
'The dog perceives the bird.'
8 Cho sem
'The dog sees.'
9 Chim to thay cho to
'The big dog perceives the big dog.'
10 Chim nyo ku?ng thay chim to
'The little bird also perceives the big bird.'

FIGURE 2 Tagmemic Solution

<table>
<thead>
<tr>
<th>Grammar</th>
<th>Lexicon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sent = + Base: tCl - Into: ICF</td>
<td>chim n 'bird'</td>
</tr>
<tr>
<td>252 252 x 1</td>
<td>cho n 'dog'</td>
</tr>
<tr>
<td>tCl = + S: N + P: tv ± O: N</td>
<td>nyo aj 'little'</td>
</tr>
<tr>
<td>252 6 x 6 x (6 + 1)</td>
<td>to aj 'big'</td>
</tr>
<tr>
<td>N = + H: n ± Mod: aj</td>
<td>ku?ng av 'also'</td>
</tr>
<tr>
<td>6 2 x (2 + 1)</td>
<td>xawng av 'not'</td>
</tr>
<tr>
<td>tV = ± Mod: av + H: tv</td>
<td>sem tv 'see'</td>
</tr>
<tr>
<td>6 (2 + 1) x 2</td>
<td>thay tv 'perceive'</td>
</tr>
</tbody>
</table>
FIGURE 3 Structural Description

```
  Sent
   /\  
  tCl  ICF
   /\  /\  
  N   tV  (N)
   \  /\  /\  
    n  (aj) (av) tv n (aj)
```

FIGURE 4 Preterminal Strings

| (1)  | n + tv   | = 4 Sent, I L types |
| (2)  | n + tv + n | = 8 Sent, I L M |
| (3)  | n + tv + n + aj | = 16 Sent, I L M N |
| (4)  | n + aj + tv | = 8 Sent, I J L types |
| (5)  | n + aj + tv + n | = 16 Sent, I J L M |
| (6)  | n + aj + tv + n + aj | = 32 Sent, I J L M N |
| (7)  | n + av + tv | = 8 Sent, I K L types |
| (8)  | n + av + tv + n | = 16 Sent, I K L M |
| (9)  | n + av + tv + n + aj | = 32 Sent, I K L M N |
| (10) | n + aj + av + tv | = 16 Sent, I J K L types |
| (11) | n + aj + av + tv + n | = 32 Sent, I J K L M |
| (12) | n + aj + av + tv + n + aj | = 64 Sent, I J K L M N |

MGP = 252 Sent, 12 patterns

FIGURE 5 Sentence Generator

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>chim</td>
<td>nyo</td>
<td>ku?ng</td>
<td>sem</td>
<td>chim</td>
<td>nyo</td>
</tr>
<tr>
<td>(2)</td>
<td>cho</td>
<td>to</td>
<td>xawng</td>
<td>thay</td>
<td>cho</td>
<td>to</td>
</tr>
<tr>
<td>(3)</td>
<td>... etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
which is determined by the exercise of each yes/no option in the tree. In the conflated tree, optional elements are enclosed in parentheses. Tagmemic models are normally of the conflated type, since they are designed to describe sets of sentences. A tagmemic grammar (Figure 2) may be reduced to its underlying structural description (Figure 3) by the following procedures:

1. Each equals sign in the grammar (Figure 2) represents a branching node in the tree (Figure 3). Construction names are node labels, and the fillers in the construction string are its branches.
2. In the conflated tree, optional units are enclosed in parentheses.
3. Since functional relationships between the units have already been fixed by the tagmemic grammar, only form symbols are needed in the tree.

Once the tree has been constructed, the anatomy of the tagmemic model becomes apparent. It is different from other models. Branching is not binary; multiple branching is permitted. And branching occurs at a series of 'natural' levels: sentence, clause, phrase and word levels. The tagmemic tree is, as it were, overlaid on a structural grid. Any single horizontal line in the tree may be read as units at the same level. It is the structure of this tree, more than any other single fact, which justifies Longacre's contention that tagmemic grammars represent a radical departure from former American structuralism.

Conflated trees represent a set of simple trees. To determine how many simple trees are represented by a conflated tree diagram, simply program the numeral 1 into the formulas and calculate the MGP of the solution. The resulting 'unary manifestation', which supposes one and only one morpheme for each morpheme class, is equal to the number of underlying tree structures. To determine these structures in the concrete, redraw the tree as many times as required, exercising each yes/no option represented by the optional elements in the tree. In this way the present tree (Figure 3) is reduced to 12 simple trees.

Now up to this point, we know that our grammar has a generative capacity of 252 sentences, and that these 252 sentences occur in 12 distinct patterns. The next step is to determine how many of the 252 sentences belong to each of the 12 different patterns.
4. Preterminal Strings

Once the conflated structural description is determined, as in Figure 3, and the number of underlying tree structures has been calculated, these are mirrored in a conflated preterminal string and a corresponding set of simple preterminal strings. Each of the tree structures represents a preterminal string, as in Figure 4.

A preterminal string is a string of morpheme classes, which, in a tagmemic grammar, represents the correct classes in the correct order. Just as there is one conflated tree representing 12 simple trees, so there is one conflated preterminal string, representing 12 simple strings. The conflated preterminal string may be represented algebraically as:

\[
\text{Sentence} = + ( n \pm aj ) + ( \pm av + tv ) \pm ( n \pm aj )
\]

This conflated string represents the 12 preterminal strings in Figure 4. Every set of this kind will have minimum and maximum strings.

The minimum preterminal string is the string formed when all of the optional elements are deleted. In the present case, the minimum string consists of 2 words, a noun and a verb (Figure 4, String #1). The maximum preterminal string is the string formed when all possible elements are included. In the present case, the maximum string consists of 6 words: Noun + Adj + Adv + Verb + Noun + Adj (Figure 4, String #12). Between these two extremes, are sentences of three, four and five words.

Simple strings are derived from the conflated string by patiently exercising each yes/no option until all simple strings are formed. Or, the simple strings may be formed directly from simple tree diagrams. Once the set of simple strings is determined, the morphemes of the lexicon may be programmed into the simple strings to form sentences. Since there are two morphemes of each class in the present example, we program the numeral 2 into the strings for each morpheme class to determine how many sentences of each pattern are formed. For example, the minimum string (String #1) produces 4 sentences, and the maximum string (String #12) produces 64 sentences. Note that the total number of sentences produced by all patterns must equal the MGP of the grammar.
5. Sentence Generators

Preterminal strings represent the output of the grammar in an abstract way. When the concrete morphemes of the language are then programmed into the preterminal strings, the strings become terminal. In a tagmemic grammar, the terminal strings are sentences of the language given in phonemic script.

To generate the terminal strings of the grammar, we first set up a sentence generator (Figure 5). This is a matrix, or array of rows and columns. The columns represent the morpheme classes in the correct order, and are labelled with a set of dummy indices, e.g. I, J, K, L, M, N. The rows are numbered to represent the stock of morpheme fillers belonging to each morpheme class. When the same class occurs more than once, it is entered in the generator as often as it occurs.

The actual generation of sentences may now proceed in a controlled fashion. This may be done on a computer, or any other mechanical device. The present generator, for example, could be programmed into the windows of two adjacent slot machines. Each pull of the levers would generate, at random, a new sentence in the language. With a digital computer, we simply call the pattern we desire and give commands; for example, the commands DO I = 1, 2 and DO L = 1, 2 produce four sentences. It is significant that in the generation of the maximum pattern, the computer refused to repeat operations on the noun and adjective classes unless these classes after the verb had a new dummy index. Telling the machine to generate a pattern I-J-K-L-I-J would not work, and produced the equivalent answer, 'but I have already done I and J'. However, when the last two slots were named M-N, the full output was generated.

Problems have been run on the computer here at the Georgetown University Computer Center, using an IBM 1620 computer with Fortran II programming. For the present problem, rather than generate the complete output, we selected patterns #1, #10, and #12, including the minimum and maximum strings, and one intermediate string. The results were the generation of 4 sentences of the I-L type, 16 sentences of the I-J-K-L type, and 64 sentences of the I-J-K-L-M-N type, or 84 sentences in all. The computer generates sentences in the following order. The first item in each column is printed, beginning from the first word in the sentence and proceeding from left to right. For the second sentence, the word at the end of the sentence on the far right is changed. For succeeding sentences, all possibilities are
exhausted in the right or terminal column, then the preterminal column, etc. When the full MGP of a solution is generated, the sentences of the original data will be found scattered at random throughout the generated corpus.

Conclusions

Our conclusions are as follows. The tagmemic model is not only an empirically based descriptive grammar, it is a generative machine. We can calculate exactly the number of sentences generated by each grammar, reduce it to its underlying structural description, determine the preterminal strings, and generate the full generative capacity of the machine according to this well defined set of fixed patterns.

Longacre has suggested that 'future tagmemic grammars might well employ these (rewrite) operations by (a) stating them in the front of the grammar, (b) carrying them out in illustrative fashion here and there throughout the grammar, and (c) incorporating sections of rewrite exercises for the reader'. We suggest that future tagmemic lab manuals might well include a complete set of mathematical answers, the MGP and the RGP of the solutions, with the structural descriptions, set of preterminal strings, and sentence generators illustrated here and there throughout the series of exercises.

The illustration submitted here is admittedly a very simple problem, and is only intended to demonstrate the generative power of the grammar. Sample results of the same methods extended over many language problems were as follows: our sample problem of 10 sentences produced 252 sentences, another problem, of 25 sentences, produced 202,000 sentences in Turkish; another problem, in Sierra Popoluca, with 75 sentences, produced over 85 billion sentences. After calculating the MGP for many problems with results confirmed by large groups of graduate students, after determining the patterns of the various languages and running the MGP on a computer, and after having these results confirmed in all cases and negated in none, by finding the original data scattered at random throughout the generative output, it is rather difficult not to admit the generative power of a tagmemic grammar.
NOTES

1 Noam Chomsky, Aspects of the Theory of Syntax, Cambridge, Mass.: The M.I.T. Press, 1965. p. 4. 'We thus make a fundamental distinction between competence (the speaker-hearer's knowledge of his language) and performance (the actual use of language in concrete situations.)' This distinction is reminiscent of DeSaussure's distinction between la langue (language) and la parole (speaking), but implies further that language is a system of generative processes.


3 Robert E. Longacre, Grammar Discovery Procedures. The Hague: Mouton & Co., 1964. pp. 11-12. The Nature of Procedure. 'He [the analyst] makes certain guesses about the grammatical structure of the language. He then submits these guesses to a series of systematic checks, in which he confirms, disproves or modifies his original guesses, and makes a few better guesses en route.'

4 J. M. Bochenski, The Methods of Contemporary Thought, Dordrecht, Holland: D. Reidel Publ. Co., 1965 Revision, pp. 92, sqq. Bochenski explains the so-called inductive method as a double reduction, i.e. (1) Regressive reduction (called explanation) begins with the known consequent C and proceeds to the unknown antecedent A; whereas (2) Progressive reduction (called verification) begins with the antecedent A, whose truth value is not yet known, and proceeds to the known consequent C. In other words, explanatory hypotheses are formed by regressive reduction: If A, then C. But C. Then A. Hypotheses so formed are verified by progressive reduction. If A, then C. But A (tentatively). Then C (the known consequent).

5 Francis P. Dinneen, S.J., An Introduction to General Linguistics, New York: Holt, Rinehart & Winston, Inc., 1967. pp. 4-5. 'A scientific study should be empirical, exact, and therefore objective.' A study that is not empirical would be non-scientific, 'one in which empirical evidence is not required'. A study that is not exact would be unscientific, 'one that employs no consistent method'. Linguistic science claims to be both empirical and exact.

6 William R. Merrifield, et al., Laboratory Manual for Morphology and Syntax, Santa Ana, California: Summer Institute


8 Noam Chomsky, Syntactic Structures, The Hague: Mouton & Co., 1957. p. 13. 'The grammar of L will thus be a device that generates all of the grammatical sequences of L and none of the ungrammatical ones.' cf. also p. 18. 'all and only' for English.

9 Noam Chomsky, Aspects of the Theory of Syntax, p. 68. 'There is a natural distinction between rules that introduce lexical formatives and the others ... it is necessary to distinguish these sets and to assign the lexical rules to a distinct subpart of the base of the syntactic component.' The separation of lexical and syntactic rules was not presented in Syntactic Structures (1957), and is (p. 79) formally attributed to the work of G. H. Matthews, 1957-1958. This development was anticipated. (On Tagmemes and Transforms, p. 45)

10 Jerrold J. Katz & Paul M. Postal, An Integrated Theory of Linguistic Descriptions, Cambridge, Mass.: The M.I.T. Press, 1964. Research Monograph No. 26, cf. also Chomsky (1965), pp. 79, sqq. The need for lexical subcategorization rules is the concern of all linguists, and developed here in terms of binary features. This is consistent with a binary phonological component. But just as there are phonological components in terms of unit phonemes, so there may also be developed a lexical component in terms of morphemes. Features would then be included in lexical subclasses.

11 Noam Chomsky, Aspects of the Theory of Syntax, p. 8. 'By a generative grammar I mean simply a system of rules that in some explicit and well defined way assigns structural descriptions to sentences.', or p. 9, 'When we speak of a grammar as generating a sentence with a certain structural description, we mean simply that the grammar assigns this structural description to the sentence.'

Noam Chomsky, *Aspects of the Theory of Syntax*, p. 69. In Figure 6, Chomsky represents tagmemic functions as separate nodes, contrary to Pike's insistence that the tagmeme is a unit. cf. also Paul M. Postal's review of *Grammar Discovery Procedures* IJAL, Vol. 32 (1966), pp. 94-95. These misunderstandings might be avoided by constructing tagmemic trees in terms of form alone.

Robert E. Longacre, *Grammar Discovery Procedures*. 'The present procedures are based on a more radical departure from former American structuralism than that found in generative grammar.' p. 7. cf. also Wallace L. Chafe's review of this same work, *Language*, Vol. 41 (1965), pp. 640-647, in which Chafe rejects the claim that tagmemics is a radically different approach. We submit that multiple branching by function makes tagmemics essentially different from the binary techniques of phrase structure grammars.

Noam Chomsky, *Aspects of the Theory of Syntax*, p. 84. 'The system of rewriting rules will now generate derivations terminating with strings that consist of grammatical formatives and complex symbols. Such a string we call a preterminal string.' Terminal strings, in Chomsky's theory, are then formed by programming lexical formatives into the preterminal string.

Preterminal strings, as defined by Chomsky in Note 15 (above), are ordered towards a lexical subcomponent with binary semantic features. The tagmemic preterminal string is oriented towards a lexical component with morpheme subclasses clearly defined, the 'highly sophisticated dictionary' of Longacre (1964) p. 8.


ON THE FORM OF RULES IN A GENERATIVE GRAMMAR

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The tagmemic view of language is a trimodal view, and a grammatical description of a natural language within its framework has an ordered set of three components. These have come to be known as the lexical, grammatical, and phonological hierarchies, respectively. I, myself, prefer (and will use in this paper) the terminology proposed by Katz and Postal\(^1\) for these components; namely, semantic, syntactic, and phonological. My preference for this terminology is of no great consequence, but it is perhaps worthwhile to state my reasons.

In the first place, I believe the term 'component' to be more appropriate than 'hierarchy', since the hierarchy is not the thing itself, but only one of several of its attributes. All three components display hierarchical structuring, but they also share other characteristics as well.

The term 'semantic' is preferable to 'lexical' for at least two reasons. First, the term 'lexical' is generally understood as pertaining to the vocabulary of a language. Each of the three components has a vocabulary, and therefore a lexicon, though the term is not generally used for other than words or morphemes. Second, I agree with Longacre\(^2\) that the vocabulary of the so-called lexical hierarchy is not made up of morphemes.\(^3\) He proposes the term \textit{lexeme}, but I prefer \textit{sememe}, and therefore find 'semantic' to be the appropriate name for the component.
The choice of the term 'syntactic' in place of 'grammatical' is not so clearly an improvement. Each of the three components has both a syntax and a grammar, the former merely being one aspect of the latter. Since the morpheme is the minimal unit of this middle component, 'morphological' might seem an appropriate name for it, but the well-known morphology-syntax opposition interferes with this use of the term (as it does for the use of 'syntactic'). 'Syntactic' is already in wide use, however, and I have chosen to accept it along with the other terms in spite of its failings.

In the past several years, great strides have been made in the study of the syntactic component, particularly in moving from limited morphological studies into the areas of phrase, clause, and sentence. There has, however, continued to be an embarrassingly large hiatus in our general understanding of the semantic component.

In studying the syntactic component, the semantic component has been used as a kind of trash heap for piling residues. This practice is, of course, not to be censured. It is a first principle of any discipline to be allowed to state explicitly the scope of a problem to be solved. Nevertheless, the time has come when forays into this largely unknown area must be made. Only when we understand the semantic component of a grammar can we be sure of our understanding of the other two; and only when we understand all three can we make a serious attempt to define those universals which will be a part of the general theory as opposed to that of any particular language.

In the development of tagmemic theory and notation, one of the basic problems has been the attempt to operate without the rules of the semantic component. In doing this, the phrase rules of the syntactic component have been made to carry much of the information which properly belongs to those of the semantic component; and the kind of information to be carried by the semantic class-membership rules has been largely neglected. A second problem is that no proposal has been forthcoming within the model for providing a means of relating the elements of adjacent components. This paper will address itself to these two questions.

Component Rules

Each component of a grammar has rules of at least two sorts: phrase rules and class-membership rules. The latter are
distribution classes of the vocabulary (or alphabet) of the component, and the former are the constructions (or patterns) into which they are distributed. To distinguish each set of rules from others, they may be named as follows: class-membership rules will be called K- and L-rules for the semantic and syntactic component, respectively; phrase rules will be called R- and P-rules, respectively. The rules of the phonological component will not be discussed in this paper.

K-rules

A class-membership rule consists of the name of the class followed by an enumeration of its members.

\( X = \{x_1, x_2, \ldots, x_n\} \)

The semantic component of any language will apparently include finite subclasses of 'objects' (O), 'qualities' (Q), and 'events' (E); and the reflexive nature of language (It can be used to talk about 'language'.) will also necessitate a finite subclass of 'speech events' (qE). The semantic alphabet will also include classes of semantic relations. A semantic relation is a 'relational sememe' (relS) as opposed to others which are 'referential sememes' (refS). The following are relational sememes required for a recent study of the verb phrase in Huixtec Tzotzil, a Mayan language of Chiapas, Mexico: 'subject' (S), 'agent' (A), 'goal' (G), 'indirect goal' (G'), 'possessor' (Po), 'modifier' (M), 'circumstance' (C), and 'simultaneous temporal order' (Sm).

\( \text{relS} = \{S, A, G, G', Po, M, C, Sm\} \)

A subclass of qualities required for the Tzotzil study is that of 'bearing' (B) whose elements are the union of a subclass 'Mode' having two members: 'indicative' (Indic) and 'injunctive'; and a subclass 'Aspect' having four members: 'timeless' (Tless), 'incompletive' (Incompl), 'completive' (Compl), and 'perfective' (Perf). The referential sememes of Tzotzil may thus be partially defined as follows:

\( \text{O} = \{o_1, o_2, \ldots, o_n\} \)
\( \text{qE} = \{qe_1, qe_2, \ldots, qe_r\} \)
\( \text{E} = \text{qE} \cup \{e_1, e_2, \ldots, e_p\} \)
\( \text{Mode} = \{\text{Indic}, \text{Injunc}\} \)
Aspect = \{Tless, Incompl, Compl, Perf\}

B = Mode U Aspect

Q = B U \{q_1, q_2, \ldots, q_g\}

refS = O U E U Q

L-rules

An L-rule has the same form as a K-rule. It has morphemes as its members. L-rules required for Tzotzil include the following:

\[(4) \quad \text{MODE} = \{\text{IMPV}, \text{SUBJN}\}\]
\[+ \quad \text{PN} = \{\text{FIRST, SECOND, INCL, THIRD}\}\]
\[+ \quad \text{IVS} = \{\text{GO, COME, BEGIN, FINISH, \ldots}\}\]
\[+ \quad \text{TVS} = \{\text{SEE, INSERT, BUY, CARRY, \ldots}\}\]

R-rules and R-rule Nets

In contrast to the phrase rules of the syntactic component which are n-ary strings (n \(\geq 2\)), the semantic phrase rules are two-termed relations of the form

\[(5) \quad x R y\]

where \(x\) and \(y\) are referential sememes, and \(R\) is a relational sememe. Such an expression is to be read "\(x\) stands in the relation \(R\) to \(y\)" or "\(x\) is the \(R\) of \(y\)". The elementary R-rules required for the Tzotzil verb phrase may be defined as follows, where \(a, a', e \in \text{refS}; b \in B; e, e' \in E; s \in S \cup G \cup \text{PoU} ; M; \) and \(s' \in A \cup G'\).

\[(6) \quad a \, s \, a', \quad a' \, s' \, e, \quad e \, s'm \, e', \quad b \, c \, e.\]

A linguistic form has a 'net' of such R-rules as a part of its linguistic derivation. An abstract and partial representation of the net which presumably underlies the English sentence Tom and Dick both love Jane is as follows, where \(o, o', o'' \in O\) and \(e \in E\):

\[(7) \quad o S e \cdot o' S e \cdot o A e \cdot o' A e \cdot o'' G e \cdot \text{Indic} C e \cdot \text{Tless} C e \cdot \ldots\]
Presumably the complexity of a net is limited only by the relations expressed in R-rules. There must be certain additional restraints, however, which will indicate how little and how much of a net may be related to a particular P-rule of the syntactic component. The structure of the P-rule will provide some of the restraints, of course, but it is not clear whether or not further restraints must also be specified within the semantic component. It may be necessary, for example, to in some way mark the R-rules as optional or obligatory for purposes of relating nets to the syntactic component.

Secondary K- and R-rules

In the grammar of a particular language, it is convenient to specify certain secondary semantic classes and phrases which have direct relevance to its syntactic component. Their specification is based on elementary classes and phrases, and greatly simplifies the notation for relating sememes to morpheme strings. Examples from Tzotzil include classes of 'active' and 'passive events'. The Tzotzil syntactic component has a passive morpheme (PASS) which has no simple correspondent in the semantic component. It is possible (and convenient) to specify a secondary correspondent and its complement as follows: A referential sememe is active (Act) if and only if its agent is also its subject; it is a passive sememe (Pass) if its goal is also its subject.

(8) For every \( a, a' \in \text{refS} \)

\[
\begin{align*}
\text{Act} &= \{ a : a' \in \text{Act} \text{ and } a \text{ is agent of } a' \} \\
\text{Pass} &= \{ a : a' \in \text{Pass} \text{ and } a \text{ is goal of } a' \}
\end{align*}
\]

A secondary relational sememe required for Tzotzil is 'referent' (R). In the verb phrase of the syntactic component, a pronoun may correspond to a semantic object which stands (from the syntactic point of view) in any of three relations to the event corresponding to the verb. These are agent, goal, and referent. The first two of these relations are semantic primitives; the last is not. The last may be either the indirect goal or the possessor of the (direct) goal, with the restriction that it not also be the agent.

(9) For every \( a, a' \in \text{refS} \) and \( e \in E \)

\[
( a \in R \vDash (a \in \text{G} \vDash e \lor (a \in \text{Po} a' \land a' \in \text{G} e)) \land \neg (a \in A e) \)
\]
The relation 'referent' is then used in the specification of a secondary class of 'referential events'. The class of all events $E$ is partitioned by three subclasses of events: one-termed or 'intransitive events' ($iE$), two-termed or 'transitive events' ($tE$), and three-termed or 'ditransitive events' ($dE$). An intransitive event has an agent, but no goal or indirect goal; a transitive event has an agent and goal but no indirect goal; and a ditransitive event has agent, goal, and indirect goal.

(10) For every $e \in E$ and $a, a', a'' \in \text{refS}$

$$iE = \{e: \neg a \wedge (a' \wedge \neg (a'' \wedge G e))\}$$

$$tE = \{e: a \wedge (a' \wedge \neg (a'' \wedge G e))\}$$

$$dE = \{e: a \wedge (a' \wedge \neg (a'' \wedge G e))\}$$

$$E = iE \cup tE \cup dE$$

$\emptyset = iE \cap tE \cap dE$

An important aspect of these semantic specifications of transitivity should be noted which differs from such specification as often given for the syntactic component. In the latter, a verb or clause is often specified as 'transitive' if it has 'potential' for occurrence with a form corresponding to a goal. This is useful for the syntactic component, but in the semantic component an event is 'transitive' if and only if it has a goal. It may turn out that the goal is unnamed, but there is a goal, and everyone knows it. Similarly, a ditransitive event always has an indirect goal. English verbs which correspond to ditransitive events include buy, sell, give, tell, etc.

A Tzotzil 'referential event' ($rE$) is defined as one which has an agent, a goal, and a referent. It is easily seen that all ditransitive events are also referential events, and that a transitive event is a referential event just in case its goal is possessed.

(11) For every $e \in E$ and $a, a', a'' \in \text{refS}$

$$rE = \{e: a \wedge (a' \wedge \neg (a'' \wedge G e))\}$$

Note that secondary classes of the type Act, Pass, and $rE$ are of a different order from primary classes of the type $O$, $E$, Mode, etc. The former are subclasses of the latter, and are usually defined on the basis of a net of R-rules rather than on single R-rules.
P-rules

Including R-rules in the theory has important implications for the nature of the P-rules as they have been developed to date. The, by now, traditional slot-class notation must be discarded in favor of a simple string of classes. The syntactic development of the Tzotzil verb phrase, for example, begins with the following three P-rules, where parentheses indicate that a constituent is optional to the construction:

\[
\begin{align*}
(12) \quad & \text{VP} = (\text{NEG}) (\text{ASP}) (\text{AUX}) \text{NUC} (\text{DIR}) \\
& \text{NUC} = (\text{PN}_1) (\text{PN}_2) \text{V} (\text{REFL}) (\text{PL}_2) (\text{PN}_3) (\text{PL}_1) \\
& \text{V} = \text{VS} (\text{PERF}) (\text{REF}) (\text{PASS}) (\text{MODE})
\end{align*}
\]

In discarding the slot-class notation, the concept of 'tagmeme' must go with it. Let me hasten to add that this does not signal any such thing as the expurgation of tagmemic theory from the notion 'grammatical function'. It merely recognizes what Householder noted several years ago, and what anyone who understands tagmemics will readily admit, that in tagmemics slot 'is always a relational expression'. This being the case, it belongs to the semantic component rather than to the syntactic.

Longacre rightly points out that 'tagmemics makes grammatical functions focal, but associates such functions with sets of items and constructions'. Discarding the tagmeme need not change this in any essential way. Grammatical function will remain focal, and the rules for relating sememes to strings of morphemes will provide the important association of function with set.

Focus on grammatical function is certainly one of the important contributions that tagmemics has made to linguistic theory. Although Bloomfield had discussed grammatical function as early as 1926, its place in modern linguistics had been obscured until it began to be emphasized by tagmemics. It was surely tagmemics which even prodded Chomsky to devote a section of Aspects to this subject, though he has said so nowhere in print that I know of.

There are those, of course, who would have had us discard grammatical function long ago. Postal and Bach after him completely misunderstood and misrepresented its significance. Although Chomsky has begun to consider grammatical function within his model, he relegates it to a subsidiary place, stating that functional 'information is already contained, implicitly, in
the system of elementary rewriting rules'. This is only true, of course, if such information is made explicit somewhere in the theory. But then, following Katz and Postal, Chomsky relegates the entire semantic component to a subsidiary place. The question naturally arises as to whether we can have tagmemics without the tagmeme. In personal discussion with Longacre in the winter of 1965-6, he indicated to me that he could conceive of a tagmemics without the tagmeme, and in a paper read the following August he stated: '... it is necessary to underscore the fact that tagmemics involves much more than emphasis on the tagmeme. I can, in fact, envision a variety of tagmemics in which the tagmeme plays no role—although I would not find such a variety of tagmemics very satisfactory or congenial'. I agree with Longacre at this point, but do not share his dissatisfaction with this prospect.

Correspondence Rules

It is almost trivial to state that a natural language relates speech sounds to meaningful units of some sort. It is an obvious fact that a speaker has the ability to give a proper semantic interpretation to the vast majority of speech signals which present themselves to him within his own speech community (with the possible exception of those produced by linguists). If we then begin with the empirical assumption that natural languages are trimodally structured, that units of sound are elements of one mode and that units of meaning are elements of another, it follows naturally that a speaker must have a well-defined means of relating the three modes. It also follows that a theory of language must have an equally well-defined means of relating them. Sydney Lamb has made a good contribution in this area, and most of what I here propose for tagmemics is based on his work. As mentioned above, the three components of a grammar constitute an ordered set. Rules which provide correspondences from the semantic component through the syntactic to the phonological simulate, in some loose sense, what a speaker does; while the inverse of such rules simulate what a hearer does. Rules of the first sort allow for an effective procedure for generating speech in the manner of a speaker who, again in some loose sense, may be thought of as beginning with the semantic component. Hockett has characterized the procedure which a hearer applies to rules of the second sort as 'open-ended parsing'. The model must theoretically allow for traffic in both
directions, but in practice the form of the rules (as suggested here) definitely favors traffic from the speaker's point of view. Lamb has now proposed a system of 'linguistic graphs' which avoids this unidirectional bias, but we will here use a form of an earlier notation.

Two relations must be provided: a relation of sememes to strings of morphemes, and a relation of morphemes to strings of phonemes. Lamb has shown that the latter relation is complex, involving two sets of rules and an intermediate alphabet of 'morphophonemes'. The earlier view, clarified by Hockett, was that morphophonemes offered just one of two alternatives for relating morphemes to phonemes.

Lamb, of course, maintains that morphophonemes constitute the alphabet of a distinct component of the grammar. It is interesting to follow the development of his model as regards the number of components (in his terms, stratal systems) which he posits. In 1964, he posited four components—our three and a fourth morphophonemic one. By 1965 he had split these into double components, and in 1966 he was suggesting six for 'at least some languages, including English'.

This is an obvious move in the direction of three components, since he must now show that each of three pairs of components has two sets of phrase structure which are of genuine linguistic interest. Significantly, in a recent stratificational study of Sango, an African lingua franca, Charles Taber finds that 'in Sango, at least, the two central strata of language are very closely related' (p. 186). He then raises the question: "Realizing that there are some discrepancies to be accounted for between the lexemic and morphemic strata, are we justified in adding, in order to account for them, a distinct and largely repetitious set of morphotactic rules?" He suggests that this would be 'wasteful', and that 'the burden of accounting for discrepancies [between these two strata] can best be handled by realization rules rather than be separate tactics' (p. 192).

This suggests what we had expected—that there are not really six strata, but that the rules for moving from one to another may require more than one step. In any case, the proposal made here is that, in relating morphemes to phonemes, an intermediate alphabet of morphophonemes may (and very likely will) be required; and that this alphabet belongs to no component having a tactics of its own, but is merely part of a complex relation. In effect, then, there are at least three sets of correspondence rules.
Each set of correspondence rules may include rules of two sorts—transformations and realization rules. A transformation places an element in position, and a realization rule provides a spelling in terms of the alphabet of the neighboring component. The transformations, starting from the semantic component, will be called $T_-, T'-, \text{and } T''$-rules. The realization rules will be called $S$-rules (for relating sememes to morpheme strings), $M$-rules (for relating morphemes to morphophoneme strings), and $MP$-rules (for relating morphophonemes to phoneme strings).

Transformations

Since both syntactic and phonological phrase rules may be conveniently represented as linearly ordered, both $T'$- and $T''$-rules may be of the form $xyz \Rightarrow yxz$, where elements are merely rearranged. A $T'$-rule which operates on a portion of the Tzotzil verb phrase (12) rearranges pronouns of the nucleus when the verb is inflected for mode or perfective aspect.

$$\begin{align*}
(13) & \quad P^1 (P^2) V (P^L_2) (P^3) \Rightarrow (P^2) V (P^L_2) P^1 \\
& \quad \text{MODE } \vee \text{ PERF}
\end{align*}$$

A $T''$-rule which rearranges morphophonemes may be illustrated from Fore, a language of New Guinea. When Fore phrase structure generates a form whose morphophonemic realization results in a sequence $tn$, it is permuted to $nt$.

$$\begin{align*}
(14) & \quad tn \Rightarrow nt \\
\text{Example: } & \quad \text{tutne 'my axe' } \Rightarrow \text{ tunte}
\end{align*}$$

Since it is not convenient to consider nets of $R$-rules as in any sense linearly ordered, $T$-rules must name the positions in $P$-rules to which sememes correspond. A $T$-rule thus has the form $x \Rightarrow y$, where $x$ is a class of sememes and $y$ is a class of morphemes with stated distribution in the $P$-rules.

An example of a $T$-rule may be drawn, once again, from Tzotzil. As stated in (12), there are two plural positions in the nucleus of the verb phrase. A plural element is related to $P^{L_2}$ if it is the agent of a transitive or referential event, and otherwise to $P^{L_1}$ if it is the agent, goal, or referent of a non-reflexive event.
(15) For every \( e \in E \), \( t \in T \cup R \), \( r \in R \), \( g \in G \), and \( p \in P \):

\[
\begin{align*}
P1 & \rightarrow PL^2 / p A t \ \text{or} \ PL^1 / p r' e \ \text{if} \ \sim (e \in \text{Refl})
\end{align*}
\]

T'- and T''-rules can conceivably be treated as ordered or not.

Realization rules

Little needs to be said here about the form of realization rules, since they have received much discussion in the literature. They are context-sensitive and unordered. It should perhaps be made explicit, however, that contexts are stated in terms of the same alphabet as that to which the element to be realized belongs.

An interesting case of an S-rule from Tzotzil is that which states the morphemic realization of injunctive mode. If \( \text{Injunc} \) is the circumstance of a negated event (\( \sim E \)), it is realized as both the emphatic modal \( \text{me} \) and the morpheme of timeless aspect \( s \); otherwise, if it is the circumstance of a stative event (\( sE \)), or if the event has an inclusive person (\( \text{Incl} \)) as agent, it is realized as the subjunctive morpheme \( \text{SUBJN} \); otherwise, if the event has a second person (\( 2nd \)) as agent, it is realized as the imperative morpheme \( \text{IMPV} \).

\[
\begin{align*}
\text{Injunc} & \rightarrow \{ \text{me} \land s / e \in \sim E \}
\end{align*}
\]

\[
\begin{align*}
\text{SUBJN} & / e \in sE \lor (o \in \text{Incl} \land o A e) \\
\text{IMPV} & / o \in 2nd \land o A e
\end{align*}
\]

M- and MP-rules have the same general form as S-rules except that linearity is used in the statement of contexts.

\[
\begin{align*}
\text{PERF} & \rightarrow \{ \emptyset / (\text{REF}) \}
\end{align*}
\]

\[
\begin{align*}
\text{em} & / \text{IVS} \\
\text{ox} & / \text{TVS}
\end{align*}
\]

In writing of the manner in which components 'interlock with one another', Pike states that 'tagmemic theory as a coherent approach must eventually stand or fall by crucial demonstrations in this area'. I suggest that rules of the above sort represent a
first step in formalizing such interlocking, and that we must now seek formal means for relating components at other than the level of minimal units.

NOTES

4 Many helpful criticisms from John R. Alsop have greatly improved this paper.
6 All Tzotzil examples used in this paper are drawn from M. M. Cowan and W. R. Merrifield, 'The verb phrase in Huixtec Tzotzil' (to appear in Language).
7 Mode and aspect sememes are tentatively treated as referential, rather than relational, but it is not clear that this is correct.
9 I substitute parenthesis for + as an orthographic convenience.
16 Chomsky, Aspects, 74.
18 Chomsky, Aspects, 16 and 75.
22 Cf. Lamb, 'Prolegomena' and Outline.
24 Lamb, 'Sememic approach', 58f.
25 Lamb, 'Kinship terminology', 41ff.
26 Lamb, 'Outline', 1.
27 Cf. fn. 5.
29 See, in particular, Lamb, 'On alternation', 111-22, where such rules are discussed in some detail, though with a slightly different format than is used in this paper.
30 Pike, Unified theory, Pt. 3, 66.
First Panel: TAGMEMIC THEORY

Chairman:
Lloyd B. Swift
Foreign Service Institute

Panelists:
Kenneth L. Pike
University of Michigan
Robert E. Longacre
University of Buffalo
Walter A. Cook, S.J.
Georgetown University
William R. Merrifield
Summer Institute of Linguistics

Discussants:
Edward L. Blansitt, Jr.
Georgetown University
Francis P. Dinneen, S.J.
Georgetown University
Nguyen Dinh-Hoa
University of Saigon
William C. Stokoe, Jr.
Gallaudet College
Philip Luelsdorff
Georgetown University
Leopoldina Nowak
Federal Society of Linguists
Neil Bratton
Georgetown University
Philip E. Miller
Georgetown University
Richard F. Thompson
Georgetown University
BLANSITT: I have a question for Dr. Merrifield. I earlier called attention to the functional equivalence of certain different slot-class correlations and I would like to know how he would handle this without a tagmeme or some equivalent concept.

MERRIFIELD: I am not sure that I get all the implications here. In talking with Dr. Blansitt yesterday he mentioned something of what he remarked this morning; and, as I understand his view, he is suggesting that we have a slot which is the linear aspect and also function—what Longacre has called function. What I am saying is that in the phrase structure of the syntactic component we have linearity, which is where that aspect comes in. In the semantic component we have function as a sememic relation, a particular relation; and other sememes related to it in the phrase rules of the semantic component will be related by transformation and realization rules to the different positions in the phrase structure of the syntactic component. I think you will have both of the things which Dr. Blansitt is suggesting.

DINNEEN: I would like to ask Dr. Merrifield about the method he uses to establish primitives. I think you suggested that in the language you are studying 'subject', 'agent', 'goal', and 'inner goal' are primitives. I wondered if this was based on semantic criteria, formal criteria, or a combination of both and if you would include 'injunction' in this particular language as a primitive.

MERRIFIELD: Yes, injunctive is a primitive in the particular grammar that I spoke of. The paper on Tzotzil will provide an extensive example of this particular approach and it is ready for publication.

How do you find sememes? That is a good question. As I said, a particular object stands as subject and as agent or as subject and as goal of a particular event. Before that I said that we had something else which we might call a sentence if we do not confuse it with what is called a sentence elsewhere; or we can call it proposition, in which case we would say that an object is subject of a proposition and that the object is the agent of that event and therefore we have a more complex way of getting to passive and active.

NGUYEN: My comment relates to both Dr. Pike's and Father Cook's papers. I think I would express a very honest feeling by saying that in the type of formulas given by Father Cook's informant there may be a risk of producing sentences that are merely Vietnamese translations of English sentences. This
would imply a need for a larger corpus of data and also careful checking and cross checking.

I think we have to also break down the verbals into pre-verbs and post-verbs; and there are as many as nine positions in a noun phrase and in a verb phrase possibly up to six positions, with directional tagmemes, etc.

I was also interested in Dr. Pike's examples from Igede regarding the instrumental and also the benefactive. In Vietnamese we not only have benefactive but also what may be called distributional. In other words, you may have something like I gave him a book but you also have in Vietnamese something like I stole the book from him.

I think it is time for us to do what Professor Emeneau has advised us to do, that is to dig further into the Vietnamese verbs.

COOK: I do not pretend in any way to be an expert on the Vietnamese language. The purpose of the demonstration here was to show that given a presumably accurate set of data you come up with a very definite structure with very concrete answers as far as their generative potential is concerned. You are dependent on your data as the language and you have to work with it as though there were nothing else. In the larger field of language analysis I agree that we have to go deeper and deeper and gather more and more data. How accurately the data will represent the language will depend on how large the corpus is.

STOKOE: Father Cook's generative model suggested to me that the maximum generative potential might be increased by a very small number if it were admitted either by the approach or by the native informant that a complete utterance could be simply one of the morphemes in answer to a question. It seems to me that in tagmemics an answer or a response from a speaker constitutes something which should be considered. I would like to ask Dr. Longacre whether it is on phonological, semantic, or syntactic grounds that he wishes to eliminate the minor clause type. Does the elimination of the short answer to a question or the interjection rest on grammatical, semantic, or phonological grounds?

LONGACRE: I do not think I can answer that question in two or three sentences because actually my reason for doing this is that I am trying to develop a general theory of hierarchy which will give us a consistent way of setting up word, phrase, clause, sentence, paragraph, and discourse which does not find us doing something arbitrarily different, for example, on sentence versus clause versus phrase. In terms of this general theory of
hierarchy, which is adumbrated somewhat in the article to which Bill Merrifield referred, it seems to me that it is not profitable to set up these minor sentences. It would probably be better to set up full sentences and then consider minor sentences to be conditioned variants of those with deletion of the bulk of the sentence structure—conditioned variants so that we set up in every case not just a maximum structure and a minimum structure but also a sub-minimum structure in which we actually delete certain items otherwise considered to be obligatory parts of the construction. In the example which you cite, the conditioning is present; it is a response to a question.

PIKE: Longacre and I are both interested in hierarchy and at this point I think I probably call on it more than he is accustomed to doing. I want to look, before looking at some things, or while looking at some things, at larger structures such as discourse structures including, for example, utterance and response as a minimum conversation. In the minimum conversation, which I will define here as an utterance and a response, the response becomes a structural slot within which we can get certain kinds of utterances in response to the first utterance. In this case we have the particular defined framework within which we can get a conditioned deletion. Rather than saying merely deletion, which is all Longacre is talking about at the moment, although it is not all he has taught about, I think he will go on to discuss conditioned variation, which he has done in other structures, then he will be able to define the deletion in terms of normal tagmemic conditioning. I know that he has also been interested in such things as metalanguage of the individual—he has written me about them—and it seems to me that when we have a quotation slot—I said 'go'. I said 'no', or I said 'tree'—we have special kinds of slots which the language itself provides. I myself discussed these in terms of hypostasis in my theoretical work; and I think that within these kinds of special tagmemic slots we can handle, in a formal way eventually, the possibilities of deletion that Longacre has referred to.

LUELSDORFF: My question is directed to Father Cook. It concerns the utility of computing the maximum generative potential in linguistic descriptions in general. Since there is no upper bound on the number of sentences in a language, given the observation that there is no longest sentence, would not a recursive grammar be more highly valued than a nonrecursive one? My second question concerns the predictability of syntactic functions given hierarchical information specified by your
structural description. If syntactic functions, grammatical functions, are predictable—and they seem to be given a slight revision in your structural description for the Vietnamese corpus—why specify them in individual grammars? For example, we can say that if an N is immediately dominated by an S it functions as a subject; if on the other hand an N is immediately dominated by a VP it functions as an object.

COOK: The students in class have often questioned the utility of the MGP. I find that calculating the exact number of sentences that come from a concrete model the student gets more of a feeling that he is actually dealing with an empirical science that has very definite empirical results. As long as you are dealing with full languages and full grammars you have a finite machine generating an infinite output. You use such terms as 'all and only'; yet it is only in the concrete definite problem that you can actually say how much is 'all' and how much is 'only'.

In tagmemics, working with a set of discovery procedures where we take a whole string at a time and where we have multiple branching, it is not immediately obvious what the function of each item is. We do not think that the argument that specification of function is redundant is valid for a multiple-branching grammar.

MERRIFIELD: I think that even in Chomsky's binary branching function is not explicit until he makes it explicit. He gave a set of rules stating that subject is defined in a particular way; until he does this explicitly it is not there.

PIKE: I pick up from my grape vine, which may not be accurate, that some transformationalists are no longer satisfied that there is no added semantic material in the transformations. If transformationalists could bring in some manner of handling function—of course it would be quite pleasant for us if they did it as a tagmeme but that is quite irrelevant—they would strengthen their whole approach. I think Chomsky made considerable strides by '65 in this direction and I am sure they will go further and perhaps go way beyond us.

LONGACRE: I want to make an objection, which I have made in print several times, to the assumption that even in English the predicate node dominates both the verb and the object. This, it seems to me, is still a hangover from traditional sentence diagramming. I think considerable insights are gained simply by stringing your constituents out on clause level—subject, predicate, object, time, manner, etc.—and that the assumption that somehow the object is dominated by the verb in some special
sense is a purely gratuitous assumption and it is very hard to give
a reason for doing this. I am a little bit unhappy that in Bill
Merrifield's paper he seems to resort to binary relations. To
me this is a step backward.

NOWAK: I wonder if you could describe tagmemics in a few
words. Would you suggest that a translator of European languages
should study it?

PIKE: Tagmemics is the most exciting thing which has hit
some of us in all our lives. It is that which gives the greatest
humanizing influence in any arts curriculum which I know of. It
refuses to treat man as a machine, but allows him to do that
which a machine cannot do: make this enormously exciting rela-
tionship between table and a table. Furthermore, it tries to
build this linkage at several points.

We have built a linkage between form and meaning in lexicon;
but in tagmemics we are showing that a similar linkage is present
also in grammar. Of course, we are not showing it for the first
time—no one who does anything worthwhile starts from scratch.
Just as in lexicon we start with a form and a meaning as a com-
posite, so in grammar we have a form and a meaning as a com-
posite.

At this point I suppose you notice that I am quite different in
my treatment from Dr. Merrifield. For reasons that are not at
all clear to me he has pulled out the meaning of 'table' and the
meaning of 'goal' and put them into one basket apart from any
form. What I have done, on the contrary, is to have the meaning
of 'table', 'chair', 'book' and the forms of table, chair, book
give one set of units in the language and another set of forms
with their meanings—tagmemes—give another set of elements in
the grammatical hierarchy. Now this goes much further in that
in addition to having a slot and a filler, in which the slot can be
a formal element such as position (fixed or with certain variabil-
ity, tie, concord, etc.) which we have to specify with a subscript
for a role such as actor or agent or goal. This I was doing in
1954, in my first volume of Language, but we are only recently
following up its implications. The next place to see it is in the
syntax paradigms. The Bilaan materials, which I published in
Language, show that you can have two or three of these functions
coming as a portmanteau function in a single formal item.

BRATTON: The discussion so far has given us examples and
as long as we are talking about simple sentences, or base phrase
markers, both tagmemics and transformational grammar can do
an adequate job. One of the reservations of transformational
grammar is that previously there had not been an adequate way of describing a sentence such as *John persuaded the doctor to examine Bill*, in which *doctor* performs two functions: it is the 'subject' of *examine* and the 'object' of *persuaded*. How does a tagmemic formula show this?

PIKE: At this point you have one tagmeme with its formal slot and two subscripts. Thus you have a tagmeme which happens to have 'goal' as one subscript, 'actor' as a second subscript; the 'goal' working to the left, 'agent' to the right. We have not worked this out for English, but this is the kind of an answer we are working on.

LONGACRE: An alternative which I personally prefer is to say that in this case we have a portmanteau realization of two tagmemes.

BRATTON: You gave a hierarchy going roughly 'word', 'phrase', 'clause', 'sentence', 'discourse', and then roughly up into the clouds. Lamb goes 'sememe', 'hypersememe', and then has dots where he might add several tiers on top of that. Chomsky divides into 'deep structure' and 'surface structure' and both of these are taken out of the domain of performance. What I would suggest is that what comes out as your surface structure 'sentence', or the performance of the surface structure, comes from a deep structure which gives you your elementary grammatical relations. If you go from sentence to discourse, aren't you putting the cart before the horse? Before a particular sentence can come out all the elements that have to do with discourse and the speaker's intentions will have to come before it.

PIKE: This leads first of all to another fascinating point, with apologies to Mr. Merrifield, Mr. Chomsky, and others. But notice that, as Longacre said in Cambridge in 1962, Chomsky turned Trager's model upside down. Trager had gone from phonetics to phonemics to morphology to syntax and up to meaning or metalinguistics. Now they start down with meaning implicit, going down through grammatical materials and ending up with phonology. It is assumed, if I am reading them right, that the generativeness is in some sense a priority from semantics (if we follow Lamb) down through certain syntactics and down through phonology. This I am challenging on empirical grounds.

The basis of the discussion of some of the recent developments has been intuition and in 1962 it was stated that the task of grammar was to make our intuitions explicit. What I want to put my finger on is two or three items in my intuition where it is totally inadequate to say that we first choose what we want to say, then
we choose a grammar, and then we choose a phonology. Since intuition has been made basic to the task of grammar, if this meets your intuition, then don't accept the model coming down from meaning first, to grammar second, and to phonology third. I shall try to elicit from your intuition what I find in mine. If I fail, of course, hold the other model; if I succeed, be careful of adopting the other model too seriously too soon.

I can be a high school teacher—which I am not—and say to the boys: 'tomorrow it is your task to write me a poem in iambic pentameter.' They will do it. Notice that I have demanded of my students, first, the generativeness of a phonological component. How then can I say that it comes only after having chosen a topic? Secondly, I can demand of my students that they write on a topic, for example, on the seasons:—and I have specified a semantic component. Or, if I have listened to Jakobson talking about poetry, notice that I can demand of my students any topic with any rhyming scheme provided that in the end there be a grammatical balance between every first, fourth, sixth, and eighth line:—so I have specified a grammatical balance before generating the meaning. This means that I cannot allow in my thinking about language a definition of competence which refuses to allow me to specify a phonological component, in the degree that I have indicated, first.

I will grant that I usually like to think that before I talk I am thinking of something to say; I don't think it is always true of some people I have heard. I also grant that there are times when I have made noises in order to get myself time to think. But the universality of the demand that competence be specified from semantics to syntax to phonology is, in my opinion, totally, forever gone. What do we replace it with? A trimodalism. You can put semantics at the top if you wish with phonology and grammar in some other order; but place it so that you can always go from any one to any of the others, if you so wish.

MERRIFIELD: I think one of the key words in what Dr. Pike has said is 'degree'. I think that he is correct in saying that we have within our theory all of these things at the same time. But in any particular speech act I like to think of the model as starting with the semantics. If I am trying to build a poem and I am limiting myself to a particular phonological form, if it is really going to be a poem, I still have to start with semantics; otherwise, it will not make sense, it will not have any meaning at all, and it will not be a poem in the commonly accepted sense. From the hearer's point of view, he does not have the meaning first;
all there is that reaches him first is the sound. And from the sound he extracts the meaning through a series of relations. I think that we have to distinguish a particular speech act from the theory which accounts for the possibility of generating these speech acts.

MILLER: I would like to suggest that what we need is a tagmemic lexicographer. We should not just work up until we get to semantics and then work down but should keep on going straight up. Perhaps as a result lexicography might become a little less of an art and more scientific.

COOK: I agree with Mr. Miller that we could use a tagmemic lexicographer; and one of the reasons (to answer an earlier question) why we are generating the complete output of a grammar, is to retest the results with native speakers. When we do this, we find out there are certain lexical restrictions which have to be imposed upon the grammar. Chomsky is doing this by means of semantic features which he programs into his preterminal strings. In Dr. Pike's system, as I understand it, where we have a lexicon of well defined morphemes, those morphemes require a great deal of careful subclassification into what Dr. Longacre has called 'a highly sophisticated dictionary'. I think that most of this panel would agree with Mr. Miller that this highly sophisticated dictionary is required and that its development is still in the future.

THOMPSON: Mr. Merrifield presented a very different kind of a model than did Father Cook. Father Cook presumably would begin the generation of a sentence, if indeed he would generate them at all, with a capital S and eventually assign morphemes to capital letters. Since you have a sememic, or semantic, component, you also have sememes as the units which are eventually realized into lexemes and which may, incidentally, be given the structural descriptions of $S \rightarrow NV$, etc. But you presumably generate sentences with sememes and not with the capital S. On this particular point I would like to interject a comment on what Mr. Pike had to say: My intuition in working with these things is that it makes much more sense to say that I add words together, or, in this case, that I add sememes together, than it does to say that I, in some sense, start out with a capital S and eventually end up going through transformations to assign any particular morpheme or lexeme (whatever one is doing) to the capital letters that I might have initially up in my head somewhere. But since we anyhow don't know how people really produce utterances, we are again guessing; and we are making models which we hope might
someday account for the way that people really do talk. I would like to ask what might happen in Figure 5 of Father Cook's paper if we change the word for 'dog' to the word for 'pebble'. We note that all of the words were selected in such a manner that no matter how you manipulate them you end up with sentences acceptable to a native speaker of Vietnamese.

I would like to make one other comment on something that Mr. Pike said a moment ago in commenting on the fact that you can have subject as goal. It seems to me that the purpose of specifying agent and goal is to make more precise the notion of subject and object. In the farmer killed the duckling the noun farmer is the agent and in the duckling was killed by the farmer it is the same. The lexeme marker of agent is by in this particular sentence. I can't see a need for having a notion of 'noun' as well as 'subject' and 'agent'.

COOK: As far as this problem is concerned, it was not doctored. It was just picked out of Dr. Merrifield's Manual, and it just happened to have this semantic content. There are other problems though where we run into the semantic problem. But I have already answered Mr. Miller's question by saying that we do need these lexical restrictions. But these restrictions are not built into the grammar; they do not belong to the grammar. In other words I hold that the only restrictions in the grammar are formal components; and that the string that is generated, even the pebble saw the bird, is a perfectly grammatical sentence, just as 'twas brillig, and the slithy toves did gyre and gimble in the wabe is perfectly grammatical. It has the right parts in the right order; and that is what I mean by grammatical. Also I may use Chomsky's trick and say: 'my machine generated it, therefore it is grammatical'.

What we need is a set of lexical restrictions; and the way to obtain such a set of restrictions while keeping the morphemes as components is to analyse these morphemes not into features but into subclasses. So we would have an inanimate class 'which doesn't see birds' and an animate class 'which does see birds'.

There is a great deal of this work to be done. That we need a tagmemic lexicographer, I agree; but I don't think he has anything to do with the syntactic component as such; he has to do with programming the right lexical items. We all need to work on this much more. But there is a difference between 'grammatical', the right parts in the right order, and 'acceptable', the right parts making sense.
MERRIFIELD: The only exception I would take, I think, is that I would like to see these lexical restrictions in the semantic component. I don't know if that is different from what Dr. Cook would do or not. But I think that we need them, and I will be glad to include them in the model. I have not claimed here to tell you everything about the model; I have just mentioned a few things that I think have not been said before. I hope that we can learn from them. When we think of a speaker or a hearer, we have to think in a very loose sense; and I said so. I think that we can perhaps visualize this model in operation. In this room there is much material for us to talk about: people who are in a certain relation to other people, people who are performing various kinds of actions right here. Right now that I could abstract for myself a nice net, draw from it and verbalize about it. This is in essence the kind of operation that I would visualize in some loose way for starting the speech act.

PIKE: Briefly, too, why the three: subject, noun, agent? I can answer, but it seems a little anticlimatic in our present climate, if I say 'to handle ambiguity'. If you look at the 1954 volume of my Language, you notice that I spoke of Spanish teacher, 'one who comes from Spain', and Spanish teacher, 'one who speaks Spanish', as being ambiguous in terms of noun, etc., but as contrastive in terms of the tagmemic content. So, this gets at ambiguity in two ways, although we have not discussed it a great deal because we have been interested in other fossae. If I say John saw the dog or the dog saw John, they mean something different; but the nominal content is the same. Therefore I have to have 'subject' as well as 'noun'. If I say Spanish teacher, I need things like 'agent', 'goal', etc. So there are two types of ambiguity which, in tagmemic theory, are resolved here. In transformational theory they are resolved by other devices. The question is: how much do you pay for the particular device, how much do you pay for the other device, and, for the particular purpose that you are after, which device can you afford to pay for?
FIRST LUNCHEON ADDRESS

TENSE, TIME, AND FOCUS IN FRENCH
TENSE, TIME, AND FOCUS IN FRENCH

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The forms of the verb in French, and their meanings have been the object of many studies.

For the last forty years at least, linguists have been repeating the refrain that grammarians of the past had tried to force the French verb into the mold of the verb in Latin, thus giving rise to all sorts of misinterpretations, not only of the significance of the individual forms, but also the paradigmatic system as a whole.

On the other hand, nowadays we read articles and books which insist on finding in the French verb aspects such as we know in Russian, or strange things like 'a present in the past'. (R. L. Wagner, J. Pinchon Grammaire du français classique et moderne.)

It seems to me appropriate in the context of this Roundtable oriented particularly to tagmemic studies to take a fresh look at the tenses of the French verb. I should like to examine them in the light of oppositions manifested in actual texts, and further to pay particular attention to those cases where it is possible to make a substitution of one tense for another in the same sentence context.

It is not the objective nature of the facts which requires such and such form, it is the way one feels inclined to present them: a sentence among many will demonstrate this. Among the Ancients the name Gaul designated the territory bounded by the Mediterranean, the Alps, the Rhine, the
Atlantic and the Pyrenees. (Le nom de Gaule désigna chez les Anciens, la contrée comprise entre la Méditerranée, les Alpes, le Rhin, l'Océan et les Pyrénées.), where désigna could be replaced by a désigné or désignait without changing the syntax, without altering the historical fact under consideration, but with a considerable difference in the presentation of the matter. (Damourette et Pichon, Essai de grammaire de la langue française, V, 347.)

My basic assumption is that the speaker who utters any tense form is making a report. This report is influenced by the peculiar view he has of the action which is the substance of his report. To clarify my point I propose the analogue of the photographic camera. There is an obvious difference, of course, between the speaker-observer and the camera-observer. The latter produces a static image on the sensitive film, whereas the speaker translates his observations into the language-code. Furthermore I do not intend to draw too literal a parallel between the human eye (lens, diaphragm, photosensitive retina, etc.) and the camera which incorporates similar elements. Rather, I invite you to consider the speaker-observer as a complex machine having not only great flexibility of adjustment, but also a certain freedom to determine his adjustments at least within the limits of the code in which his observations are expressed.

As my title suggests, the variables are the components which are subject to adjustment: the direction in which the camera is pointed, the angle of the lens, the focal length of the lens, the depth of focus determined by the aperture of the diaphragm.

Fortunately, to make these various adjustments manifest to us all, I have had the help of my son-in-law Lee Battaglia, who is a professional photographer. I shall therefore be able to show some of his slides to illustrate my remarks. I take pleasure in acknowledging my thanks to him for his technical aid.

Photograph 1 was taken with an extreme wide-angle lens, of a special design, which does not really concern us since as speaker-observers we have two eyes placed in a horizontal plane.

Photographs 2 through 4, all taken with a wide-angle lens, have in common the feature of covering a considerable width of the horizon up to 180° of coverage—the horizon being far or near.

Another thing which all these pictures have in common is the reduction of the arc of the horizon to a single plane, i.e. that of the photographic film. The arc reduced to a single plane is our
pseudo-horizon. These three pictures are all analogous to the present tense (sometimes called the 'gnomic present', used in French, as also in English, to express 'permanent' truths, such as proverbs and maxims.) Thus the equation is established between breadth of field and length of time-span. (An all-time picture is judged to be a non-time.) However one central feature is constant: the time-span includes the moment-of-report just as the arc of the horizon includes the mid-point on that horizon, namely that which is directly in front of the camera, corresponding to the point at which the axis of the light-beam bisects the pseudo-horizon at right-angles.

In Photographs 5 and 6 the adjustments made are such that we get extreme depth. Apart from the composition of Photograph 6 which leads the eye to the distant steeple, everything in the whole picture is in sharp focus. The angle, i.e. the breadth of field is immaterial and irrelevant. What is here reported by the present tense in French is the totality of what lies in front of the observer at the moment of report, whether near or far. By near I refer to the kind of immediacy in the report expressed in English by the be + -ing construction: I'm talking to you about the French verb. Je vous parle du verbe en français. The term far is analogous to our simple present: I speak French. Je parle français. The latter report in English is, so to speak, 'remote'. For the French speaker, everything is in focus, equally immediate (or remote), equally attention-getting.

By way of contrast, consider Photograph 7. Here the row of figures in focus may be taken as representing actions reported with immediacy. But the foreground and the background out of focus would also find expression in the present tense.

Now if we turn the camera to the left of the point on the horizon which corresponds to the moment-of-report we are in a position to observe and report on that segment of time which we call 'past'.

With this time-span, depth of focus is crucial, and this slide presents the situation in French. The code requires the French-speaking reporter to choose. As I said just now, the figures are in sharp focus, over against the background which is out of focus. A figure in the row of figures represents an action, so that the attention of the receiver (hearer of the report or viewer or the picture) is riveted upon this. This is what happened, and the succession of such focused reports cumulates to constitute 'the narrative'. This is an 'event' in a series of events. Such an event is reported by the passé simple which I shall call the 'past'.
In Photographs 7 and 8 the background, though out of focus, is nevertheless somewhat visible and discernible. The receiver looking at the background sees the action unclearly. His attention is caught by the grosser elements such as the subject of the verb rather than the act. This is the kind of report conveyed by the imperfect. Its essential characteristics are (1) reference to background, i.e. contemporaneous with another past tense, (2) descriptive rather than narrative, and (3) descriptive of the subject, not calling attention to the action, i.e. the substance of the verbal meaning. This is exemplified in the sentence: Depuis, la haine ne cessa pas de grandir et le roi n'osait plus venir à Paris. (A. Malet, Histoire de France, I, 472, quoted by Harmer, The French Language Today, 206.) 'Thereafter, the hatred did not cease increasing (i.e. increased continuously) and the king did not dare to come (i.e. was afraid to come) to Paris'.

The explicit context of an adverb indicating momentary or continuing time does not change the distribution of these two tenses, past and imperfect. So we find such sentences as A un moment il était là, à l'instant suivant il sortait 'One moment he was here (or there), the next he went out'.

I have just stated the 'essential' characteristics of the imperfect, which may now be summarized in the term 'descriptive (of the subject)'. I now would like to show that the multiple uses of the imperfect tense in French do fit into the frame of reference I propose: There are 10 separate uses of this tense, by my count, supported by most grammarians and by contemporary texts.

(1) Imperfect associated in a given text with a past expressing the opposition background vs. foreground in the past time-span. The syntactic context is the independent or dependent clause, for either of these tenses.

(2) In the dependent clause introduced by si 'if' two different cases: (a) si + imperfect in the subordinate clause and another imperfect in the main clause, e.g. S'il voyait un ivrogne chance-celer et choir, il le relevait et le réprimandait (A France, Pierre Nozière, 87.) 'If he saw a drunkard totter and fall, he would pick him up and reprimand him'. The imperfect in both clauses has the same descriptive value in past time as in (1). (b) The other case with conjunction si I leave to later, namely (7).

(3) Imperfect in the main clause substituted for a conditional, the subordinate clause having a pluperfect (anterior of imperfect) introduced by si, e.g.: Si vous n'étiez pas venu, je vous faisais
appeler. (A. France, L'orme du Mail, 62.) 'If you hadn't come I would have sent for you'.

Such a substitution of the imperfect for the conditional I take to be parallel to the very common substitution of the present for the future, e.g. Demain je pars pour Paris 'I leave for Paris tomorrow'. The conditional is to the imperfect what the future is to the present.

(4) The semiauxiliaries, aller 'go' + infinitive and venir de + infinitive, are used in only two tenses, namely the present and imperfect, e.g. Je vais faire cela 'I'm going to do that'. J'allais faire cela 'I was going to do that'. and Je viens de faire cela 'I have just done that'. Je venais de faire cela 'I had just done that'. The descriptive value of each of these forms seems clear.

(5) Imperfect of certain semiauxiliaries like pouvoir 'to be able': L'entreprise a réussi, mais votre incurie pouvait tout gater 'The undertaking did succeed, but your carelessness could (have) ruined everything'. This case is similar to the preceding one.

(6) Imperfect in close juxtaposition to a past: A peine avait-elle regagné sa place sur le canapé qu'André se levait d'un bond, la figure blanche, les yeux étincelants ... Il marcha vers l'une des fenêtres et ... (Curtis, La Quarantaine, 189) 'Hardly had she resumed her seat on the sofa when Andre leaped up with a white face, eyes shining ... He strode toward one of the windows and ...'

Charles Bruneau has commented on this usage with the term décalage. This word means 'off-set, non-match, lead, or lag, being (or putting) out-of-phase'. Bruneau however refers to this in time. I would accept the term décalage to refer to the effect of shifting attention to the subject André, then quickly to his actions (in focus) expressed in the past. There follows in the text a series of five past tense forms like the row of figures in focus (Photograph 7). One of these narrative forms is worth quoting in its context: (André) tira le cordon qui actionnait l'ouverture des rideaux 'Andre pulled the cord that worked the opening of the curtains (whose function was to open the curtains)'. The cord is 'described' in the imperfect by specifying its function. But this does not tell us that the curtains were opened. (Compare actionna.)

The six uses listed above all have a time reference to the past and a descriptive (out of focus) value.

(7) Si + imperfect in the dependent clause and a conditional in the main clause: Si j'avais le temps, j'irais au théâtre 'If I had
the time, I'd go to the theater'. The form of the imperfect, in this context, signals a contrary-to-fact supposition, but in the present time-span.

(8) Imperfect in the main clause, called imparfait de discrétion, and by a number of other labels, used almost exclusively in direct address, with verbs like venir, vouloir, etc., e.g. Je venais vous demander, M. le Directeur ..., je voulais vous demander, ... 'I came (wanted) to ask you, Sir, ... ' The time-reference is neutralized, irrelevant, overridden by the descriptive value. In a similar situation, reference to past time would be rendered by the pluperfect (see below).

(9) The so-called 'hypocoristic' imperfect: Ah, qu'il était joli, joli, mon petit Maurice (cf. Leif Slettsjöe 'L'imparfait dit hypocoristique' in Français Moderne 31-32 (1963-64) pp. 241-61; 27-44).

My older daughter, as well as my mother-in-law, both use baby-talk in English when talking to babies and pets, and in this vein, both frequently use a simple past—a hypocoristic past: Yes he was a good little doggy. Here again the time value of the French imperfect is submerged. But the descriptive value is clearly signalled.

(10) A point of controversy among grammarians concerns the so-called sequence of tenses (la concordance des temps.)

The imperfect in the dependent clause, frequently a noun clause, is associated with the simple past or another imperfect in the ruling clause, e.g. Galilée affirma que la terre tournait 'Galileo contended that the Earth turned'. This does not deny that the earth still turns at present, but only that the turning was contemporaneous in the background, with Galileo's contending. This latter is the event narrated; the imperfect calls attention to Earth, the subject of tournait.

On the other hand, nothing in French grammar prevents this other report: Galilée affirma en 1632 que la terre tourne. 'Galileo contended in 1632 that the Earth turns'. The use of the present simply records the speaker's view of what he reports, namely the contemporaneousness of the earth's turning with the moment-of-report. Its descriptive value is not changed, only the orientation of his view.

It is generally known that in modern French the simple past is limited to somewhat formal usage, written or spoken. This observation is used by Professor Emile Benveniste to propose a theory to the effect that the simple past is the 'historical' narrative tense in the writing or telling of history; and that other kinds
of narrative in the past are all to be grouped under the heading of discours (which I render by conversation). In conversation the function of the simple past is performed by the perfect. A corollary then is that the simple past is excluded from conversation. So far so good. But the other corollary should be that the perfect is excluded from the 'history' except if we take history to mean strictly that series of events which we symbolized earlier by the figurines in a row, and then the statement becomes circular.

In any case, the imperfect, used in both 'history' and 'conversation' has its typical value of background descriptive.

There are a multitude of examples to be found in contemporary literature of the simple past and the perfect in close juxtaposition. I suggest that this is like a rapid switching of lenses of different focal length (corresponding to different breadths of vision): Photograph 9 (90mm) simple past in focus, Photograph 10 (35mm) perfect, in focus, and Photograph 11 (500mm) for comparison. One example among many, I take from J. P. Sartre: Je me complais à mon obscurité, je souhaitai la prolonger, m'en faire un mérite. J'enviai les détenus célèbres qui ont écrit dans des cachots sur du papier à chandelle (Les Mots, 152.) 'I enjoyed my obscurity, I wanted to prolong it, to make a merit of it. I envied the famous prisoners who wrote in dungeon cells on candle paper' (Translated by Bernard Frechtman, Fawcett Crest Paperback, 114!)

The perfect expresses an action (in focus) an event, but with a less delimited time-span, i.e. what is seen with a lens of shorter focal length as in Photograph 10. This wider field expressed by the perfect may extend right up to the edge of the present point in time. This means that the perfect may also designate an event in the past whose result is a present state or situation. Accordingly, it assumes the function of the conversational narrative past tense in modern French as also in German and Italian.

But the important thing to note about this 'echo in the present', as it were, is the following—which I believe has been overlooked heretofore: the implied present result is either negative or affirmative in the French perfect. It is, therefore, not to be simply equated with our English present perfect, which implies an affirmative. If I say J'ai toujours aimé les chocolats the likelihood seems about even that the implication is et je les aime encore or mais maintenant ils me rendent malade. 'I have always liked chocolates (and I still do)' or 'but now they make me sick'.
This is not a recent development: two famous poems come to mind, one written in the early part of the seventeenth century, the other in the last years of the eighteenth. In both the same phrase is used elle a vécu, literally, 'she has lived', i.e. 'she is dead'.

Et, rose, elle a vécu ce que vivent les roses
L'espace d'un matin
Malherbe, 'Consolation à M. du Périer'

Elle a vécu, Myrto, la Jeune Tarentine ...
A. Chénier, 'La Jeune Tarentine'

The morphology of the pluperfect permits the following proportion: the pluperfect is to the imperfect what the perfect is to the present.

j'avais écrit  j'écrivais
j'ai écrit  j'écris

But we have seen that (a) the imperfect lies in the same 'field of vision' as the past, and (b) that the perfect is merely less delimited than the past, but also in the same general field of vision. The pluperfect covers a span of time preceding that covered by the past, the imperfect and the perfect. As a photographic analogue I suggest a double exposure with a relatively short focal-length lens recording the anterior past (the pluperfect) to the left of the picture, and a longer focal-length lens recording the past in focus, and/or the imperfect out of focus in the background. If we have a wider coverage to the right (the perfect), the pluperfect lies to the left of that.

To summarize: in the past—that area which lies to the left of us—the simple past in focus is the narrative tense par excellence. The perfect when used in the same text as the past marks an event narrated but outside the strict narrative thread. The perfect substitutes in conversation for the narrative past but also frequently ties closely into the present. The imperfect is the descriptive past and directs attention upon its subject rather than the action.
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PANEL II

CURRENT RESEARCH IN TAGMEMIC DESCRIPTION
THE USE OF FUNCTION-SET IN ENGLISH ADVERBIAL CLASSIFICATION

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In a recent article in *Language*, Longacre discusses four fundamental insights of tagmemics, one of which is the 'correlativity of function and set.' In discussing this he says,

Tagmemics makes grammatical functions focal, but associates such functions with sets of items and constructions. A function may be considered to be a defining property of a set while the set may be said to manifest a function. Functions are formally demonstrable. Sets may be described and operated on as prescribed by set theory. By function is meant the peculiar office or role of one formally distinguishable part of the same construction. He later states that 'each grammatical function is associated with a set of items or constructions or both'.

It seems to me that Longacre's discussion of function is largely in terms of construction analysis while not excluding other uses of the concept of function. In fact, he has said, as quoted earlier, that tagmemics associates function with sets of items. However, function should not be seen as too close to sets, or the two concepts become redundant. The determination of sets of items is dependent on rigorous procedures of classification of which the determination of function is one part, i.e. the defining property, as Longacre says. One way to aid in the determination of function is to ask questions which can be classed in general as 'how', 'when', 'where', 'why' questions, but for
really efficient operation will need to be more specific. The 'how' questions might be: 'in what way?', 'to what extent?', 'by whom?', 'by what?', etc. The answers to these questions are sought, of course, in the data and the context in which these data occur.

One area of language study has seemingly been overlooked, at least until recently, in the study of the relation of function to classification and the production of linguistic sets; that is the area of English adverbials. My purpose in this presentation is to emphasize the role of function in such linguistic analysis as an example of the way tagmemics associates function with sets, and to exemplify a methodology for linguistic description and language teaching. I must emphasize the word exemplify here for two reasons: (1) the obvious limitation of time for this presentation, and (2) a limitation imposed by the very small size of the corpus from which the data have been taken. Although the data consist of a small, limited corpus, the method to be described was designed for electronic processing equipment which would allow the analysis with highly accurate results of an extremely large corpus. Essentially the same methodology can be used by a field investigator without such modern equipment who is limited to filing slips of data by hand. The techniques could be used more widely than is evident in the data presented here.

In describing English adverbials little attention has been paid historically to the feature of function, although adverbials have been classified in several different ways. In any classification the bias or viewpoint of the classifier is important, i.e. the results will be in accord with the purpose of the analyst, and with the amount and type of data available to him. Consequently it can be said that the results of classification are in direct relation to the focus of the analyst and the data available. A further controlling factor is the analyst's methodology or set of procedures.

All of these factors are variables: the focus can be shifted, the data can be changed in several ways, and the analyst can change his methodology. The need for an improved technique, as noted by various authors, for example, H. A. Gleason, Jr., in his Linguistics and English Grammar and Ralph B. Long in his The Sentence and Its Parts, is our subject here today.

Hungerford says there are only three main types of adverbs: manner, time and locative. Pence and Emery assert that an adverb can have a very wide range of functions. They group the adverbs of English into the following five classes: interrogative, relative, correlative, independent and transitional.
Hungerford states in a footnote that adverbs are usually defined on the basis of meaning or as words that modify a verb, adjective or other adverb. 10 Francis treats adverbs according to their position of occurrence; 11 Fries takes a similar position. 12 Pence and Emery give some working principles for identifying forms as adverbs or as prepositionals based on positional factors. 13 Classification of adverbials has been done according to formation by Poutsma. 14 Long classifies adverbs by function and position; 15 he also comments on the use of form and meaning but does not seem to use them significantly in his classification. He treats prepositions as adverbials.

Classifications based on only form, or position, or function are to me patently inadequate. 16 No single criterion is sufficient to distinguish the significant groups for English; even a combination of two or more of these classificatory features is not acceptable as a complete classification, for all three features must be taken into account if the relevant features are to be included. At some points form alone may be sufficient, e.g. the occurrence of -ly (as a morpheme added to an adjective) clearly indicates the presence of some kind of adverbial; position alone may adequately subdivide certain adverbials, e.g. very; function may tell us that very is indeed an adverb. However, ultimately all three features will be included in any final and adequate scheme. Such a classification is possible using the techniques and concepts of tagmemics.

In fact, in the tagmemic approach each class would occur as a manifesting unit of a tagmeme on a particular structural level (phrase, clause, sentence). 17 The classes could, therefore, be grouped as phrase level adverbials, etc. One difficulty is that some forms occur on more than one level, e.g. only in The only point he made was . . . and He only made one point. However, this does not preclude recognizing the validity of the suggestion; it is simply a further complexity in the classification of adverbials. After the formation of a proper classification of adverbials, the factor of external distribution of adverbial classes in construction types and levels could be used to further refine the classification.

By form is meant the formational features, i.e. the type of linguistic structure of the element including nongrammatical features where relevant, e.g. phonological considerations. Grammatical features relevant to the classification of English adverbials include the presence of -ly as a suffix in some forms.

Function can be defined as indicated earlier, the office or role of the element, or, in the instance of English adverbials, as its
use in relation to the verb of the clause or to some other head ultimately relatable to the verb, or some other role which we want to label as adverbial. The members of a given class may manifest various roles in different contexts; thus, for a particular adverb to manifest two or more roles is not surprising, e.g. a prepositional phrase such as by + N in All these rays are united by a lens. (83) (means) and ... the path difference is ... altered by a whole wave length. (61) (degree).

Position is determined by the physical order in which the forms occur in relation to some other class of grammatical units, or, in the tagmemic approach, in relation to other tagmemes in the same construction. The same adverb may appear in more than one position in different constructions, e.g. today in Today we know that ... (90) and This arrangement is known today very exactly. (98).

In connection with the feature of position, it should be noted that for the adverbials of this presentation the position is either pre-, mid- or post-verbal (or some combination) within the clause, since the clause is the limit of focus chosen here. Sentence level adverbs (therefore, nevertheless, etc.), adverbial clauses in dependent (but not imbedded) relation, and phrasal adverbs are not treated in this classification. By means of an algorithm developed by a former colleague certain prepositions were excluded from treatment as not being adverbial. Phonological considerations are also helpful, along with this algorithm, in separating such expressions as: This bill amounts to $2.98. and This applies to the situation.

Complements were also separated from consideration, although they possess similarity to adverbials in some respects. However, in classifying data, techniques must be used to separate the adverbials from all similar materials when a distinction should be made.

Such a classification procedure as I have implied here results in a larger number of classes than might come from simpler types of procedures. However, the increase in number of classes is demonstrably relatable to the increased adequacy of the description in this instance and probably in many other instances. The advantage of such a detailed classification is, among others, that one can vary the 'delicacy' of the classification, as Halliday has labelled it. That is, one can shift his level of focus from the details (subclasses) to a higher level of central interest in the classes, or to a broad consideration of the larger including hyperclasses (sets that subsume two or more classes in each one).
Applying the three features listed (form, function and position), results in the following classification. Since these results are based on a small, limited, written corpus, this classification is not intended to be anything more than illustrative of a methodology. It would most certainly be revised by the addition of even a similarly small amount of data, or by a speaker of English testing it against his own knowledge of the occurrence of English adverbs in his speech. For easy reference, classes are listed alphabetically within each hyperclass which is numbered 1, 2, 3, etc. The classes are numbered 1.1, 1.2, 1.3, etc. Names are indicative of the function of the class. Position and formation type are also indicated for each class.

In keeping with the principles of tagmemic analysis the following are basic to determining relevant classes:

(I) Relevant classes are emic in the system.

(II) A proper classification will consist of only emic classes, subclasses and hyperclasses (i.e. emic sets).

(III) Certain procedures and criteria must be used to produce these emic sets.

(IV) The following are to be used in setting up and evaluating any classification scheme:

(A) Two formal differences must exist between each two classes.

(B) The possible differences are:

1. position in the construction,
2. cooccurrence restrictions between members,
3. occurrence in different contexts or structures,
4. formational or internal structural features,
5. order of constituents within an ordered class.

Note that the first three criteria may be viewed as external; the last two are internal. Class membership lists may also be helpful, if not used in a circular way, especially when the data consist of a closed corpus.

(V) These guidelines apply to subclasses and hyperclasses as well.

(VI) A single difference of any type creates only etic division resulting in alloclasses, i.e. non-contrastive variant sets.

The following procedures are tentatively proposed as useful and adequate to a limited extent in setting up an emic classification of language data. These procedures are partly formal (i.e. based on grammatical information—conceivably on any formal feature, i.e. phonological and lexical, too) and partly functional...
These procedures and the accompanying notes should be applied as a unit to all the data being classified.

Procedure 1. Determine the following for each new form to be classified: (1) its position in the including construction, (2) its formational type, (3) its function in the construction, and (4) cooccurrence restrictions which may be relevant as indicated by 'clue' words present. Clue words will give information as to the function or formational type of the form, e.g. certain prepositions, clause introducers, and lexical tips indicating the function of the whole element.

Procedure 2. Set up various etic positions (labelled A₁, A₂, A₃, etc.) in which the forms occur and correlate these with the etic classes which can be set up on the basis of function (manner, means, temporal, degree, location, associative, etc.). Function-position class labels can be designed to designate each of these classes. Formational distinctions can be added as modifications to this listing of classes, and any relevant cooccurrences can be included at this point also.

Procedure 3. Assume the resultant classification to be emic and set up diagnostic criteria for each set. Charts showing membership in class, subclass and hyperclass aid in checking these diagnostic criteria and also in checking for consistency. A concordance of all forms analyzed and classified may be helpful at this point by indexing all the forms treated and making quicker and easier the identification of the class of the new form.

Procedure 4. Modify the listings as new data is analyzed in accord with the principles presented.

In specific reference to the classification of English adverbials, but capable of broader generalization in at least some instances, the following notes are added:

(1) Position will be in relation to the nuclear tagmeme of the relevant level (or to a nuclear tagmeme in cases where there is more than one).

(2) The formational type will include, beyond those already indicated: degree phrases, manner phrases, location phrases, etc. where the type of phrase is specified by either a limited set of lexical items, or by some formal marker.

(3) The function of prepositional phrases (as adverbials) may be determined by: (a) the particular position (e.g. limited occurrence in reference to the nuclear tagmeme), (b) by the lexical item which manifests the slot following the preposition (i.e. based on the role or use manifested as expressed by the meaning relations found in the surrounding context).
clause, noun, etc.). [See (2) above.] In the instance of a preposition plus a noun phrase the head of the noun phrase may determine the function class of the phrase. For example, compare the following: with a precision (63) respect (or reference) function, with the result that ... (90) stative function, with uniform brightness (31) degree function, with the function of light (10) associative function.

(4) The direction of modification may be important, i.e. some English adverbials tend to modify the following element, some the preceding, and others either. Note: and partly reflected by it (11) in which partly modifies reflected, but by it modifies reflected; the ear arches inward (10) in which inward modifies arches; and But we quickly discern a ... pattern (73) and The magnitude ... can be determined quickly by ... (15) in which quickly modifies either discern or determined.

(5) The lexical content and/or class of the verb may condition the function of the adverbial unit in whole or in part. For example, the passive construction seems to be inherently associated with the occurrence of the agent tagmeme.

(6) The function of the form may be ambiguous, either due to the limited context being considered, or ultimately. For this reason two investigators may not always agree on the identification of the function until this point is recognized. Note: it illuminates the inside of the funnel with uniform brightness (31) manner, degree, associative, respect are all possible functions from certain viewpoints.

(7) Phonological features of stress (both sentence and word stress), pause possibilities, and intonational contours may also influence the results when the analysis of spoken data is undertaken.

(8) It may be helpful to consider the feature of transform possibilities in terms of adverbial classification, but this requires the special abilities of a native speaker used in conjunction with the other techniques.

NOTES

2 Ibid, p. 65.
3 Ibid, p. 65.
6 Ibid, pp. 120, 131-2, 311.
7 Ibid, p. 269.
8 Hungerford, Harlan M. 'The verb head construction ... with special reference to the marked infinitive and single-word adverbs,' Univ. of Michigan dissertation, 1949, pp. 39ff.
10 Hungerford, op. cit., p. 40.
13 Pence and Emery, op. cit., p. 86.
16 Cf. Gleason, op. cit., pp. 120, 128, 129, 133.
17 Suggested by Longacre in private communication. A further feature useful in adverbial classification suggested by Longacre is occurrence in nuclear vs. peripheral tagmemes, e.g. agent would be nuclear whereas time would be peripheral.
18 Formulated by Moneta Prince, a colleague at the Linguistics Research Center at the University of Texas in 1962.
20 The work reported in this paper was done under a grant from the National Science Foundation to the Linguistics Research Center. It was first reported in the Linguistics Research Center publication LRC 63-WDE1, April, 1963. The corpus of data used in the analysis, labelled 05 at the Center, was Light Visible and Invisible by Eduard Ruechardt, The University of Michigan Press, Ann Arbor, 1958 (Translated by Frank Gaynor). After the original report was published, the work of Sven Jacobson, 'Adverbial Positions in English', published in Sweden (Ostervala, 1964), came to the author's attention. The data used (British English) and the purpose of the author (a contribution to the description of English adverbials and a handbook for teachers and students of English syntax) makes it of a quite different nature than the present paper. It is, however, a seemingly complete treatment of British English adverbials and is important in any ultimate classification of English adverbials.
APPENDIX

Illustrative tentative classification of English adverbials

(The following classification is only illustrative and not intended to be a representative nor even approximately complete listing of adverbials in English. It is intended to illustrate the methodology of classification and certain features of classification discussed in the accompanying paper, i.e., features of function, formational type and position of occurrence of forms found in a limited corpus used as a test sample. Examples are given for each subtype, but illustrate only the point involved. Certain alternate arrangements are also possible. Numbers in parentheses are page references in the corpus.

1. Pre-, Mid- and Post-verbal Adverbials
   1.1 Conjunctive
      Single forms (non-ly), e.g., also
      'The drawing also shows ...' (45)
      'Total reflection of light can also be demonstrated by ...' (24)
      '... the vibrations of ... light set up vibrations also in the ...
      particles,' (107)
   1.2 Degree
      Single forms (-ly), e.g., merely
      '... it merely redistributes it in space.' (50)
      '... it would merely become larger and less bright,' (67)
      'If B is shifted merely by half a wave length ...' (61)
   1.3 Manner
      Single forms (-ly), e.g., obviously
      'Obviously, the angle $\theta$, ..., can be made so large ...' (22)
      'It was obviously very difficult to explain this ...' (54)
      'A phrase difference ... means obviously that ...' (16)
   1.4 Time
      Single forms (non-ly), e.g., now
      'Now only the speed of the rotation ... need be measured.' (34)
      'It is now reflected in a ... direction,' (33)
      'S and S' are now the sources ...' (53)

2. Pre- and Mid-verbal Adverbials
   2.1 Manner
      Single forms (non-ly), e.g., thus
      'Thus it was possible to determine ...' (62)
      '... the diameter can thus be measured in this way ...' (69)

3. Mid- and Post-verbal Adverbials
3.1 Manner

Single forms (non-\textit{ly} and \textit{-ly}), e.g. \underline{likewise}, \underline{readily}

'... both paths will likewise measure the same \underline{number} of ...' (60)

'The compression and expansion of the air occurs likewise at \underline{regular} intervals.' (12)
The tagmemic model of grammatical description has been subject to a number of terminological, notational, and theoretical modifications since its birth as 'gramemic theory', and has also been subject to not a little criticism, most notably by Paul Postal. This paper will attempt to discuss and refute some of Postal's criticism, and to propose a modification which is both notational and theoretical.

One of Postal's many stated motivations for depreciating the work of non-MIT-oriented linguists is the question of 'structural descriptions'. As a basis for his discussion of this work Postal assumes that 'the minimal requirements for a grammatical description are that it describe precisely what the sentences of a language are and that it say precisely what structure each has'. In other words, a grammar must be an explicit formal device which enumerates all and only the well-formed strings and which 'automatically' assigns to each sentence a correct structural description (henceforth SD) showing what elements the sentence contains, their relations to each other, the relations of the sentence to other sentences, etc. (3)

Though there may be some who hesitate to consider the all-and-only requirement as minimal, nevertheless I am sure that all would consider such a grammatical description to be a highly desirable goal, to say the least; and the other requirement would be essential even if the all-and-only requirement were sacrificed;
witness e.g. the importance to understanding, of the relation of Bill to see in I want you to get John to ask Bill to come see you.

Postal then goes on to discuss various special classes of rewriting systems called 'phrase-structure grammars' (PSG), and deals in particular with the types of restrictions necessary for such systems to permit automatic assignment of SD to strings enumerated by them. An important restriction, or condition, discussed is one which permits only context-free (CF) rewriting, as opposed to context-sensitive (CS). Postal says it can be shown that 'CS-PSG fail to meet the minimal requirement of mechanical assignment of structure to generated sentences' (15); we will return to this condition later.

We now turn to the theme of this paper, tagmemic description of agreement. Bloomfield recognizes three types of agreement: concord, government, and cross-reference. Hockett goes him one better by recognizing a fourth type, governmental concord. Each of these several types of agreement involves restrictions limiting the occurrence of particular members of one paradigmatic class of forms with respect to the occurrence of particular members of one or more other paradigmatic classes of forms. Though what I will say here will have obvious parallels with respect to the other types of agreement, in this paper I will treat only the phenomenon of what Bloomfield calls concord, or what Hockett calls governmental concord.

The attention which has been given to any type of grammatical agreement in published tagmemic descriptions has been slight, and has largely been only suggestive, not attempting rigorous characterization of the restriction involved. Thus Pickett gives the following tagmemic formula for Isthmus Zapotec:

\[ \pm \text{IndSubj}_c \pm \text{IntrDeclPred} \pm \text{DepSubj}_c \pm \text{IndSubj}_c \]

and the statement that 'Certain limitations in the agreement between the Independent and Dependent Subject accompany the various positions mentioned ... They are indicated ... by subscript c ... The two subject tagmemes must agree in number and person ...' In their Beginning Morphology - Syntax Elson and Pickett use the notational device of the 'tie-bar', provided with a numeral to key it to the corresponding statement of agreement:
The person marker on the verb must agree with the head noun in number and gender.\(^7\)

The reason why this sort of lax formulation is undesirable is compellingly put forward by Hockett:

In the early 1920's, as he was formulating his policy of antimentalism, Bloomfield gave us a definition of linguistics: that branch of science devoted to the determination of the place of language in the universe. If we take this task seriously, as I think we must, then, clearly, we must search for an exact characterization of language, via exact characterizations of specific languages, since only when we have that can we distinguish with precision between language and not-language, or hope to discern how language came into existence in a universe that had theretofore been languageless. When we attempt to explain this or that feature of language, the explanation must refer to features of the world that are 'simpler' than language itself. That is why psychological 'explanations' are of no avail; for human psychology as a whole is much more complicated than language. That is also why practical descriptions, no matter how elegant, are insufficient for our basic purpose. A practical description, by definition, leaves gaps to be filled in by the reader, and every such appeal to the reader is, in effect, an appeal to psychology. The fact that a good reader can indeed fill in the gaps reflects something of his ability as a possessor and manipulator of language—and it is just this ability that requires explication by linguistics.\(^8\)

So if we seek for tagmemic descriptions of specific languages to add to our understanding of language, we must endeavor to make tagmemic statements capable of mechanical interpretation with respect to the structural claims they make, requiring no linguistic sense on the part of the reader. This, I am sure, is precisely why Postal and his colleagues are so concerned over the automatic assignment of SD by a grammar.

In his eagerness to show tagmemics to be a special case of PSG, Postal attributes to tagmemics 'at least one new claim' and states his 'Condition (5)' as a formalization of that claim, namely that 'each constituent which itself appears as a member of a string
which branches from some node must be developed into a single symbol which is the filler class of the tagmeme . . . ' (35).

Now one can hardly read Elson and Pickett (Postal's principal source for characterization of tagmemics) without realizing that Postal's Condition (5) is not in the least implicit in published tagmemic work, and that it is in fact quite incompatible with the entire concept of grammatical hierarchy of which so much has been said in the writings of tagmemicists. 10

But because of Condition (5) and the 'unnecessary complexities' (44) which it entails, Postal finds that his CS-PSG interpretation of Elson and Pickett's treatment of agreement is enormously, unnecessarily complex and makes a suspect truth claim about the structure of the language involved. In view of the fact that Condition (5) does not in fact characterize tagmemics, though, one wonders what all the shooting was about.

If Postal's attempt does not then correctly formalize the intention of Elson and Pickett, I attempt below to show how their intention might be interpreted by a device suggested by Longacre, 'use of unitary symbols for pattern points (tagmemes) with indication of the manifesting sets deferred to subsequent rules'. 11 By 'rules' I take him to mean simply sets of unitary or tagmemic formulas which can be considered as 'expanding' the unitary symbols thus far employed. Interspersed with applications of these 'rules' are Longacre's 'operations' of 'reading', 'permutation', and 'exponentiation' (my terms for the operations which he symbolizes by script $\mathcal{R}$, $\mathcal{P}$, and $\mathcal{E}$ respectively). 12 For reasons to become clear shortly, I propose to allow exponentiation only after no further rules, readings, or permutations are applicable.

With this machinery assumed, I propose the following rules, which should not be taken as making any claims about the structure of Spanish as a whole, but only about the tiny seven-item sample given in Elson and Pickett's Illustrative Problem 6a:

la casa buena       'the good house'
el libro bueno       'the good book'
las manos largas    'the long hands'
los palos largos    'the tall trees'
la casa grande      'the big house'
el libro grande     'the big book'
la mujer buena      'the good woman'

(1) $N = \pm L:ar + H:n \pm M:a_1/a_2$
(2) $n = +nnu:nma;c/nfem \pm p_l \pm p_l$
It will be readily seen that this set of rules is CS, as the same element can appear on both sides of the = sign when other elements in the same rule do not. This explains the restriction on exponentiation: if exponentiation were carried out before all applicable rules, readings, and permutations had been exhausted, the necessary contexts might be obliterated.

Thus it is possible to give a formal tagmemic description of concord, using CS rules. Indeed, it appears that certain types of CS 'rules' have long been implicit in tagmemic writings, e.g. in statements of allomorphy: Waterhouse says that Oaxaca Chontal 'Suffix 211 has two allomorphs: /-go/ after voiced sounds and /-ko/ after voiceless.'

We must now return to Postal's statement quoted above that 'CS - PSG fail to meet the minimal requirement of mechanical assignment of structure to generated sentences.' This distressing failure can however be avoided, Postal continues, by prohibiting rules which would expand a symbol A into any string containing another A. (16) He goes on to say: 'this very natural condition prevents the only natural PSG description of both coordinate constructions and endocentric derivation. . . . This is an important conclusion because there is independent evidence in terms of both simplicity and correctness of SD to show that these processes of sentence formation are transformational' (16).

So it seems that a desire to give a formal tagmemic description of agreement provides further incentive to incorporate transformations into tagmemic grammars, a step which has already been suggested by Longacre. (14) Further investigation along such lines is certain to result in still better tagmemic grammars.

The best is yet to come.
NOTES


2 Paul Postal, Constituent Structure: A Study of Contemporary Models of Syntactic Description, RCPAFL 30, Bloomington, 1964; in this paper all references to Postal's work refer to Constituent Structure, and are given as parenthesized page numbers within the text of this paper. See also Postal's review of Longacre (loc. cit. fn. 11), IJAL 32.93-8 (1966).


7 Benjamin Elson and Velma B. Pickett, Beginning Morphology-Syntax, Santa Ana, 1960, p. 65.

8 Charles F. Hockett, 'Sound change', Lg. 41.199 (1965).

9 E.g. 2.3, 'Structural Level', pp. 23-31.

10 It requires no stretch of the imagination to see this in Pike's 'On tagmemes, née gramemes' (IJAL 24.273-8, 1958): 'The grammatical hierarchy has the tagmeme as its minimum, with various kinds of tagmemic constructions as higher-layered units in the hierarchy' (275); 'In our approach a construction would be a sequence of two or more tagmemes in a higher-layered tagmeme or hypertagmeme' (277).


1. Introduction. In *Syntactic Structures* Noam Chomsky wrote:

... the possibility of conjunction offers one of the best criteria for the initial determination of phrase structure. We can simplify the description of conjunction if we try to set up constituents in such a way that the following rule will hold:

If $S_1$ and $S_2$ are grammatical sentences, and $S_1$ differs from $S_2$ only in that $X$ appears in $S_1$ where $Y$ appears in $S_2$ ... and $X$ and $Y$ are constituents of the same type in $S_1$ and $S_2$, respectively, then $S_3$ is a sentence, where $S_3$ is the result of replacing $X$ by $X + \text{and} + Y$ in $S_1$ ...

Chomsky goes on to argue, in substance, that a phrase structure grammar (as he defines it) has no way of incorporating such a rule—that is, a rule which describes a binary transform. And because this rule leads to considerable simplification in writing a grammar, 'it provides', he writes, 'one of the best criteria for determining how to set up constituents'.

I wish to argue that Chomsky was right in giving great importance to the description of conjoining, that it does indeed put a number of important constraints on the way we describe the constituents of a grammatical string, and that, therefore, the specification of tagmemic conjoining rules will be both interesting in allowing us to compare and evaluate grammatical theories and
necessary in establishing criteria which a grammatical description must meet. In this paper I would like to report on my attempts to describe conjoining in English, focusing particularly on two important changes which I think are necessary in Longacre's generative model of tagmemics. Because of limited time and because conjoining is extremely complex, I will further confine my remarks to conjoining with and at the clause level, realizing that many problems in the description of conjoining remain.

Why is the description of conjoining of such importance in writing a grammar? There are two basic reasons:

1. Conjoining, like embedding, is theoretically an open-ended (recursive) operation. Though there are undoubtedly psychological and rhetorical constraints on all recursive rules, there seems no reason why, given a particular string like

   John, Bill, and Frank are here,

we cannot always add one more item to the list:

   John, Bill, Frank, and Larry are here.

Furthermore, this recursiveness is not the same operation as recursive embedding; or, in plain language, coordination is different from subordination. Conjoining is an operation repeating constituents of a construction (syntagmeme) at a particular level (e.g., sentence, clause, phrase, word), while subjoining, on the other hand, is an operation not of repeating but of restricting a particular constituent in a construction. Conjoining adds to the number of constituents at a level; subjoining does not. I think it important not to confuse these two kinds of recursiveness, if we wish a grammar to reveal not just the form but also the relationships of elements in a string. Conjoining, then, requires that a grammar be able to describe what I will call linear recursiveness.

2. The second reason why conjoining is an important constraint on the form of a grammar is that it is an especially context sensitive operation. As Chomsky observed, conjoined constituents must be 'constituents of the same type'. The difficulty lies in saying what 'of the same type' means. Clearly, the form of the conjoined elements does not determine whether or not they may be conjoined. That is, class labels like Noun Phrase, Prepositional Phrase, Adverb, etc., do not provide sufficient information
about the constituents of a string to allow us to write conjoining rules. Conjoined constituents can have different forms:

John stepped into the water carefully and without a word.

And constituents of the same form cannot always be conjoined:

*John danced with Mary and with a limp.

Furthermore, if we define 'of the same type' as 'dominated by the same node in a phrase structure tree', we cannot easily explain such conjoinings as,

I floated and he swam across the lake.

Also, conjoining or coordination is a label for at least three different linearly recursive operations: conjoining proper, disjoining, and alternating. That is, conjoining with and is different from conjoining with but and or, as the following three sentences demonstrate:

John danced with Mary and with Sue, too.
John danced with Mary or with Sue (*too).
*John danced with Mary but with Sue.

Conjoining clearly requires more information about constituents of a construction than can be derived from a tree diagram. Conjoinable constituents are not necessarily those of the same form or those dominated by the same node in a phrase structure tree.

2. Linear Recursiveness in a Tagmemic Grammar

In the introduction to Grammar Discovery Procedures, Longacre sketches a grammatical model which might be called Generative Tagmemics. That is, he attempts to make explicit operations or rules which were often implicit in tagmemic grammars. Though I think he left out at least one important feature of tagmemics in his reformulation—as I shall point out later—he does isolate the three general kinds of generative operations which are motivated by the traditional tagmemic assumptions about language. These operations or rules, if you wish, are:

(1) 'Adjoining rules', or 'reading rules', which specify the ways that tagmemes or string constituents may be adjoined in
syntagmemes or constructions at the different grammatical levels. Reading rules use three kinds of symbols: 'cover symbols' for tagmemes representing formal relational categories in syntagmemes (e.g. Subject, Predicate, Object, Complement, etc.), 'signs' preceding each tagmeme symbol representing various collocational options (e.g. +, +, +( .. ), etc.), and 'super -scripts' representing the option of repeating a tagmeme in a particular reading (e.g. \( S^n \)) (I shall have more to say about these superscripts when I discuss tagmemic conjoining rules.).

(2) 'Permutation rules' which specify the ways that tagmemes in a particular reading can be reordered. These rules are important in conjoining, for conjoined constituents cannot be permuted separately:

John bathes in the morning and at night.
In the morning and at night John bathes.
*In the morning John bathes at night.  

(3) 'Replacement rules', or 'exponence rules', which specify the constructions at various levels that can manifest the formal relational categories (tagmeme symbols). For instance, these rules specify that the relational category Subject can be manifested by different kinds of noun phrases, pronoun phrases, relative clauses, etc. It is these rules which allow recursive embedding in tagmemic grammars.

Which of these rules, or what combination of them, can describe linear recursiveness, particularly conjoining? It seems to me that conjoining is a particular kind of reading or adjoining operation which must be carried out before the permutation rules can apply. Longacre's superscripts are motivated by the need for linear recursiveness. In fact, I shall argue that repeating a tagmeme is equivalent to conjoining; for if a tagmeme is actually repeated, then a conjunction marker (and, but, or, and others, including special intonation) is obligatory:

John fishes with a fly-rod.
(Subject, Predicate, Instrumental)

John fishes with a fly-rod and with a casting-rod.
( .. . Instrumental\(^2\))

*John fishes with a fly-rod with a casting-rod.
Notice that if the rule that repeating a tagmeme requires a conjunction (including special intonation), then the analysis of a sentence like,

I live at 2165 Newport in Ann Arbor,

requires recognizing at least two Location tagmemes, perhaps Area Location and Point Location. If there are two Location tagmemes here, then they can be permuted independently, as indeed they can, for we might say—with special contrastive emphasis,

In Ann Arbor I live at 2165 Newport.

though not,

*At 2165 Newport I live in Ann Arbor.

Here I am foreshadowing my next point—that tagmemes must be differentiated much more than they frequently are in order to describe linear recursiveness, among other things. This is a clear instance of what I think Chomsky meant when he said that the description of conjoining 'provides one of the best criteria for determining how to set up constituents'.

Though Longacre's superscripts can describe some conjoinings, there are others which they cannot at present describe. First of all, sequences of tagmemes as well as single tagmemes can be conjoined:

John runs slowly and walks quickly.
I float and John swims across the lake.
John walks quickly in the morning and slowly in the afternoon.

Because conjoining or repeating involves both single tagmemes and sequences of tagmemes, superscripts on single tagmemes are inadequate. Hence I propose, as the first of two changes in Longacre's model, that a rather different kind of tagmeme be introduced into the reading rules. The rules presently account for only two of three basic kinds of grammatical relations: 'subordinate relations' (satellite tagmemes) and what I shall call for want of a better term 'interordinate relations' (relations of nuclear tagmemes to each other). The new tagmeme will describe 'coordinate relations', a third general kind of grammatical relation. It differs somewhat from other tagmemes in that it defines
an operation, similar to the phoneme defining an operation that Pike has recently suggested. I will symbolize this new tag-meme as $\pm K^n$, indicating that it is optional and recursive. It will replace all the superscripts in Longacre's reading rules. Tentatively we can say that $K$ (or the coordinate relation) adjoins $X_2$ to $X_1$ in which $X$ = any tagmeme or sequence of tagmemes in the reading.

If we have the clause level reading,

Subject Predicate Object Frequency K

then any tagmeme or linear sequence of tagmemes (short of the whole syntagmeme which may be conjoined at the sentence level) may be repeated, giving us the readings,

Subject and Subject ...
'John and Mary hold the child every morning.'

Subject Predicate and Subject Predicate ...
'John holds and Mary washes the child every morning.'

Subject Predicate Object and Subject Predicate Object ...
'John holds the child and Mary washes the dishes every morning.'

... Predicate and Predicate ...
'John holds and washes the child every morning.'

... Predicate Object and Predicate Object ...
'John holds the child and washes its face every morning.'

... Predicate Object Frequency and Predicate Object Frequency ...
'John holds the child every morning and washes the dishes every night.'

... Object and Object ...
'John holds the child and his wife every morning.'

... Object Frequency and Object Frequency ...
'John holds the child every morning and his wife every night.'
... Frequency and Frequency ...
'John holds the child every morning and every night.'

However, the operation also permits such anomalous strings as,

*'John and the book hold the child every morning.'
*'John holds and the book contains the child every morning.'
*'John and where I was are here every morning.'

Obviously the operation must be qualified further. Not all tagmemes are K-equivalent or conjoinable. We must add to the rule as follows:

\[ +K^n \] in which K adjoins \( X_2 \) to \( X_1 \), and \( X_1 \) and \( X_2 \) are K-equivalent.

The question now is, how can we describe K-equivalence; or in Chomsky's terms, when are \( X_1 \) and \( X_2 \) constituents of the same type? This brings me to the second proposed change in Longacre's generative model of tagmemics.

3. Deep Structure in a Tagememic Grammar

As we have seen, K-equivalence cannot be determined either from the grammatical function (relational category) or the manifesting forms of a tagmeme. That is, different forms may be conjoined:

John stepped into the water carefully and without a word.

And tagmemes of the same grammatical function (e.g. Subject) often may not be conjoined:

*'John and where I was are here.'

Hence, a tagmeme notation which marks only these two features of tagmemes (function and form) does not supply enough information to determine K-equivalence. I would argue that this limited notation (e.g. Subject: noun phrase) reveals only the surface structure of syntagmemes.

In order to go beyond surface structure it is essential, I believe, to realize the importance of traditional tagmemic designations like Subject-as-Actor, Subject-as-Goal, or even Subject-
as-Location and Subject-as-Time, etc. Often we try to do without these complex designations, or we mix grammatical categories (Subject, Predicate, Object, etc.) with these semantic categories (Actor, Location, Time, Purpose, etc.). To exclude them is to limit our grammars to a description of surface structure, making it impossible, I think, for us to explain such a phenomenon as conjoining. To mix these grammatical and semantic categories is to obliterate the important difference between surface and deep structure. Perhaps I can clarify my point with some examples.

In all the following sentences, grammatical meaning is invariant while grammatical form changes:

Subject-as-actor: John feeds the cat in the morning.
Subject-as-goal: The cat is fed by John in the morning.
Subject-as-time: In the morning is when John feeds the cat.
Subject-as-action: Feeding is done in the morning. (Stylistic deletions)

In a tagmemic grammar, the relations between these sentences is not a transformational derivation from an underlying base sentence but rather a change of focus on semantic categories, conditioned chiefly by discourse constraints. In the first sentence there is subject focus on actor, in the second, subject focus on goal, etc.

The concept of the tagmeme as I am presenting it here—and it is really not very new—can be represented in a diagram (suggested to me by Kenneth Pike).

FIGURE 1. Elements of Complex Tagmeme Symbol \( A_B: C_D \)

<table>
<thead>
<tr>
<th>Form (Surface structure)</th>
<th>Grammar</th>
<th>Lexicon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>Meaning (Deep structure)</td>
<td>B</td>
<td>(D)</td>
</tr>
</tbody>
</table>

Example: Subject Actor Noun (young male human)

In Figure 1, A (Grammatical form) represents relational categories in a construction (or syntagmeme), such as Subject, Object, Predicate, Complement, Modifier, etc. B (Grammatical meaning) represents what I have been calling the semantic categories in a construction, such as Actor, Goal, Location, etc. C (Lexical form) represents morpheme classes, such as Noun, Verb,
Pronoun, Adjective, etc. D (Lexical meaning), which I will not discuss in detail here, represents semantic equivalence, as in the possible anaphoric relationship between John, the boy, he, his in a given text. (This element D is of great importance in formal discourse analysis.)

Reading rules can now be seen as ordered within a matrix (Figure 2) in which the various semantic categories (B in Figure 1) intersect with construction (syntagmeme) types; the cells at these intersections are filled by relational categories (A in Figure 1). Neither the rows nor the columns in this matrix are anywhere near complete; nor am I sure I can complete them quickly for numerous problems remain, among them the handling of negation and disjunction, which seem closely interrelated. However, we can tentatively say that readings proceed left to right across rows, including the reading of the new tagmeme J\(\pm K^n\); permutation rules then reorder tagmemes in a reading, and exponence rules eventually give values for the symbols C and D.

We can now describe K-equivalence, which is determined by the deep structure of syntagmemes, in terms of the semantic categories. The rule for conjoining with and or a conditioned variant of and (e.g. special intonation pre-terminally when conjoining is repeated) at the clause level is simply that clause-level tagmemes are K-equivalent if their grammatical form and meaning (A and B in Figure 1) are identical. This rule allows sentences like,

John stepped into the water carefully and without a word.
I floated and he swam across the lake.
John danced with Mary and with Sue.
John bathes in the morning and at night.
John runs slowly and walks quickly.

The rule does not allow the following sentences:

*John danced with Mary and with a limp.
*John and where I was are here.
*The man is and hit me.
*He took John home and Mary seriously.
*I want to know why John and when Mary are coming.
### Diagram:

#### Examples

<table>
<thead>
<tr>
<th>Ex.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Semantic Categories

- actor
- agent
- location
- time
- cause
- manner
- direction
- location
- inst.
- accomp.
- quality
- direct goal
- indirect goal
- transaction
- equation
- motion
- assert
- item
- etc.
- alternation
- disjunction
- conjunction
- purpose

#### Grammatical Meaning

- Concorl a reading rules (Very much over simplified)

---

### Notes:

5. Skiing can be pleasing on a sunny day.
4. Black is the color of my true love's hair.
3. John can dance the polka with Mary.
2. The door may be wet.
1. John will run with Mary to school.
Certainly the rule I have given will have to be qualified. For instance, first person pronouns cannot be conjoined except as parts of sequences:

*I and I are going.
But: I must and I will succeed.

However, we explain exceptions or qualify the rule; and in spite of the numerous complexities of linear recursiveness which have perforce gone unmentioned here, I hope I have demonstrated some of the constraints which the description of conjoining puts on tagmemic reading rules, especially the need to distinguish between surface structure and deep structure in tagmemic grammars.

NOTES

1 This article was supported in part by the Center for Research on Language and Language Behavior, University of Michigan, under contract OEC-3-6-061784-0508. The author is also indebted to Kenneth L. Pike for extended discussions about parts of the paper.
3 Ibid, p. 38.
5 Chomsky's rule has been qualified by Lila R. Gleitman in 'Coordinating Conjunctions in English', Language 41 (1965): 260-293. A way of describing conjoining which bears, I think, some resemblance to that discussed below is suggested in Charles J. Fillmore, 'Toward a Modern Theory of Case' (pre-publication copy), a longer version of Fillmore, 'A proposal concerning English prepositions' in Monograph Series on Languages and Linguistics Number 19, Georgetown University Institute of Languages and Linguistics, Washington, D. C. I was given his paper too late for it to have any effect on this paper, unfortunately.
7 Several uses of and are not here considered as conjoining; e.g. It went faster and faster. (Intensification), Go and get it! (Sequence), He danced with Mary, and very well, too. (Emphasis). Also, there is a set of clause patterns in which the subject
and accompaniment tagmemes conjoin; e.g. John danced with Mary vs. John and Mary danced (also fought, talked, argued, etc.). For a listing of various uses of and and other conjunctions, see Prepositions, Conjunctions, Relative Pronouns and Adverbs (New York: Funk and Wagnalls Co., 1953).

8 These assumptions are neatly summarized in Kenneth L. Pike, 'Beyond the Sentence', College Composition and Communication 15 (1964): 129-135.

9 We might have In the morning John bathes, and at night. Poetic language is characterized by greater freedom of permutation.


13 For an example of a grammar in which grammatical and semantic categories are mixed, see Nguyen Dang Liem, English Grammar (a combined tagmemic and transformational approach) Linguistic Circle of Canberra Publications, Series C, No. 3 (Canberra, 1966).


15 K-equivalence, interestingly, is never identity. If a tagmeme is repeated, it does not mean the same thing in both instances, e.g. There are books and books and Take that and that! Repeating linguistic units very often signals that a new
referent is intended and hence is a very important feature of discourse, e.g. John saw the movie and John did his homework. This sentence suggests to me that two people named John are involved. In the following sentence there is some ambiguity whether one or two people are involved: John saw the movie and he did his homework. In the next sentence, though, only one person is involved: John saw the movie and did his homework. I have considered deletion, therefore, a feature of sentence-level, discourse constrained conjoining, very similar to other anaphoric markers. See Rolf Karlsen, Studies in the Connection of Clauses in Current English: Zero, Ellipsis, and Explicit Form, (Bergen: J. W. Eides, 1959) for a thorough discussion of the anaphoric function of deletion.
ENGLISH STRUCTURE ABOVE THE SENTENCE LEVEL

JAMES O. MORGAN
Manhattan Bible College and Kansas State University

This paper attempts to set forth three conclusions drawn from a pilot study of English discourses. The corpus consisted of two parts: (1) a series of five fifteen-minute newscasts broadcast over KSAC, the Kansas State University radio station; (2) four written discourses, namely, an essay by Ralph McGill, a printed version of a speech by John F. Kennedy, an article from The National Observer on the President's State of the Union message, and an article from Trans-Action on the role of the President.1

Attention was focused on the paragraph level. Analysis proceeded from the writer's earlier work on English and on discourse structure in the Greek historians. It was assisted by an unpublished tagmemic statement of lower levels of English by Max D. Smith, a statement of English independent clause types by Leo Engler,2 several articles by Kenneth L. Pike,3 an article by Alton L. Becker,4 and the work of Robert Longacre.5

Three conclusions were reached. First, if the higher levels are to be studied and structural units are to be discovered or posited, attention must be given to the lexical hierarchy as well as the grammatical. Second, there are grammatical and lexical patterns; and emic units can be described. Third, if such units are described, we must have a better definition of sentence than the clause type which fills a nuclear slot.
General considerations

Sentences laid end to end do not necessarily comprise a paragraph. What we call a paragraph, much as any other construction, is comprised of a series of overlapping, interconnected, lower-level structures. The repeated configurations of phonological, grammatical, and lexical features give coherence to the whole. But there is more than sequence in the configurations—there is hierarchical structuring. This structuring is evident in phonology, grammar, and lexicon—with particular significance in the latter two.

Phonological units higher than 'sentence contours' can be recognized but are generally peripheral to our purpose. We can recognize, for example, continual slowdown of tempo and rundown of pitch through the course of some paragraphs. We can also recognize the abrupt acceleration of tempo and sudden general rise of pitch at the beginning of many paragraphs. These assist us in determining borders and in recognizing some form of continuity within the paragraph; but they do not clearly indicate its internal structure. The phonological features, in addition, do not always correspond to the grammatical paragraph any more than certain contours necessarily signal closure of a grammatical sentence.6

The phonological materials, as we see them, are not nuclear to the definition of a grammatical or lexical paragraph; they are peripheral and confirming.

We should also note that indentation in written discourses does not necessarily signal the borders of a grammatical paragraph. However, what authors do more or less intuitively in changing paragraphing seems rather well founded in grammatical structure as well as lexical.

Grammatical devices and constructions which span sentence borders can be recognized, too; but it should be noted that they seldom occur without strong lexical reinforcement. For example:

Most of their foreign policy goals have very little to do with the fact that they are communist and a great deal to do with the fact that they are Chinese and Chinese nationalists with a small n / And these goals would be basic to any government in Peking ... / (Profile, Monday, 8)

There is not only the use of a conjunction; there is also the lexical connection by use of their foreign policy goals and these goals, Chinese and Peking, and so on. In the written part of the corpus, examination of all connections between constructions
manifesting paragraph level functions in which we would regularly expect a sentence reveals some interesting points. All the constructions within a discourse showed lexical connection with a prior construction. This is what we expect in a coherent discourse or essay. Then forty-four percent also exhibited grammatical connection (other than simple juxtaposition and sequence of clause types). Examination of the newscasts revealed that eighty-nine percent of the constructions showed lexical connection to prior constructions, while forty-three percent of those lexically connected showed grammatical connection (other than simple juxtaposition and sequence of clause types).

It seems obvious at this point that lexical hierarchy as well as grammatical hierarchy must be considered and that focus may, at least at certain points, be needed on the lexical hierarchy. If so, the linguist interested in the higher levels of discourse structure must become involved in the semantic structure of particular discourses if not that of the whole language.

Someone may object to the use of newscasts as purely spoken English to balance the written materials of the corpus and provide a sample for comparison. However, comparison of the scripts used by announcers with the transcript of the broadcasts showed a considerable amount of change from script to utterance. Further, in addition to the announcer and two regular newscasters, twenty-seven other persons were interviewed or made statements in the five newscasts. In this, there was a mixture of exposition, narration, dialogue, etc. Only one statement could be definitely identified as being simply read from manuscript. Finally, comparison of the utterances of the announcers with those of the 'guest speakers' proved unfruitful.

Grammatical considerations

What kind of constructions occur in slots or manifest functions on the paragraph level and with what frequency? What devices are used to connect such constructions? What can be said about emic types of paragraphs?

In the corpus, there were 281 paragraphs and 1,281 slots posited. While these slots were filled by a variety of constructions, ninety-two percent (1,181) were filled by grammatical sentences. (By grammatical sentence we mean, minimally, a construction whose base slot or function is manifested by an independent clause.) The remaining slots were manifested principally by noun phrases (seventy-four of one hundred). These occurred
principally as 'signature' (Marvin Kalb CBS News Washington/), as topic headings (Debates over the weekend/), and in contexts related to weather (Highs in the sixties lows in the thirties/). Some sixteen constructions which could be considered as on a clause level but not grammatical sentences were found. For example:

Rogers propounding his theocratic doctrine and also predicting a quick end to the Viet Nam war/ (Profile, Monday, 20)

The meeting to take up recent clashes over land cultivation along the border between the two countries/ (Profile, Wednesday, 15)

Some ten constructions were left unclassified as residue. For example:

What if/ (Profile, Tuesday, 15)
Absolutely, Howard/ (Profile, Thursday, 6)
But not now./ (McGill, 3)

Due to the weather contexts and the signatures, the newscasts exhibited eighty-seven percent filling of slots by sentences, while the written materials exhibited ninety-six percent.

A number of kinds of devices connect these constructions into paragraphs. These are in addition to simple juxtaposition. One device is the use of a group of function words and phrases.

Conjunctions: and, but, or, yet. Sentence connectors: therefore, however, for example, also.7
Subordinators: because, for, since.

A second device is the use of sentence modifiers (in addition to the above). By sentence modifier we mean the occurrence of a circumstance function or slot (regularly in initial position) manifested by a construction which may express time, location, cause, manner, condition, sequence, purpose, etc., on the clause level. For example:

Last week new administrative heads were named for the division of biological sciences and the departments of
mathematics and physics/
In each case the man involved is a recognized leader ... /
(Profile, Tuesday, 7)

Bundy told reporters the situation in Southeast Asia remains difficult but with elements of hope/ Among the hopeful signs Bundy sees economic progress among free nations in that area/ (Profile, Wednesday, 7)

These sentence modifiers occur in the same positions as the sentence connectors mentioned above and perform the same functions on the paragraph level—not how IC grammar has treated them in the making of IC cuts. Thus we have the simultaneous filling of two slots by the same filler on two levels. The constructions manifest a time or location function on the clause level and a sequence function on the paragraph level.

A third device which appears, but whose limitations and distribution will require more investigation, is the sequence of independent clause types which may manifest paragraph functions through their occurrence in sentences. For example, given a base or topic sentence of the sort that has a transitive clause in its nucleus, if there is a series of two explanatory sentences following (as opposed to a concluding sentence), there are certain restrictions on what types of clauses may occur. In this case, sequences of transitive + transitive, transitive + passive, passive + transitive, passive + passive, and copulative + copulative are found—but no others.

A combination of these devices, or at least of two of them, is frequent. And it should also be noted that these devices are also used within sentences.

A fourth device is both grammatical and lexical: parallelism of grammatical role. That is, two lexically related (or even identical) units manifest analogous grammatical functions in consecutive constructions. For example:

Secretary Rusk denied today that ... /
After a four hour closed session ... the secretary told reporters ... /
He also denied the underlying assumption ... /
Rusk said flatly ... / (Profile, Monday, 3)

A university student who faces a federal charge of possession and sale of LSD says he'll fight the case ... /
Twenty one year old John Doe was arrested . . . / He's now free on bond / The Pasadena California student says that . . . /

(Profile, Monday, 13)

An interesting phenomenon was observed in the midst of several series of these parallelisms. The sequence of connection remains unbroken even as the lexical unit becomes a genitive modifier of the head expression in the subject tagmeme. For example, note these fillers of consecutive subject slots:

Many a sincere, average deep-South Southerner
his present harassment
he (McGill, 25)

Note that if his present harassment were transformed into a grammatical clause, his would become he and fill the subject slot in a passive clause, i.e., the analogous grammatical role.

Of course, it must be noted that parallelism of grammatical role is not limited to the subject slot but is often found elsewhere. In addition, this parallelism may extend to a whole series of tagmemes. This is the more traditional use of the term parallelism.

Without such knowledge, he stands uncertain and defenseless . . . /
With such knowledge, he is no longer alone . . . /

(Kennedy, 1)

The restrictions mentioned above on the sequence of independent clause types plus the distribution of the other connecting devices seemed to point (at least for a while) in the direction of two emic types of paragraphs in English discourse (or at least in the corpus collected so far). One type would have its base or topic slot filled by a sentence with a copulative or intransitive clause in the base slot in addition to having a characteristic sequence of connecting devices and clause types in succeeding sentences. The other would have a sentence with a transitive or passive clause and its own characteristics sequences. Further examination might have brought these close to the traditional expository and narrative paragraphs; but this pilot study has forced two conclusions:
(1) The study has been too limited to draw anything near a final conclusion as to precise emic types. To reach that point, a much larger corpus and some means of simultaneously handling a multiplicity of factors is needed.

(2) A definition of the sentence in terms other than clause types filling base functions is needed. There were very neat little patterns appearing. These were intricate and even beautiful. But something was missing, a missing link, so to speak. It was the definition of a sentence.

In spite of this lack of conclusive results, two observations may be of interest. Beginning sentences, which were tentatively labelled as filling concluder slots in paragraphs of the type cited above, connecting devices of the first and second types were present over seventy percent of the time. This compares with ten and twenty-five percent for the first two explanatory slots. This was especially true in the newscasts. It seems that almost every time someone was ready for a 'conclusion' of some sort he used one of these connecting devices, not only to connect to the prior constructions, but also to signal the occurrence of this function.

Also by allowing for the filling of slots on the paragraph level by constructions which could be called minimal paragraphs themselves, much of the residue and complication can be cared for. (This obtains even without the additional definition of sentence.) This layering of paragraphs within paragraphs is not extensive; but it can scarcely be ignored.

Lexical complications

When we turn to lexical structures and devices used at and above the grammatical sentence level, we note that manifesting constructions within discourses are related to each other. These constructions may be connected at two distances: adjacent and nonadjacent. They may be connected to adjacent constructions of the same manifesting grammatical level (eighty-six percent in our corpus) or to an adjacent construction of a higher level (nine percent). An example of the latter occurs as Ralph McGill spends a whole paragraph describing the disaster of the boll weevil plague in the South and then says:

On top of all this came the great depression. (McGill, 4)
By means of all this, the lexical syntagmeme manifested by this sentence is connected not just to the preceding lexical syntagmeme (which is manifested in a grammatical sentence), but to a higher level lexical syntagmeme which is manifested in the preceding grammatical paragraph.

A construction may also be connected to constructions of the same or higher level which are nonadjacent (five percent in our corpus). For example, the topic sentences of two paragraphs may be closely linked lexically.

There are four basic devices by which these connections are made: (1) repetition of the identical lexical syntagmeme and its grammatical manifestation, (2) change of level of abstraction of the same lexical syntagmeme with retention of same grammatical syntagmeme, (3) retention of level of abstraction of same lexical syntagmeme with change of manifesting grammatical syntagmeme, (4) a change both of the level of abstraction of the same lexical syntagmeme and of the manifesting grammatical syntagmeme.

These devices may be illustrated as follows. The particular illustrations are not taken from the corpus, but they show the kinds of lexical connections which do occur in the corpus.

(1) Repetition of the identical lexical syntagmeme

Mrs. Brown made dilly bread.
Mrs. Brown made dilly bread like no one else.

(2) Change of level of abstraction of lexical syntagmeme

Mrs. Mary Brown baked bread four times a week.
Mrs. Brown prepared the special recipe for neighbors as well as her own family.
This little woman turned out four batches each Monday, Tuesday, Thursday, and Saturday.
She always made it in the morning.
She did this because she had a family of seven to help support.
It provided another means of income.

(3) Change of grammatical syntagmeme manifesting lexical syntagmeme
Back home Mrs. Mary Brown baked bread fresh four times a week.
It was a highlight of the day for Mrs. Brown to bake bread.
Children sniffed the air for the appetite-whetting fragrance of Mrs. Brown's freshly-baked bread.
Six-year-old future housewives imitated Mrs. Brown baking bread.
Grownups sneaked looks at the windowsill where the freshly-baked bread appeared.
Mrs. Brown's bread even occasionally drew checker players from the firehouse.
Oh, the thought of bread freshly baked by Mrs. Brown!

(4) Change of both (2) and (3)

Back home Mrs. Mary Brown baked bread four times a week.
Her baking it was a highlight of the day.

The interlocking of the lexical and grammatical structures here certainly suggests that simultaneous study of the lexical and grammatical hierarchies is necessary to describe accurately the structure of a discourse. One example of how it may assist is helpful. The expressions I think and it seems often occur at the beginning of sentences. If they are sentence initial, they are—at least on first examination—grammatically nuclear to the sentence structure. However, they are regularly peripheral in terms of the lexical structure of the sentence in the paragraph. One should also note that they may occur in other positions. For example:

It seems the house is a good buy.
The house it seems is a good buy.
The house is a good buy it seems.

Recognition of the potential positions of such an expression may lead to useful positing of this construction, i.e. it seems, as filling some sort of modifying slot. It has assisted in the investigation of the present corpus in that the 'other clause' such as the house is a good buy in the above example then fits the pattern of clause sequences permitted in the paragraph and subparagraph structure.
In conclusion, clearer definition of sentence is the first item needed. Then need is found to consider further the lexical hierarchy as well as the grammatical if paragraph structure is to be described in terms of emic units. And there is every reason to believe that it can be so described.

NOTES


2 To appear under the heading 'Sentence Types' in a forthcoming paper: Leo F. Engler and Elaine P. Hannah, 'A Structural Analysis of Speech Samples for the Clinician'.


6 Ibid., 126, 127.


8 The name John Doe is substituted for the name appearing in the corpus.
Second Panel: CURRENT RESEARCH IN TAGMEMIC DESCRIPTION

Chairman:
    Kurt Jankowsky
    Georgetown University

Panelists:
    Howard W. Law
        Hartford Seminary Foundation
    Dan M. Matson
        University of Wisconsin
    Alton L. Becker
        University of Michigan
    James O. Morgan
        Manhattan Bible College and
        Kansas State University

Discussants:
    Robert J. Di Pietro
        Georgetown University
    Richard F. Thompson
        Georgetown University
    Neil Bratton
        Georgetown University
        Beaver
        Chicago
    H. Jay Harris
        Georgetown University
    Edward L. Blansitt, Jr.
        Georgetown University
DI PIETRO: I would like to address a question to Professor Matson. I would like to comment on the point he made concerning the role of context-sensitive rules in a grammar. There is a set of forms in Spanish which bring into question the form of the rules stated. In *el gorila hembra, gorila is a masculine word and hembra is a feminine word, I suppose. Also *la pantera macho, in which *pantera is feminine and *macho masculine and the plurals of forms like *perro lobo could be *perros lobo or *perros lobos, depending on your informant, as well as *pez espada with plurals *peces espadas or *peces espada. I am interested in knowing how a tagmemic grammar would handle such things.

MATSON: As I said before, I am not familiar with the structure of Spanish. It strikes me that this curious behavior of *gorila and *pantera is an example of something funny going on in the semantic structure rather than the grammatical structure.

THOMPSON: I have a question on Mr. Becker's paper. If in *John fishes with a fly rod with a casting rod we change fly rod to friend, we note that it does occur.

We may not accept *John danced with Mary and with a limp but we do accept such utterances as John went home and in a hurry, which I think do pop up quite often.

BECKER: The first example, John fishes with a fly-rod, changing it to with a friend I think changes the tagmeme to an accompaniment tagmeme and we do not have two instances of the instrument. I do not think the example home and in a hurry is conjoining. I think it is a special emphatic and and I distinguish it from conjoining for two reasons. It is not iterable; that is, you cannot have a whole series of items of a different type—you can only have one following any other tagmeme. They are, moreover, separately permutable as true conjoinings are not, so that you can put in a hurry at the beginning of the sentence; and you do not have to bring the whole unit linked by and and to the front. This is an interesting phenomenon, but I think it is different from conjoining.

THOMPSON: I have a question for Mr. Morgan. I have been interested in what we have above the sentence level and I have been specifically applying this study to Chinese. I think that the study of the written paragraph deals with content and involves stylistics and perhaps other kinds of things. I think that when we speak of tactics beyond the range of sentence we are within the linguistic system proper. I have not been able to come up with anything I would want to call a paragraph. I have come up
with what I would call a dialogue and the absence of a dialogue: a monologue.

I had a problem with your use of 'emic types of paragraphs'. I am not sure I know what you mean by this; when I use 'emicization' I am referring to hierarchical kinds of analogies where one goes from a lower stratum to a higher stratum and I am not used to the term on the rank level.

MORGAN: As I understand the question there are a couple of points here. Considering the kind of corpus with which I was working, especially the newcasts, there were blocks of material that were definitely a monologue. For instance, there might be a stretch of three minutes on the war in Vietnam, but on different aspects of it. Each aspect seemed to have an internal structuring, and I call those paragraphs. It may be, because of the nature of the corpus, a very special instance.

What I mean by 'emic types of paragraphs' is that you may find a type of paragraph A—and this is hypothetical—which might turn out to be a semantically labeled expository paragraph or descriptive paragraph. By emic type paragraph B, I mean 'narrative'.

BECKER: On this same question of the reality of the paragraph as a unit, there is another important point. In work that we have recently completed at the University of Michigan, we took out all indentations in three samples of prose and asked subjects to put them back in. We found that they could quite easily. Then we took out all open class words and substituted nonsense syllables so that the lexical signals for the most part were gone and things like prepositions and plurals and articles were left. Using the same passages, we found that the subjects could still mark the paragraphs with very little loss of accuracy from when the English words were there. These paragraphs were the paragraphs that were marked by the writers when they composed the material, although that does not necessarily have to follow. So I think that there is a phenomenon which is a psychological reality, which has grammatical and lexical—and now we are questioning phonological—markers and signals which we can call a paragraph.

MORGAN: I would add that in the analysis of the newcasts there were smeary borders. When one looked at the whole newcast, as I tried to do, as a series of waves, there were transition points where you did not know what to put where and, as far as I was concerned at this point, you had to leave them on the border.
BRATTON: I would like to direct my question to Mr. Becker. In regard to your examples *The man is and hit me and *He took John home and Mary seriously:—when you read the latter, there were a few titters around the room which meant that people had somehow made an interpretation. Of course a sentence like this is the basis of certain forms of wit; whereas one cannot do anything with the former. In your investigations have you come up with anything about the nature of deviance? Can you specify any order of deviation in terms of tagmemics?

BECKER: This is close to what we call 'punning' in English. I think the way I would look at it is that the first element of the two conjoined elements took John home, location or direction, sets up an anticipation for a parallelism. Then when the manner tagmeme comes up there is a sort of reciprocal backward moving attempt to interpret home as a manner tagmeme. Conjoining leads up to anticipate repeating the semantic categories. When they are not repeated, we look for the reason why.

BRATTON: Does your grammar tell us why one is a greater breaking of the rules than the other?

BECKER: I do not think that we are breaking a more important rule; I just think that we do not have a strong enough anticipation for the second part established. You notice that in *He took John home and Mary seriously we have John and then Mary coming after the and; and so we are anticipating, I think, a greater parallelism there.

I think your point is good. Is there a degree of difference here? If there is, I think the grammar ought to explain it. I think that perhaps combining different categories of verbs like is and hit may be less free than combining satellite tagmemes like location, etc., where there may be a greater feeling in the nucleus of the sentence than in the periphery.

LAW: I think punning involves a good deal of meaning, and play on meaning is sometimes used as a way to explain what a pun is. I do not think we ought to overlook the difference in degree of semantic materials in the two illustrations. He took John home contains considerable semantic material—I would not want to count the sememes at this point—and Mary seriously adds an additional amount. Whereas, the man is is almost as minimal (in terms of semantic content) as is possible if one is still to have a subject-predicate construction. I would look for degrees of difference in the semantic or lexical area to correlate with some of these other factors which have been mentioned. That, I
think, would give us the total explanation more adequately than any single factor taken by itself.

BEAVER: Would there be any means of accounting for different degrees of grammaticalness such as might be associated with a sentence such as John holds and Mary washes the child every morning?

BECKER: I think that we are starting at the wrong end of an assumption; we are starting with the assumption that this is ungrammatical, which I would not grant. If you say that it has a different intonation from other conjoinings, or if it has a special intonation in some conjoinings that does not occur in others, I think you would be right.

HARRIS: My question is for Dr. Morgan. You made the observation that it is necessary to distinguish between the definition of clause and the definition of sentence; you failed to do so. I have continually argued with Father Cook this year that Japanese has either one or the other. I would like to know whether you could clarify your own personal distinction for the purpose of either discourse or paragraph analysis.

MORGAN: I was speaking with reference to English, not to the structure of language in general. Do analogous levels have to occur in every language? I would say no at this point. It might be that clause and sentence are crammed together (for example, let's say in Japanese) into one level. In English they may be separate. I do not think there is any a priori rule at this point.

MERRIFIELD: This is a comment on Professor Di Pietro's remarks. I think a tagmemic solution to handle the kind of examples that Professor Di Pietro suggests will require recognizing that his examples are not comparable to those found in Mr. Matson's paper: all of the examples given by Mr. Matson include an article, a noun, and an adjective. But in Professor Di Pietro's examples there is an article and a noun without an adjective; that is, if we want to use noun in that sense. Gorila hembra or pantera macho is not a noun followed by an adjective but a noun + noun in a compound noun phrase; or call it a noun, if you like, of some larger size; and all of these—hembra, macho, lobo, espada—are nouns in Spanish I will contend. So what we have here is a noun phrase preceded by an article. I do not think that we can handle this by shifting to semantics beyond the point of recognizing that gorila hembra is a noun. We are talking about a certain thing, and we are not modifying it, and in this sense we go to semantics. We cannot go to semantics to solve a problem of gender because gender is grammatical, not semantics at all.
CHAIRMAN: Unfortunately, Dr. Di Pietro is no longer in the room.

WERBOW: I would like to ask Professor Becker whether he has come to terms with the question of the levels at which the conjoining takes place and whether in the example John stepped into the water carefully and without a word the without a word is considered to be parallel with carefully at the same level, let us say phrase level; or if indeed then we do not have sentence-level conjoining and what is being conjoined is John stepped into the water carefully and he did so without a word or something of that kind. With John fishes with a fly-rod and with a casting rod I would suppose that we do not have clause level conjunction but conjunction at the phrase level.

BECKER: I think something very like that does happen and I have found that conjoining is very different at different levels. I do not think the same rule that I have applied here is going to apply at phrase level or word level. But I do find things that do occur at different levels; this has long been a tricky point in tagmemics. We have, for instance, 'agent' at word level with the suffix -er, as in singer. We could have agent at phrase level in the hammering by John or John's hammering. We have agent, as we have seen, at clause level; we may well have it at sentence level in As for John, ... or something like that as a special sentence level agent; and even beyond I am sure. We will have to describe them at different levels; but I think that very interestingly these semantic categories—agents, temporals, locations—appear at any level and a specific language might have it at a different level from another language. I think the grammatical form which manifests these is different at different levels, and I think this may be one of our major keys for separating levels.

LAW: I think this may also be a way of aiding us in typologizing languages. Languages which characteristically do something at a particular level may be different in that way from languages which do it at another level.

BLANSITT: I would like to address a question to Dr. Law. I have, on occasion, defined the adverb as the class of elements which the grammarian did not know how to classify. It seems to me that so often the grammarian finds certain categories which he can define either in traditional terms or in modern terms on the basis of form and the rest he seems to lump together. If it is a very small item he may call it a particle, and if it is too large to be called a particle, he will probably call it an adverb or by some other cover term for the residue. In any event, 'adverb',
'adjunct', etc. seem to be used in many cases simply for the residue after the linguist has stopped classifying. I would like your comments.

LAW: I have also classified adverbs as a wastebasket which people dump things into when they cannot do anything else with them and I think it is about time that we emptied the wastebasket on the analyst's table and look at it and quit using the term 'adverb', 'adverbial', etc. except in the most general hyper-hyperclass situation where occasionally it is the easiest thing to do because people know what we are talking about, supposedly. We should look at adverbs, adverbials, etc. and try to do something about classifying them and then talk, as I am grateful to hear most of the panelists and others have talked, about temporals, locatives, manner, etc., which makes a lot more sense.
PANEL III

GRAMMATICAL ANALYSIS
Symbolic logic is an artificial language constructed in the hope that its use will clarify thinking and protect us from linguistic booby traps.

The simplest kind of symbolic logic treats the 'sentence' as a tagmemic unit, and considers the ways in which sentences may be combined to form larger sentences. Actually sentence is too broad a term, since we are concerned only with 'logical statements', or 'propositions', which may be classified as either 'true' or 'false'. If the letters p, q, r, etc., represent elementary propositions, we are concerned with such constructions as

(1) p and q
(2) p or q
(3) if p, then q
(4) p iff [if and only if] q
(5) not both p and q
(6) not p
(7) p but not q
(8) q

A chemical metaphor is useful. The elementary sentence tagmemes are called 'atoms', and the sytagmemes are called 'molecules'. The molecular glue which binds these atoms together are the connectors and, or, not, if ... then, etc. Chemists distinguish nascent oxygen (O), ordinary oxygen (O₂), and ozone (O₃) although these molecules are formed from only one kind of atom. In linguistics the deceptively simple connectors often provide the only clue as to which molecule is intended.
In natural language these terms are often ambiguous, the choice of meaning sometimes determined by the cultural 'universe of discourse'. A restaurant that says you can have apple pie or ice cream for dessert may charge extra for pie a la mode. But a college which asks a liberal arts major to take chemistry or physics may be happy if the student takes both. If Professor Snarf gives the better B grade only to pretty girls or to those who laugh at his jokes, what grade does he give a student who is 'pretty' and 'laughs'? If you send Christmas cards to your friends and to your wife's friends, do you send two cards to your mutual friends?

What we are saying is that the natural connecters or and and do not always carry the same meaning. In symbolic logic this ambiguity is intolerable, so we arbitrarily pick one meaning as orthodox, and ask the other usages to find another form. As a clue to the reader that the connecter is being used in its orthodox sense it is customary to replace the word by a symbol. Thus, 'p and q' is written variously $p \cap q$; $p \land q$; $p \cdot q$ or merely $pq$. The inverted U is read 'cap' or 'intersection', the inverted V is a capital without its crossbar, the dot stands for 'logical product', with mere juxtaposition the briefest notation of all. Likewise 'p or q' may be written $p \cup q$; $p \lor q$; $p + q$; contrasting with the respective notations for and. Here $\cup$ is read 'cup' or 'union'.

An ambiguity also lurks in the molecular statement 'if p, then q'. A man says 'If your house burns I will pay you $10,000'. Is his statement 'false,' if it turns out he cannot and never intended to pay? The orthodox decision is that any 'if-then' statement is 'true' except in the case that the 'if'-clause is true but the 'then'-clause is false. So, unless your house burns and he does not pay, the unethical insurance agent made a true statement. For this type of 'material implication' the mathematician writes $p \supset q$; or $p \rightarrow q$; with the alternate reading 'p implies q'.

'Union' is 'commutative', in that $A \cup B$ is equivalent with $B \cup A$, and 'associative': $(A \cup B) \cup C$ and $A \cup (B \cup C)$ are equivalent. 'Intersection' is also commutative, $A \cap B = B \cap A$, and associative, $(AB)C = A(BC)$, but 'implication' is neither. In special instances, however, both $A \supset B$ and its 'converse' $B \supset A$ may be true.

The orthodox interpretation of these symbols of symbolic logic may be shown by Venn diagrams. Let a circle represent all the situations where the statement $R$, this is red is true; and let a
square represent the instances where H, this is a horse, is true. Then

\[ \text{R and H} \quad \text{R or H} \quad \text{if R then H} \quad \text{R but not H} \]

The molecular statements are true in the shaded domains.

In symbolic logic we make the assumption that whether the molecular statement is true (1) or false (0) is completely determined by the truth values of its component parts. Thus, there are 16 possible molecular statements involving precisely two atomic constituents. As many of these as desired may be assigned appropriate symbols. The meaning of any molecule can be 'defined' by its truth table.

<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>p.q</th>
<th>p ∨ q</th>
<th>p ⊃ q</th>
<th>p iff q</th>
<th>¬p</th>
<th>p</th>
<th>q</th>
</tr>
</thead>
<tbody>
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<td>1</td>
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The 8 columns tabulate half of the possibilities. Column six uses the coined word iff for if and only if. The seventh column is the 'denial' of the first; for, whenever the one is true the other is false. Column eight uses the Sheffer stroke to indicate not both p and q. Each row may be assigned an 'ordinal', \( N = 4 - p - 2q \). [For 3 atoms this becomes \( N = 8 - p - 2q - 4r \).] There are 4 rows in the truth table, called 'quadrants', and \( 2^4 = 16 \) distinguishable columns. This is the number of distinct 'subsets' of a set S of 4 elements, including the two extremes the 'empty' set \( \emptyset \) and the set S itself. The molecular statement \( \emptyset \), being always false, is called an 'absurdity'; the molecular statement S, being always true, is called a 'tautology'. The Sheffer stroke may be used to define all the others: for instance, \( ¬p \) is the same as \( p|p \).

*   *   *

\[ \text{DUAL GRAPHS IN SYMBOLIC LOGIC / 145} \]
The foregoing remarks are well known, what follows is a new contribution.

Recall how a mathematical function, \( y = f(x) \), may be represented as (1) a numerical table, (2) an algebraic equation, or (3) a geometric graph.

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<th>x</th>
<th>y</th>
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<tbody>
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<td>1</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

\[ y = x^2 \]

Each representation has its advantages, permitting us to 'see' the function as a whole. Linguistically \( y = f(x) \) is a frame with two slots, \( x \) and \( y \), with the added feature that if slot \( x \) is filled there is a unique choice for \( y \). Thus we may interpret this as a sentence which defines \( y \), the equal sign being the 'copula', and \( f(x) \) being the 'predicate nominative'. Each point on the graph represents an ordered pair \( (x, y) \) which 'satisfies' the given relation. The 'variable' \( x \) is assigned any value in its domain of definition (manifestation set) and the value of \( y \) with which it is coupled can be determined.

Among the molecular statements of the 'calculus of propositions' the domain of \( x \) consists of two discrete choices: one of the truth values 0 or 1. The four quadrants are completely represented by the four points \((1,1), (0,1), (1,0) \) and \((0,0)\). A molecular graph would consist of some subset of these 4 points. Thus the graph of 'x implies y' would omit only \((1,0)\) corresponding to \( x=1, y=0 \).

But projective geometry has revealed a beautiful 'duality'. For each postulate \( T \) in the projective plane the words point and line may be interchanged to obtain a 'dual' postulate \( T^* \). The two statements \( T \) and \( T^* \) are either both true or both false [so that \( T^* \iff T \) is a tautology]. For instance, if \( T \) says that two points determine a line, its dual \( T^* \) says two lines determine a point.

We construct a 'dual graph'. Each quadrant is represented by a 'line'. We label the corners of a square \( P, Q, -P, -Q \) so that \( P \) and \( -P \) are diagonally opposite, as are \( Q \) and \( -Q \). The four quadrants are represented by the four sides of this basic square.
The base line PQ in this dual graph corresponds to the point (1, 1) in an ordinary point graph. Similarly, the line P Q (with P true and Q false) corresponds to the point (1, 0). The dual graph of a particular molecular statement is obtained by drawing only those lines for which the molecular statement is satisfied. Thus, 'P implies Q' consists of three sides of the square, excluding only the side P Q.

In presenting the dual graph the labels P and Q at the extremities of the base are important, but the upper labels are 'redundant', and may be omitted. Using a script variant the graph of 'P implies Q' may be written \( \supset \). This happens to coincide with one of the standard symbols for material implication.

In like manner the graph of 'P or Q' is \( \bigcup \), which coincides with the set union notation for this 'disjunctive' molecule.

The graph for 'P iff Q' is an 'equal sign'; and the graph for 'P iff (-Q)' resembles the symbol for 'parallel' lines in geometry. [A point is on one of two parallels iff it is not on the other!]

We propose that the arbitrary symbols for the various molecular relations be deliberately replaced by their dual graphs. Often this entails the adoption of a symbol already in use, so that the allover change is not drastic; but the consistent use of dual graphs should eventually displace the current hodge podge of arbitrary notations. Whenever it is desirable to treat the elementary sentence P as a diatomic molecule which 'asserts P' regardless of Q, a statement which is true in the two quadrants P Q and P Q, the dual graph resembles the capital L. The graph of the conjunctive molecule 'P and Q' is merely the base line, which must not be
confused with the line joining \(-Q\) to \(-P\). We suggest placing \(P\) and \(Q\) on the line of writing, and 'underscored': \(_PQ\). As is the case with the multiplicative dot for \(\text{and}\), no harm results from its omission: \(P \, Q\). Contrastively, the 'overline' \(\overline{PQ}\) may be written \(\overline{P} \, \overline{Q}\), since the reading 'P-bar, Q-bar' correctly means 'not \(P\) and not \(Q\)'.

After adopting its dual graph as the symbol of each molecular relation, we are rewarded with a bonus. Any side of the square may be taken as its base, and this line may be reversed in sense by flopping the entire graph over [a line reflection in the plane]. Exploiting this freedom we find that each graph has eight equivalent 'readings'.

As a particular instance, another reading for 'P implies Q', symbolically \(P \implies Q\), is 'not-Q implies not-P'. This is the 'contrapositive' form. In some texts on symbolic logic this result is available only after a cumbersome derivation.

The trademark of a good notation is that it fits the notions. The concept of a dual graph shows that the symbols proposed here are 'natural' and not a fortuitous device. We believe the inherent beauty of this particular coupling between notion and notation is due to the isomorphism between the calculus of propositions and the group of transformations of a square onto itself.

Does this exercise in symbolic logic have other linguistic implications? Perhaps. Since any 'mathematic' is a language within a language, mathematics as a whole will benefit profoundly from the insights of tagmemic analysis. The first fruits should appear in its foundations, where the \textit{Principia} of Whitehead and Russell has already alerted contemporary mathematicians to the need for a new appraisal of mathematical logic as a relevant part of human behavior. Mathematicians have a conviction that they are not merely playing a chess game with the symbols of their invention; they believe that their linguistic statements have meaning and relevance.

Hopefully mathematics can repay its debt to linguistics by sharing some of its own insights. Since both disciplines are concerned with 'patterns', the concepts of set theory and linear order, the study of relations as explored in the new field of graph theory, as well as the classical results in finite groups might be able to contribute to current linguistic research.

After phonemics has identified the meaningful units of sound, is an arbitrary assignment of reference labels the only feasible choice? Why not make assignments subject to a 'principle of
proportion', where phoneme 1 is to phoneme 2 as symbol 1 is to symbol 2. Other criteria such as readability and writeability might override proportion. Thus, every phoneme must be labeled; however, characters that can be drawn in one continuous script are, in this respect, preferable to those which are made up of disjoint strokes. If an alphabet optimizing such desirable characteristics as these is chosen, each symbol serves not merely to identify its phoneme but gives a clue to its classification. This principle of taxonomy is already recognized in chemistry and biology. An arbitrary decision is necessary to clean up the exceptional cases, otherwise too many intrinsically simple characters would be reserved for phonemes that do not occur in a given language. Compare:

```
| p | k |
| b | g |

| s | ts |
| z | dz |

| f | s |
| 3 | d3 |
```

A phonemic alphabet with built-in proportion would have analphabetetic overtones.

Perhaps a simplification of the system of abbreviations used in tagmemic formulas might be achieved. With 26 letters available in the alphabet it would seem feasible to avoid using the same letter for different notions. A judicious alternation of consonants and vowels might make these concise rules pronounceable, as were the medieval names of syllogisms.

More important is the display of linguistic data in appropriate rows and columns, a device already employed by traditional grammars to indicate inflections and conjugations. Only after mathematicians had learned to display the coefficients of a simultaneous system of linear equations in rectangular arrays were they able to operate on these matrix syntagmemes as units in another hierarchy.

A word of caution from Alice in Wonderland. One should remember who is master. Notions should control the notations. When a computer is programmed to translate from language A into language B it is sorely tempted to ignore those features of language which are not amenable to mechanical transformations. This is no excuse for a linguist to ignore them.

It is customary to assume that the laws of grammar are invariant, irrespective of the lexical content. But if phonemes are responsive to their acoustical environment, why should not the number of taxonomic slots be dependent on the slot fillers? For
instance, instead of a Cartesian product of masculine/feminine
gender with singular/plural number, why not (1) masc., (2) fem.,
(3) plural. Again, languages grow, and perhaps most native
speakers add to the lexicon; is it not just as natural to coin new
patterns of grammar as to coin new words? For purposes of
study we may confine our attention to a closed system, but ulti-
mately we must be at home in a dynamic open system.

APPENDIX

A PHONEMIC ALPHABET

with built-in proportion
TOWARD A TAXONOMY OF SPOKEN GERMAN

STANLEY N. WERBOW

The University of Texas

Though the study of German syntax has not received anything like the amount of attention devoted to phonology, morphology or lexicon, it is not fair to continue to mouth the old clichés about scholarly neglect of it. Still, the amount of accepted scholarly opinion after a century and a half is pitifully small. True, Grimm, Kehrein, Vernaleken and then Paul, Behaghel, Erdmann, Wunderlich and Blatz erected imposing edifices in their studies of the syntax of chronological varieties of written language syntax. What of spoken German? This too came in for a share of attention when the new upsurge of interest in syntax deriving from Otto Behaghel’s leadership combined with the interest in dialects deriving from Georg Wenker’s startlingly new dialect work in the late 1870’s. Using a framework designed by Miklosich and refined by Behaghel, Gustav Binz devoted his Basel dissertation of 1888 to a study of the dialect of Basel, and in 1891 Hans Reis wrote of the dialect of Mainz. Johann Ries lodges the complaint in his review (AfdA, 1891, 337-343) that the phenomena claimed for a dialect were simply characteristic of spoken German as opposed to the written language, the grammar of which had been used as a basis for comparison. Hans Reis (DLZ 1891, 154) acknowledged Ries’s objection but allowed, still purely from a dialectological viewpoint, that it would be necessary to have studied all German dialects to establish the Spoken German norm that Ries had called for. The next years saw more studies of dialect syntax, of which Schiepak’s monumental (two volumes,
work on Egerland, 1899 and 1908, is the most notable. He tried to fill out the whole Miklosich-Behaghel framework: (1) Intonation, added according to Ries on Scherer's insistence (cf. Scherer, ZfdG 1878, p. 119ff.), (2) Morphology, (3) Word Classes, (4) Congruence, (5) Word Order and Order ofClauses, (6) Ellipsis, and (7) Pleonasm and Tautology.

The objections of Ries necessarily apply to Schiepak also although he was not trying to do a syntax of spoken Egerland alone. He, like Binz, included dialect literature, tales, folksongs and historical material from the 16th century onward as well as spoken dialect observations. He was oriented to the historical method and thus compared his findings with Old and Middle High German and with the Standard Written Language. But in 1936, when Erich Labouville wrote on the syntax of Dillingen on the Saar, he still essentially compared his findings with the grammar of Standard German; he opined that 'it is much more difficult to establish rules and principles for a living dialect, which as a result of its exclusively spoken use can develop free and unhindered, than for a literary language, the style and grammatical structure of which can for various reasons be systematized and reduced to definite grammatical rules and formulae'. He did recognize that the peculiarities he found in his dialect were shared by other dialects as 'they are common to the Volks- und Umgangssprache in general'. Even as late as 1959, Heinz Sperschneider used standard written for comparison (Studien zur Syntax der Mundarten im östlichen Thüringer Wald, Marburg 1959), and so did Klaus Baumgartner in his study of the language of the Leipzig metal workers (Syntax der Leipziger Umgangssprache, Berlin 1959).

What meanwhile of the syntax of general, spoken German? The grammarian Hermann Wunderlich devoted a book to the peculiarities of Spoken German syntax (Unsere Umgangssprache in der Eigenheit ihrer Satzfügung, Weimar and Berlin 1894), for which he cited literary texts, especially plays including Götz von Berlichingen! He concentrated on certain salient features such as ellipsis, pleonasm and anacoluthon. He chose literary texts which seemed to him to possess features of the spoken language in order, in those days before the tape recorder, to protect himself from the charge of subjectivism (p. viii). Having observed a phenomenon in spoken German, he then located it in a literary work and cited the latter as his example. He was fully aware of the interregional quality of dialect syntax, a point which the most recent champion of Spoken German Syntax, Heinz Zimmermann, took from him; but he was also very much aware of the close
interrelationship between the spoken and the written language, a relationship which Zimmermann chooses to break. Zimmermann's Basel dissertation of 1965 (Zu einer Typologie des spontanen Gespräches), spotlighted by the article in Wirkendes Wort by his teacher Heinz Rupp 'Gesprochenes und geschriebenes Deutsch', (WW 15, 1965, 19-20) claims that the syntax of spontaneous, spoken German is so different from that of the Standard language, whether written or spoken, that it must be treated independently of it. Not only does he reject formal written language as a basis for comparison with 'spontaneous talk' but also any usefulness of recorded interviews such as those in the Zwirner collection in studying spoken German syntax. The features he chooses to study to the exclusion of usual syntactical categories are familiar from Wunderlich: ellipsis, pleonasm, anacoluthon, abbreviated reference, and, most importantly, the reversal of the thema-rhema or known-unknown sequence shown by Boost for the German sentence or clause, a topic on which I shall have more to say in what follows. Zimmermann, secretly or candidly, recorded 30 hours of intimate, family talk, rejected all but the few hours in which he himself was a participant, and chose to report only a small amount of this.

A rebuttal of Zimmermann and Rupp was not long in coming. Hennig Brinkmann, who had seen Rupp's article in manuscript, was able to dispute the allegation that the spoken component of linguistic interaction must be studied independently of the rest of the language. His article in the same year of Wirkendes Wort, 'Die Konstituierung der Rede', (WW 15, 1965, 157-172) and another one in the next year, 'Der Satz und die Rede', (WW 16, 1966, 376-390) are contributions to discourse analysis of German. He points out that the 'horizon' or speaker-to-speaker relationship, and the context of situation ('Situation') do, as Zimmermann feels, importantly condition the utterance ('Redefolge'), but that is not grounds for studying any given type of linguistic situation exclusively. After all, it is just the effect of the other components, horizon and context of situation, on the speech component which Zimmermann needed to study, and how can one do this if he does not keep the language factor constant, that is study the whole of the language under one system? Everything from the grunt of recognition to the most eloquently constructed Ciceronian period must be included in an overall taxonomic frame so that syntax and discourse analysis can operate upon them. It was only from knowledge of the standard language derived from Boost that he was able to observe the reversal of the thema-rhema sequence as characteristic
of intimate talk where the context of situation provides the known so that the utterance can begin with the rhema and the essentially redundant thema may be stated last. We find in Brinkmann's discussion of discourse (op. cit. 386 f.) belated and probably independently arrived at similarities with Pike's 'Unified Theory' and Harris' 'Discourse Analysis'. Brinkmann promises a chapter on discourse analysis in the revised edition of his Deutsche Sprache, Gestalt und Leistung, (Düsseldorf, 1962).

Zimmermann failed to realize that though a lecture differs from a sermon, a monologue from a discussion, and a subject-oriented conversation from small talk, that even the mood verbalization, which is his 'spontaneous talk', should be seen within the grammar of its language. Of the materials which are available in this country for analysis, the various Zwirner collections are the most useful. Though they represent a variety of spoken German more highly stylized in the direction of formal language than Zimmermann was after, there is considerable range, the Alan Pfeffer interviews being in part more formal as well as less dialectal than the original Zwirner dialect interviews. This is of course consistent with the pedagogical objectives of the research planned on them. The informants are school children, teachers, housewives—in general educated middle-class speakers who give what amount to informal lectures, though some approximate the informal monologues of most Zwirner interviews. For objectives like Zimmermann's the candid sound camera would be a more suitable instrument for collecting data than the tape recorder, though even that would not provide the whole context of situation, say smells.

Aside from the question of availability of spoken materials, it is only by studying the whole spectrum of spoken and written German that we can determine the range of phenomena and the relationship of spontaneous talk to the rest of the language. In fact, Zimmermann's observations are made against an inadequate background; namely, that of a tacitly assumed prescriptive school grammar. He alleges, for example, an infringement of the rules of congruence in the use of a singular verb form with a series of subjects. This is found, of course, not only in far more formal spoken language but even in the written language. His example deals with the guests expected for tea: 'Der P. kunnt nit, aber dr. B. und dr. G. nimmt aine (einen Tee)' that is: P. isn't coming, but B. and G. is having some. Zimmermann provides no information on suprasegmentals, but I would gamble that the two latter subjects are separated by a hesitation phenomenon. This
is, thus, a difficulty which grammarians of dialect have suffered from for almost a century and which Zimmermann himself recognizes in others: an inadequate basis of comparison. Usually the language variety under consideration is compared with a grammar of standard German which, if not fictional, is at least highly idealized.

Some years ago I became convinced that the Sapir-Whorf syndrome had been working against German grammarians, keeping them from insights which were commonplace in American linguistics. It is the fact that German lacks the lexical distinction between sentence and clause. The one word Satz serves for both so that it was natural that the tremendous theoretical argumentation that culminated in J. Ries, Was ist ein Satz? (Prague 1931; (222 definitions!) should have arisen. How could a nicht-Satz be a Satz, or 'how could a non-clause be a sentence?' Of course, German grammarians have long admitted that a single word might be or, at least, serve as a sentence; but it was an insight that had to be reconquered time and again. Rupp asks in desperation over the unruliness of the spoken language: 'Wie lässt sich ein solcher Gesprachsteil überhaupt noch aufgliedern, wie lässt sich hier noch sagen, was ein Satz ist? Wo findet sich das Subjekt, das Prädikat, das Objekt? Handelt es sich um einen Satz oder mehrere?' ('Gesprochenes und geschriebenes Deutsch', WW 15, 1965, p. 28).

The Duden now distinguishes between discourse (Rede), to which single word items like the exclamation 'Fire' are assigned, and 'real' sentences in which the 'listener becomes conscious of the consecutively spoken words as a simultaneity, because he can understand the sense of the whole only when the last word has been spoken'. These latter (Sätze) claim the greatest part of the grammarian's attention. To Rede or discourse are also assigned sections of speech larger than the sentence and, as the Duden grammar says (p. 431); 'It can also extend over hours'. I felt that between this discourse extending over hours and the one word discourse there was indeed an affinity. They are both 'all the speaker said'. I accept the now common linguistic definition of a part of discourse marked by a final intonation contour as a useful segment of discourse and call it a sentence.\(^1\) Thus Fire! was a whole discourse to be sure, but also a sentence, a sentence of a particular structure. Following Pike's hierarchical thinking, I operated with three sentence level constructions: the clause with its minimum component the finite verb and its various clause types; the clause-partial which can be thought of as a reduction
from the clause pattern (though it is not always possible to determine to which specific clause type the partial belongs, as, for example in English The one on the right. as a response to the question Which one do you want? might represent: I want the one on the right, or The one on the right is the one I want.) And finally I operated with the nonclause which for want of a better name I call the group of contact establishing particles like oh, affective particles like ouch, and yes and no. My objective, worked out in part in the Master's Thesis of Martin Gottschalk, (Texas 1960) is to determine the kinds and complexity of sentences, defined by intonation as I said, and described in terms of the sentence level constructions. We subclassified clauses only on the basis of word order, that is position of the subject and verb, \[MC_1 = S \ Vf \ A \ (\ldots) ; \ MC_2 = Vf \ S \ A \ (\ldots) ; \ MC_3 = A \ Vf \ S \ (\ldots) \ [X]\] and the partials on the basis of the part of a clause they represented, i.e. \(PA_1\) subject or topic only; \(PA_2\) subjectless verbal construction; \(PA_3\) non-finite verb construction; and \(PA_4\) adjunct only, adverbial or adjectival determiners. The resulting tabulations by sentence composition, length, and degrees of complexity do not make an interesting recitation.

I shall quote a few figures not for their own sake but in order to argue that comparable work on a larger range of spoken and written materials and even materials from other historical periods would provide part of the basis for defining genera of spoken and written language. Our studies use the traditional concepts of simple sentence, complex sentence, and compound sentence, except, of course, that any of our three sentence-level constructions may constitute or be a component of such sentence types. Thus yes is a simple sentence, yes, please a compound sentence. In our sample corpus of 1835 sentence level units, there are 344 simple sentences; of these 313 are clauses. We would expect material like Zimmermann's to differ markedly here in that partials and nonclauses would loom much larger. For the single transcribed conversation which he published this is the case, though naturally the number of items is too small to use statistically. Of the 63 sentences there, 42 are simple sentences; and of these only 24 (or just over half) are clauses while eight (or one-fifth) are partials and ten (or one-fourth) are nonclauses. Our material had 18 partials and 13 nonclauses in about nine times as many simple sentence, so about one-half of one percent. The nonclauses in the Zwirner monologues occurred predominantly in the exchanges with the interviewer. There are in the materials we studied 166 sentence-level units
in complex sentences of which quite understandably 152 are clauses. Of the 1325 sentence-level units in compound sentences, 687 are clauses, 309 partials, and 329 nonclauses. It can readily be seen that this is the characteristic sentence type of the monologue, perhaps of spoken German in general. Differentiation in number of sentence level units in a given volume of corpus, in their type, length, and arrangement could yield objective criteria for defining genera of Spoken German.

The answers to these and other questions will come when the techniques of mechanical sentence analysis developed in machine translation and discourse analysis projects can be applied to large bodies of spoken materials. Hundreds of Zwirner and Pfeffer tapes have been transcribed; and most of the transcriptions are now on deposit in this country. Zimmermann's material could be analyzed from this point of view as well without his intimate knowledge of speaker-to-speaker relationship and context-of-situation. Indeed, the Rothenberg Colloquia of 1965 were devoted to exploring means of exploiting the German Language Archive's recordings by computer storage and analysis. (Gesprochene Sprache. Forschungsbericht der deutschen Forschungsgemeinschaft No. 7. Wiesbaden 1966.)

With the known primary interest in phonetics and phonology in Münster but also because of the state of the art in general, it is not surprising that grammatical analysis is only in very early stages. A start has been made toward machine recognition of morpheme boundaries (W. Bethge and H. Richter, 'Zur Klassifizierung von Morphemen für die automatische Verarbeitung hochsprachlicher Tonbänder des Deutschen Spracharchivs', in Sprache - Zuordnung - Strukturen. Festgabe für Eberhard Zwirner. The Hague 1965, pp. 1-40); and even objective recognition of intonational signals of syntactical boundaries are under study (see Ariel Bloch, 'Intonation und Satzgefüge', in Festgabe für E. Zwirner). Both in Munster and in East Berlin, experiments using natural and simulated speech are being aimed at establishing parameters of German sentence intonation. (See Alexander V. Isachenko and Hans-Joachim Schädlich, 'Untersuchungen über die deutsche Satzintonation', Studia Grammatica V II, Untersuchungen über Akzent und Intonation im Deutschen. Berlin 1966.)

In addition there have been two national conferences in Germany on the syntax of natural language under Hans Eggers in 1963 (Erstes Kolloquium über Syntax natürlicher Sprachen und Datenverarbeitung, Wiesbaden 1964) and under Herbert Pilch in
Peter von Polenz ('Zur Quellenwahl für Dokumentation and Erforschung der deutschen Sprache der Gegenwart', WW 16, 1966, 3-13) pleads for the study of a wide variety of written and spoken texts including news reports and transcriptions of the informal debates in the German legislature (Aktuelle Stunden). He has noted interesting changes made in these informal remarks by the press in reporting them. While his remarks are directed rather at the formal language whether written or spoken, the recently founded Institut für deutsche Sprache in Mannheim has a separate research group for the spoken language. Let us hope that it will not be too separate. The differences I suspect in construction of sentences will undoubtedly be joined by those in lexicon, and in features like the length of words, phrases, clauses and sentences. At one extreme of the statistical spectrum will still be 'officialalese' and at the other will be something like Zimmermann's 'spontaneous talk'; but we shall have criteria for understanding them all within one overall grammar and stylistics of the German language. It would seem strangely retrograde in this day of language universals to fragment the study of a single language because of variation in language genus or linguistic genre.

NOTES

1 Consider the great pains to which Eugen Lerch needed to go to establish this definition in his 1938 article: 'Vom Wesen des Satzes und von der Bedeutung der Stimmführung für die Satzdefinition', Archiv für Gesamtpsychologie 100, 1958, 133-197, a definition which the modern East Berlin generative school calls correct though intuitive (Cf. Isaacenko and Schädlich, 'Untersuchungen über die deutsche Satzintonation', Studia Grammatica VII, Berlin 1966, p. 43; see also E. Seidel, Geschichte und Kritik der wichtigsten Satzdefinitionen, Jena 1935, p. 37.

2 I agree with Longacre's remarks in 'The Notion of Sentence' elsewhere in this volume that the traditional categories of sentence complexity are not powerful or adequate in syntactical analysis; but I submit that they may have a useful function in taxonomy in the sense in which I am using it here. Degrees of sentence complexity are, thus, used to distinguish the varieties of a language; and Phooey, Mary, I'm going is a second degree compound sentence with nonfinal intonation pattern as part of its conjoining requirement.
Although sector analysis was originally developed outside the mainstream of tagmemic analysis, both types of analysis have much in common. Both accept the tagmeme (as defined by Pike) as the basic unit in the grammatical hierarchy of a language; both recognize the 'intimate ... correlativity of function and set' and the mutual dependence of each on the other;¹ both consider patterning to be central to human behavior and, in Longacre's words, 'recognize as superior the grammar which sets forth the patterns of a language in the more straightforward and direct manner.'² At the same time, both admit— to quote from Longacre again—'the usefulness of grammatical transforms as one means of expressing relations between sentences',³ although neither uses the rewrite rules of transformational grammar as the way of expressing such transforms.

I assume, furthermore, that tagmemic analysis—like sector analysis—rejects the concept of a set of 'kernel sentences' which every native speaker of a language first internalizes in some fashion and then transforms into the other sentences of the language by means of transformational rules. Indeed, I believe it much more likely that what a child internalizes first are the most common sequences of positions on the different levels in the grammatical hierarchy of his language, together with the types of constructions that may occur in those positions—in other words, the strings of tagmemes on each level. A small child, for instance,
will learn to say naughty doggie not as a transform of The doggie is naughty but rather as a sequence of two tagmemes which together form a 'cluster': a slot for a 'modifier', which can be filled by an adjective like naughty or nice, and a slot for the head or 'nucleus' of the cluster, which can be filled by a noun like doggie or pussy. When the child says naughty doggie about a specific dog, he is using the whole construction—the cluster—to fill a single position on a higher level: he is using it as a 'complement'—or as the 'predicate', if you will—in a sentence with no subject. Later, when the child learns to use what Bloomfield calls 'displaced speech', he will fill the 'subject' slot as well, and will say something like Fido naughty doggie, where the cluster naughty doggie more clearly fills a single position on a higher level. Still later, of course, the child will learn to add more slots (such as the 'determiner' slot) to the sequence of slots within the cluster, and still other positions to the sequence of positions within the predicate—so that he will be able to say Fido is a naughty doggie or Fido was a naughty doggie. And then one day, perhaps, the child, noting (unconsciously) that both the subject position and the complement position can be filled by constructions of the same type, will say Mark bit a naughty doggie instead of A naughty doggie bit Mark. (Only a few days ago the mother of a small boy reported to me just such a transposition of elements in her son's speech, although with different words.) When the child learns to say Mark was bitten by a naughty doggie instead of Mark bit a naughty doggie, he is on his way to using transformational rules—but it is significant, I believe, that all the constructions in all his transformed sentences will fit into the positions he has already learned. In other words, no transformational rule seems to produce a new tagmeme.

But although sector analysis may justifiably be called a form of tagmemic analysis, it differs from orthodox tagmemic analysis in certain respects. Perhaps the most important of these is to be found in the different assumptions held by adherents of the two schools regarding levels of analysis. I agree with Longacre that 'immediate constituent analysis yielded ad hoc hierarchies specialized overmuch in terms of particular sentences [and] failed, therefore, to uncover hierarchically arranged patterns of maximum relevance and comparability'. With him I reject the assumption that almost every structure in a language can be cut into two constituents: I know of no way of determining the first cut in a noun cluster like three blind mice with any real assurance that I am not being arbitrary. And yet I believe that there are many
more binary constructions—at least in English—than Longacre seems to recognize; I also feel that, in his desire 'to uncover hierarchically arranged patterns of maximum relevance and comparability', he has tried to compress the nine or ten different kinds of levels to be found in the grammatical hierarchy of English into the four or five levels that tagmemic grammarians always seem to find in other languages. Although it is interesting to find similarities between English and other languages, over-simplification may result in the failure to note certain significant features.

Let me give one or two specific examples. Longacre rightly makes much of the function of a given set: 'the tagmeme concept', he says, 'restores function to its rightful place in grammar'. Now surely the function of a prepositional phrase is so very different from that of a noun cluster that the two cannot possibly be claimed to exist on the same level, at least in English—and yet, if I am not mistaken, Longacre treats them both as being on 'the phrase level'. A prepositional phrase (the only unit, by the way, that is called 'a phrase' in sector analysis) is marked by the preposition which introduces it, and normally consists of a preposition plus a noun cluster: a noun cluster, then, belongs to a set which fills one of the two slots in a prepositional phrase, and occurs on a different level from that of the phrase. Since a prepositional phrase, in turn, regularly fills a post-nucleus slot within a noun cluster, it is difficult to say which of the two is on a 'higher' level—but they certainly occur on different levels, a fact which is obscured when both are called 'phrases'.

Again, in the sentence Hearing a low groan, Arthur Bates, the night watchman, turned on his flashlight, the noun clusters a low groan, the night watchman, and his flashlight all seem to be on lower levels than the subject Arthur Bates: they are all parts of predications that are being made about Arthur Bates. Similarly, the cluster the pioneer's family in Longacre's classic example does not seem to be on the same level as the slow lumbering covered wagon: the former is part of the predication being made about the latter. It is for this reason, as I point out in The Verb System of Present-Day American English, that Longacre's sentence can be shown to be homologous to John ate downtown yesterday as well as to John sold gum downtown yesterday, so that one might claim that the original clause should be cut into four constituent parts instead of into five. It is significant, I think, that Ruth Crymes, in her study of 'Some Systems of Substitution Correlations in Modern American English' (to be published shortly by
Mouton and Company) found that she had to assume—as does sector analysis—the existence of at least one predicativval level between the phrase and clause levels, just as she had to distinguish between the cluster and phrase levels. She has shown that English has a well developed substitute system for the entire predicate—i.e., for the verb plus its complements—quite distinct from the substitutes for the verb alone, or from those for noun constructions alone, and even from those for whole clauses. Incidentally, I might add that the recognition of predication-making units as sets filling fixed positions within the sentence is proving to be extremely useful in the analysis of the styles of different authors, an area to which sector analysis has been applied with increasing frequency during the last two or three years.

Sector analysis was originally devised for the analysis of individual sentences as they appeared in a given text. Recently it has been applied to units larger than single sentences; but it is still used most commonly in analyzing single sentences, beginning on the sentence level and working from there down to the morpheme level. The principal emphasis is placed on the identification of the positions on higher levels: that is, the positions on the sentence, clause, clausid, trunk, predicate, and predicatid levels. (A predicatid is a nonfinite predicate; a clausid is made up of a subject plus a predicatid.) The positions on these levels are called 'sectors', to distinguish them from the 'slots' on lower levels; hence the term 'sector analysis'. After the various positions have been identified, the analyst then notes all the different types of constructions that may occur in any given position (and may, if he wishes to, make up a chart showing all the tagmemes he has been able to identify—or else a chart showing the tagmemes that occur most frequently). At the same time he may look for the different meanings suggested by a given tagmeme, as for instance by the tagmeme 'subject position filled by noun cluster'. (Because of its initial emphasis on positions for large units, sector analysis has implications for the teaching of reading and writing; but a discussion of such implications would take me beyond the scope of this paper.)

Although each sentence is analyzed as it appears in the text, it has been possible to derive, from the analysis of large numbers of sentences, the pattern of sectors and/or slots that may occur on any level. It is not possible to predict the ordering of levels below the predicated level: from there on down to the morpheme level, an analyst must take the levels as they come. Each level is named after the type of construction which occupies
the entire level; as I suggested earlier, there seem to be only nine or ten different construction-types in English, and therefore only nine or ten different kinds of levels, although, because of the recursiveness to be found in all languages, the same kind of level may appear again and again at greater depths as the analysis of a sentence proceeds. The total 'depth' of a sentence—that is, the total number of levels that one finds in analyzing it—provides some measure of the complexity of the sentence and may indeed be a better index of its 'readability' than is provided by most readability formulas now in common use.

Throughout the analysis, the function of a given construction is determined by its use—by the position which it fills—in a larger construction; the construction is then taken out of the larger construction and is examined by itself, for its own internal form. For this reason a sentence should not really be analyzed alone: its function will depend upon the position which it fills within a sequence of sentences. It is this fact which enables us to distinguish between the first and last utterance in the following conversation between a man named Bill and his wife, who have a son also named Bill:

Bill.
Yes?
Who broke that window?
Bill.

However, in order to simplify the following summary of analytic procedures used in sector analysis, I will limit myself to the discussion of single sentences.

But before I turn to the sentences that appear in Figures 1, 2, and 3, I would like to call attention to one important result of the insistence in sector analysis that the function and the form of any unit be analyzed on separate levels. Inevitably certain items that are merely single words in form, prove to be fillers of positions for constructions. This is true, for instance, of the so-called 'personal pronouns', which are not—with only a few exceptions—substitutes for nouns, but are rather substitutes for nominals. (The exceptions are one and ones, and—in speech—items like thingamajig, whatsis, and you-know-what, as in that red thingamajig on the shelf.) Other substitutes for constructions are words like then and there. Actually, substitutes in English are substitutes for tagmemes, not substitutes for constructions: the substitute for last winter in subject position (as in Last winter
was very cold) is the pronominal it, whereas the substitute for last winter in adverbial position (as in Last winter we went to Florida) is the protemporal-adverbial then. This dichotomy between function and form sometimes results in a single word taking two different kinds of modifiers, one a modifier of itself as a word and the other a modifier of the construction whose position it is filling. The expression just judges is ambiguous for this very reason: the word judges is a noun, and as such it may take an adjective modifier, so that just judges may mean 'judges who are morally right or fair'; on the other hand, the word judges may function alone as the nucleus of a cluster in which there happen to be no modifiers—and thus, as the filler of a cluster position, it may be modified by a construction-modifier like just (meaning 'only'). The difference between the two just's becomes clearer when both are used together as in just just judges. (It may be noted in passing that pronominals like me and you and him, since they are substitutes for constructions rather than for words, are regularly modified by construction-modifiers, as in only me, even you, especially him.)

But to turn now to some sample sentences. The first sentence—in Figure 1—the one beginning with the words just as she was locking up her desk—contains within it all the different construction-types that we have been able to identify so far in English. I should point out, however, that one of these types—that of clusters—has several subtypes: on the third line of the analysis, for example, there appears the cluster just as she was locking up her desk, with a clause as its nucleus modified by the construction-modifier just, while halfway down through the analysis of the sentence there appears both a noun cluster, my partner, and an adjective cluster, rather stupid. Indeed, even the sentence-unit on the second line of the analysis is merely a special type of cluster, a cluster with the trunk as its nucleus modified by a front adverbial. (There might also have been one or more end adverbials following the trunk.) A 'cluster', then, is a construction consisting of a 'nucleus' with (or without) preceding and/or following 'modifiers'. Clusters are the same as Bloomfield's 'endocentric constructions', although his definition is considered inadequate: noun clusters, for example, are not considered as belonging to the same form-class as nouns, nor are noun clusters regarded as necessarily functioning in the same way as their nuclei.

A 'sentence-unit' (like the one on the second line of the analysis) is a unit which could stand alone as a sentence if it had the proper capitalization and end punctuation (or the proper
intonation). It is derived from a 'sentence' as that sentence appears in writing or in speech by removing the initial capital and the end punctuation—or by removing the intonation. (Any sequence signal, interjection, noun of address, or the like appearing in the original sentence is also removed on the sentence level.) A sentence-unit, as I have already said, is a special subtype of cluster: it contains an obligatory 'trunk' as its nucleus, with one or more optional 'front adverbials' preceding it and one or more optional 'end adverbials' following it, as its modifiers. These adverbials can usually be identified by their ability to shift from the front position to the end position or from the end position to the front position, although occasionally some factor such as the complexity of the subject or the time sequence of different elements within the sentence will make such shifting unnatural or even impossible. (But we have found that even fourth graders will regularly shift last winter to end position when changing the statement Last winter they went to Florida to a yes-no question.)

On the sentence-unit level one cuts off the front and end adverbials; what is left is by definition the trunk. In the first sentence-unit appearing in Figure 1, only two sectors have been filled: a front adverbial sector, and the trunk sector. Each of these sectors is filled by a construction; either construction may now be brought down to a lower level and analyzed for its internal form. In Figure 1, the front adverbial is analyzed first—and is found to consist of a cluster, as I have already pointed out. (Clusters are enclosed between large K's, the second K being inverted.) Since the construction-modifier just is a single word, it is not brought down further; however, the nucleus of the cluster—as she was locking up her desk—is brought down to a lower level and is identified as consisting of an included clause, marked by the includer as. (The clause is enclosed between square brackets.) This includer is then cut off, and all the rest of the clause is brought down. An included clause is by definition a sentence-unit to which an includer has been added; the unit she was locking up her desk must therefore be a sentence-unit. On the sentence-unit level we cut off front and end adverbials, to find the trunk; in this instance we find no adverbials—the sentence-unit consists of only a trunk. We can write the trunk over again, on a lower level, or we can do what is done in Figure 1 and merely label the same level 'sentence-unit and trunk'.

A trunk is again a binary unit: it is made up of a 'subject' and a 'predicate'. The subject is defined as that unit around which a 'carrier' shifts to transform a statement into a yes/no question. \[^{13}\]
The carriers are so called because they 'carry' emphatic stress and/or the negator not or n't in emphatic and/or negative trunks: neither emphatic stress nor the negator can occur without some carrier to carry it. The carriers also carry the tense morpheme in predicates; this tense morpheme—or rather, the time-orientation—is symbolized by \( x \), and the position filled by carriers is therefore labeled 'X' and is called 'the x sector', from which carriers get their nickname 'x words'. The X words in English are am, are, is, was, were; will, would; shall, should; can, could; may, might; must; ought; have, has, had, do, does, and did when they are not used as verbs; and sometimes need and dare.) The trunk she was locking up her desk can be transformed into a yes/no question by shifting the X word was around the pronominal she; she is thus identified as the subject of the trunk (and is enclosed in a rectangle in the diagram, as is every nominal). All of the trunk excluding the subject is, by definition, the predicate, which is marked with a wavy arrow above it pointing to the subject about which it makes a predication.

Cutting the X word out of the predicate leaves a predicate-like unit which, however, lacks time-orientation. Such a unit is called a 'predicatid', where the suffix -id is used to signify lack of time-orientation. (A 'clausid' is a nonfinite clause; a 'verbid' is a nonfinite verb form.) Predicatids are recognized as important constructions in English; they are certainly among the most versatile, occurring, as they do, in any of several different sectors, on various levels. More than that, they also serve as models for a large number of the shortened sentences one hears in conversations and reads in advertisements, either as questions or as commands; for example,

- Have a drink?
- Finished your work yet?
- Going home now?
- Feeling tired?
- Come on in.
- Sit up straight.
- Been waiting long?

There is reason for believing that the different kinds of predicatids make up a basic set of constructions in English, constructions which are not obtained merely by means of deletion rules.

There are, of course, predicates in which the tense morpheme is not carried by an X word but is incorporated in the verb itself,
as in the other predicate in the sentence analyzed in Figure 1, saw a woman wearing earrings as large as golf balls walk into his office. Originally such predicates were analyzed differently in sector analysis from predicates containing X words. Now, however, we follow the lead of Ruth Crymes, who—in her study of English substitutes—'assigns the tense morpheme to a pre-predicatid slot, shiftable to V slot when no carrier is required'. Thus every trunk is assumed to contain a predicate, and every predicate is assumed to contain a predicatid. (In diagrams, predicatids are enclosed between braces.)

It is not possible, in the time at my disposal, to describe all the sectors and subsectors—and the shifted positions for the same—that occur on the predicatid and lower levels. Indeed, some of these lower-level positions are still being investigated: earlier formulations of criteria for their identification have been questioned and are currently being reexamined. It is fairly certain, however, that every predicatid contains a sector for a 'verbal' (which may take either a single verbid or one or more auxiliaries plus a verbid); the verbal sector, in turn, is followed by a single sector for an 'object' (marked O in the diagram) and by one or more sectors for 'complements', and by one or more sectors for 'particles' (marked B in the diagram). The object in the predicatid locking up her desk consists of the cluster her desk, made up of the nucleus noun desk preceded by the determiner her (which is marked in the diagram by a bent arrow, to show that no other element—not even another determiner—can precede it within the cluster).

We have now analyzed each construction in the front adverbial, down to the word level, and take up the analysis of the trunk. We again identify the subject by converting the trunk into a yes-no question (did my partner's rather stupid secretary see ... ) and by then finding the other position for the X word (my partner's rather stupid secretary did see ... ). The unit between the two positions for did is the subject. When we bring the subject down to the next level, we see that it consists of a cluster made up of the nucleus secretary preceded by two modifiers, one (my partner's) in the determiner slot, and the other (rather stupid) in an adjectival slot. Each of these modifiers has to be brought down to a lower level. The construction-type manifested by my partner's is unlike any other construction-type in English in that it is signaled by its ending; the 's marks it as being a 'possessive'. (It is interesting to note that the word partner's cannot really be claimed to be an item on the word level at all: the 's fills a slot
on an entirely different level from the level on which the slot filled by the word partner occurs. An even better example would be the word Education's in the Board of Education's decision, in which the 's is obviously added to the cluster the Board of Education, not to the noun Education. The word Education's clearly cannot belong to any form-class or part of speech. Cutting off the possessive ending 's from my partner's, we have left the cluster my partner, which has already been discussed, as has the cluster rather stupid.

The predicate saw a woman ... is analyzed as consisting of the X word did plus the predicatid see a woman ... Only two sectors are filled in this predicatid: the verbal sector and the object sector. When we bring down the object, we see that it consists of the predicatid walk into his office, which makes a predicatid about the subject a woman wearing earrings as large as golf balls. The two together therefore make up a 'clausid' (which is enclosed in the diagram between square brackets across which little lines have been drawn). Within the subject there is another predicatid, wearing earrings as large as golf balls; but this second predicatid does not make a predicatid about the woman—it describes her. We could insert the words who was: a woman who was wearing earrings as large as golf balls. The second predicatid, therefore, is a modifier of the nucleus noun woman and fills a post-nucleus slot in the cluster a woman wearing earrings as large as golf balls. This whole cluster could be replaced by the single pronominal her—but the clausid of which it is the subject would require at least two words as a substitute, the pronominal her and also either the verbid enter or else a pro-predicatid such as do that or do so.

This difference between the use of a predicatid as a modifier and the use of a predicatid to make a predicatid is, of course, exactly that feature of English which underlies the ambiguity to be found in Chomsky's example I found the boy studying in the library ('whose ambiguity of representation', he says, 'could not be demonstrated without bringing transformational criteria to bear'). Perhaps even better examples are those to be found in Figure 2 where the first sentence refers to our finding of a tree which we already knew to have been blown down by the wind, while the second sentence refers to a tree which we were looking for and which we expected to find still standing—but which, when we found it, turned out to have been blown down by the wind. The predicatid blown down by the wind in the second sentence makes a secondary predicatid (about the tree) within the clausid the tree.
blown down by the wind, but at the same time it fills the complement sector within the primary predication found (or did find) the tree blown down by the wind. There is, however, a second kind of clausid that might occur within the primary predication, one which I have not seen described as distinct from the first by transformational grammarians: this is the kind of clausid which fills, not the object and complement sectors, but rather only the object sector, as in the third sentence in Figure 2. Since the object sector may be filled by a clausid—and since the object sector may also hold the subject of an object-complement clausid—it follows that one should be able to make up a sentence with a clausid functioning as the subject of a clausid, the two together filling the object and complement sectors within a primary predication. This is just what one finds in the fourth sentence in Figure 2. (The nonfinite verbid to be may be inserted before the complement a disgrace, although it is often omitted after certain verbs.)

The predicatid in the subject cluster is made up of the verbid wearing plus the object earrings as large as golf balls. This object is a cluster with the nucleus earrings, which is modified by the single postmodifier as large as golf balls. This modifier, in turn, is an adjective cluster with the nucleus large—but large is modified, not by two separate modifiers as and as golf balls, but rather by the single 'discontinuous modifier' as ... as golf balls, in which the first as is a word belonging to the form-class of 'anticipators', whose function is to 'anticipate' a following modifier. (Another such anticipator is too, as in too clever for his own good, which should be compared with very clever: too anticipates a following modifier, very does not.)

The construction as golf balls—like the construction into his office—is a '(prepositional) phrase', made up of a preposition plus its object. (Prepositional phrases are enclosed between angle brackets in the diagram.) Cutting off the preposition in each case leaves the object of the preposition, which is then brought down to the next level and is analyzed for its form, in its own turn. (The object of a prepositional phrase might itself include another phrase, as in the book on the table in the hall.)

I will not attempt to go through the analysis of the sentence in Figure 3. It does not introduce any new constructions or levels; it is presented here only to show how predicatids and clausids may be embedded within each other in an English sentence, in an amazing hierarchy of concatenations. I think the diagram in Figure 3 does what Longacre claims the description of a language
should do: it gives centrality to the linguistic patterns, and
throws those patterns into bold relief. It makes clear, I believe,
the nesting quality of English predications, which Nelson Francis
attempts to show with his Chinese boxes but it does so one
step at a time. And it makes graphic the 'layers of structure'
that Fries discusses in Chapter XII of his Structure of English.
It also shows up— I hope—the potential ambiguity that is inherent
in a language with a word order as fixed as that of English.
Since the constructions in a sentence must be written—or spoken—in a linear sequence, certain constructions are likely to turn up
at the end of a sentence, regardless of the level on which they
occur. But differences in the identification of the level to which
a construction belongs may result in differences in the interpre-
tation of the meaning of the sentence. In the example given here,
for instance, it may be that Mrs. Fox merely wanted the police-
man to perform his duty during the time she was sleeping. In
that case, the included clause while she was trying to sleep would
fill the end position in the clausid beginning with the words the
policeman, and there would be no suggestion that Mr. Fox regu-
larly arranged to have the grass cut while Mrs. Fox was napping.
In my analysis, however, I have made Mr. Fox out to be a cad
by placing the included clause on a much lower level. I think that
this is a more interesting analysis—but I cannot prove that it is
the right one.

NOTES

1 Robert E. Longacre, Grammar Discovery Procedures (The
2 Ibid., pp. 13-14.
3 Ibid., p. 16.
4 Leonard Bloomfield, Language (New York: Henry Holt and
5 Longacre, op. cit., p. 16.
6 Ibid., loc. cit.
7 Robert E. Longacre, 'String Constituent Analysis',
8 Robert L. Allen, The Verb System of Present-Day American
9 See the discussion in Robert L. Allen, 'The Classification
of English Substitute Words', General Linguistics, V (1961), 7-20,
and also—for you know what—Allen Walker Read, 'A Type of Os-

11 Bloomfield, op. cit., p. 195.

12 This term is borrowed from Edward M. Ouchi. Sentence-units were originally called 'non-included clauses'.

13 There is one exception to this rule: middle adverbs like often, already, really, slowly, and the like may shift from their usual position following the X word to a position between the subject and the X word, as in I never have been to Europe. Such middle adverbs, of course, do not form part of the subject, but they can easily be distinguished from the subject by their -ly ending or—in the case of those that do not end in -ly—by their occurrence in a given list.

14 This last example shows that it is not true, as has been claimed by some linguists, that the first auxiliary (that is, the X word) is deleted from predicates used as questions because of the fact that the auxiliaries lack secondary or tertiary stress, and the speaker tends to begin his question with a stressed word. In the question Been waiting long? there is only a week stress on the been—but it is not omitted from the question.

15 Crymes, op. cit., p. 66, n. 1.

16 Compare with this analysis the analysis of the cluster the pioneer's family in Longacre, 'String Constituent Analysis', p. 68, where Longacre segments the pioneer's family into the, pioneer's, and family. His analysis fails to distinguish between the different levels on which the words in this cluster occur.


FIGURE 1.

Sentence:
Just as she was locking up her desk, my partner's rather stupid secretary saw a woman wearing earrings as large as golf balls walk into his office.

Sentence-Unit:
Front Adverbial
just as she was locking up her desk my partner's rather stupid secretary saw a woman wearing earrings as large as golf balls walk into his office

Cluster:
(Included) Clause: just as she was locking up her desk
Sentence-Unit & Trunk:
Predicatid:
Cluster:
Possessive: my partner's
Cluster:
Predicatid:
Cluster:
Discontinuous Modifier:
(Prepositional) Phrase:
Cluster:
Predicatid:
(Prepositional) Phrase:
FIGURE 2. Three Different Uses of Predicatids

As a modifier in a noun cluster:

We found the tree blown down by the wind. (= the tree which, we had heard, had been blown down . . .)

As the predicatid in an O-C clausid:

Object Complement
We found the tree blown down by the wind. (We found the tree we sought—but found it blown down . . .)

As the predicatid in an Obj. clausid:

Object
We heard the tree blown down by the wind.

Compare this Obj. clausid functioning as the subject in an O-C clausid:

Object Complement
I consider Aunt Agnes dancing the twist at her age a disgrace . . .
FIGURE 3. Concatenations

Sentence:
But today Mrs. Fox wanted the policeman to make her husband stop having the grass cut while she was trying to sleep.

Sentence-Unit:

today)Mrs. Fox wanted the policeman to make her husband stop having the grass cut while she was trying to sleep

Trunk: Mrs. Fox wanted the policeman to make her husband stop having the grass cut while she was trying to sleep

Predicate: did { want the policeman to make her husband stop having the grass cut while she was trying to sleep }

Predicateid: { want the policeman to make her husband stop having the grass cut while she was trying to sleep }

Clausid: the policeman to make her husband stop having the grass cut while she was trying to sleep

Predicateid: to make her husband stop having the grass cut while she was trying to sleep

Clausid: her husband stop having the grass cut while she was trying to sleep

Predicateid: stop having the grass cut while she was trying to sleep

Clausid: having the grass cut while she was trying to sleep

Predicateid: the grass cut while she was trying to sleep

Trunk of Clausid: the grass cut

(Included) Clause: [ while she was trying to sleep]

Sentence-Unit & Trunk: [ while she was trying to sleep]

Predicate: was trying to sleep

Predicateid: trying to sleep

Predicateid: to sleep
THE SECTORS OF WRITTEN ARABIC

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It is important to begin any discussion of Arabic by stating clearly what kind of Arabic we are talking about. So, let me explain briefly what the term written Arabic in this paper stands for.

Apart from the Arabic colloquials, or regional dialects, such as Egyptian Arabic, Moroccan Arabic, or Iraqi Arabic, one comes across such labels as 'classical Arabic', 'literary Arabic', 'formal Arabic', and 'written Arabic'. What we are concerned with here is the kind of Arabic which may be designated by any one of these four labels. More precisely, we are concerned with the kind of Arabic that one often reads or writes rather than with the kind of Arabic that one often hears or speaks—hence the preference for the term 'written Arabic'.

The importance of written Arabic is indicated by the position it occupies in the Arabic-speaking countries. It is the language of books and newspapers and, when read, of broadcasting stations, as, for example, in news broadcasts. It is taught in school as a subject, and it is the medium through which other school subjects are taught. It is, therefore, the only language which all educated Arabs have in common. Its structure has been kept intact throughout the centuries, and uniform throughout the Arabic-speaking world, due mainly to the conservative influence of the Qur'an, the Moslems' Holy Book. To quote David Cowan, 'the fundamental grammar of written Arabic has hardly changed at all during the last thirteen centuries.'
In contrast to the relatively large number of studies that have been done on the different Arabic colloquials, no satisfactory description of the structure of written Arabic, utilizing the concepts and techniques of modern structural linguistics, is yet available. All the existing grammars of written Arabic still concentrate on word-classes and the traditional 'parts of speech', with little, if any, attempt at looking at larger constructions which function as single syntactic units filling certain definable positions on the different levels of the grammatical hierarchy of the language.

In the remainder of this paper, I will summarize briefly the results of analyzing the syntax of written Arabic using the methods and techniques of sector analysis as developed by Professor Robert L. Allen of Teachers College, Columbia University. The terminology used here is, therefore, mainly that of Allen. I will discuss the major levels on which an Arabic sentence can be analyzed, and the major positions to be found on each of these levels.

Four top levels of analysis can be identified in an Arabic sentence. These are: (1) the 'sentence level', (2) the 'trunk level', (3) the 'predicate cluster level', and (4) the 'predicate nucleus level'. The positions on each of these levels are called 'sectors'.

The first or sentence level consists of a 'trunk' which may be preceded and/or followed by modifiers called 'front' and 'end sentence adverbials'. These adverbials modify the trunk as a whole and are identified by their potentiality for shifting from the front position to the end position and vice versa. For example:

(1a) fi-ṣ-ṣaifi nadhabu ?ila-š-ša:ṭi?i
(1b) in the summer we go to the beach
(1c) In the summer, we go to the beach.

In the above sentence, the front adverbial sector is occupied by a phrase, one of several construction types to be found in Arabic. As Allen uses it in his sector analysis of English, the term 'phrase' here refers only to a prepositional phrase which consists of a preposition followed by the object of the preposition, which may itself be a single word (or lexeme) or a construction.

The front and end adverbial sectors may be occupied by more than one sentence adverbial, but usually not more than two. In (2) we have both a phrase and an included clause functioning together as sentence adverbials in the front sector.
(2a) \(\textit{fi-š-saifi Cindama: tastaddu-l-hara: ratu naqdhabu \?ila-š-ša:ti?i}\)

(2b) in the summer when intensify the heat we go to the beach

(2c) In the summer, when the heat intensifies, we go to the beach.

So, an included clause is another kind of construction which may function as a sentence adverbial. An included clause consists of an includer (such as \(\text{Cindama:} \) in the above example) followed by a clause which may itself be analyzed separately, as an independent sentence, on the different levels of analysis.

The next or second level is the trunk level which consists of two sectors: the 'subject' sector and the 'predicate' sector. The subject sector may or may not be filled. In (1) and (2), the subject sector is empty. When it is filled, the subject sector is the position for any one of several kinds of nominal constructions, such as noun clusters, personal pronominals and nominal clauses. These constructions function in much the same way as do their counterparts in English, as described by Allen, though they may differ in their internal structure. For instance, most adjectival slots in English noun clusters are prenuclear, while in Arabic noun clusters, they are postnuclear.

The predicate sector, on the other hand, must be filled. In fact, it is the only sector in written Arabic which must be filled. The subject does not always occur before the whole predicate, since some units in the predicate, namely the verbal units, may shift to a position preceding the subject position. This occurs in (3) where the verb \(\text{qarrarat} \) 'decided' precedes the subject \(\text{?al-lajnatu} \) 'the committee'.

(3a) \(\text{qarrarat ?al-lajnatu fiClan ?an tanfad}\)

(3b) decided the committee actually to disband

(3c) The committee actually decided to disband.

The main point in the above example, however, is the adverb \(\text{fiClan} \) 'actually' which fills a predicate adverbial sector on the third or predicate cluster level. This level consists of a predicate nucleus and two predicate adverbial positions or sectors. The first of these two adverbial sectors is the position for what may be called 'middle adverbials', such as the adverb \(\text{fiClan} \) in (3). This sector is, therefore, called the M (or 'middle) sector since it occurs roughly in the middle of the trunk. Middle
adverbials usually occur close to the main verb of the sentence and tend to modify that verb rather than the whole predicate.

The other predicate adverbial sector occurs at the end of the predicate cluster, and is usually occupied by phrases—as in (4)—instead of by single adverbs. Both kinds of predicate adverbials may be dropped without affecting the grammaticality of the sentence in which they occur. However, middle adverbials may be shifted to any one of several shifted M (or M) sectors, while the other predicate adverbials cannot be shifted. The position for these nonshiftable adverbials is, therefore, called the D(or 'droppable') sector.

(4a) qarrarat ?al-lajnatu ?an tanfaḍa baḍa-l-ijtimaːc
(4b) decided the committee to disband after the meeting
(4c) The committee decided to disband after the meeting.

Predicate adverbials cannot be shifted to the beginning of the sentence without changing the meaning of the sentence as a whole. Compare, for example, the sentence in (4) with the following sentence:

(5a) baḍa-l-ijtimaːc qarrarat ?al-lajnatu ?an tanfaḍ
(5b) after the meeting decided the committee to disband
(5c) After the meeting, the committee decided to disband.

When the predicate adverbial after the meeting in (4) is shifted to the beginning of the sentence in (5), it ceases to be a predicate adverbial, and becomes instead a sentence adverbial in the 'F' (or 'front adverbial') sector, modifying the sentence as a whole.

The fourth or predicate nucleus level consists of three sectors: the 'verbal' sector, the 'object' sector, and the 'complement' sector. The last two sectors are quite similar to their counterparts in English, as analyzed by Allen, and, therefore, need no elaboration at this point. I would like, however, to discuss the verbal sector in some detail. It consists of three slots: the 'first auxiliary' slot, the 'second auxiliary' slot, and the 'verb' slot. The first auxiliary (or x1) slot is the position for any one of the group of words traditionally listed as kaːna wa ?axawaːtiha: 'kaːna and its sisters'. The second auxiliary (or x2) slot is the position for such lexemes as the negators laː 'do(es) not', lam 'did not', and lan 'will not', the particle qad, which roughly means 'already', and the future particle sawfa 'will/shall'.
Both first and second auxiliaries are listable lexemes. The verb slot is the position for verb forms.

The verbal sector may have all three slots filled, as in (6), or it may have only a second auxiliary followed by a verb form, as in (7), or just a verb form, as in (8), or just a first auxiliary, as in (9).

(6a) ?al-lajnātu  kā:na nā t qad  cāra ḍat  ?al-iqtira:ha  cāla-l-majlis
(6b) the committee was already presented the proposal to the council
(6c) The committee had already presented the proposal to the council.

(7a) lam ta  cūrid  ?al-lajnātu  ?al-iqtira:ha  cāla-l-majlis
(7b) did not present the committee the proposal to the council
(7c) The committee did not present the proposal to the council.

(8a) cāra ḍat  ?al-lajnātu  ?al-iqtira:ha  cāla-l-majlis
(8b) presented the committee the proposal to the council
(8c) The committee presented the proposal to the council.

(9a) ?al-waladu  kā:na huna:
(9b) the boy was here
(9c) The boy was here.

The verbal units in (7) and (8), however, occupy the shifted verbal sector (or  \( \tilde{V} \) ) which precedes the subject sector. This shifted verbal sector is the position for either a first auxiliary, such as in kā:na ?al-waladu huna: (which has exactly the same meaning as the sentence in (9) above), or a verb form which may or may not be preceded by a second auxiliary, as in (7) and (8), but not for the three verbal units together. That is why this sector, and not the postsubject sector, is considered to be the 'shifted' rather than the 'base' verbal sector. This explanation is necessary in view of the fact that, in the majority of Arabic sentences, the verb occurs before the subject—a fact which might lead, at first glance, to assigning the 'base' verbal sector to the presubject position.

The verbal sector may also be empty, as in the following example:
(10a) ?ahmadu waladun dakiyyun
(10b) Ahmed boy clever
(10c) Ahmed is a clever boy.

In this sentence, however, we should assume the presence of a 'zero' lexeme, meaning is, in the first auxiliary slot. This can be verified by changing this sentence to the past tense, in which case the first auxiliary ka:na 'was' must occur either before or after the subject Ahmed.

I have limited myself in this paper to the major sectors of written Arabic. I have not discussed all the 'shifted' sectors, nor have I mentioned those 'peripheral' sectors which occur on the sentence and trunk levels, as, for example, the sectors for coordinators, such as wa 'and' and 8umma 'then', or for nouns of address. I have also limited myself to the four top levels of analysis, without going into the lower levels on which the different kinds of constructions may be analyzed. To do so would have taken us beyond the scope of this paper.

NOTES


3 For a statement of the premises and procedures of sector analysis, see Robert L. Allen's article 'Sector Analysis: From Sentence to Morpheme in English' which appears in this volume. See also The Verb System of Present-Day American English (The Hague: Mouton & Co., 1966) chapter x; and A Grammar of Written English (Mimeographed edition, 1963), both by the same author.
Third Panel: GRAMMATICAL ANALYSIS

Chairman:
Wallace M. Erwin
Georgetown University

Panelists:
Arthur Bernhart
University of Oklahoma
Stanley N. Werbow
University of Texas
Robert L. Allen
Teachers College, Columbia University
Yehia A. El-Ezabi
U.A.R. Ministry of Education

Discussants:
Robert E. Longacre
University of Buffalo
Neil Bratton
Georgetown University
Berberi
Institute of Modern Languages
Mahmoud-Sini
Georgetown University
Walter A. Cook, S.J.
Georgetown University
Howard W. Law
Hartford Seminary Foundation
Philip E. Miller
Georgetown University
Crawford Feagin
Georgetown University
Robert J. Di Pietro
Georgetown University
George R. Long
LONGACRE: I think that Dr. Allen is using the term 'level' in a different sense than some of the rest of us use it, presumably for different purposes. In terms of a general theory of hierarchy such as I have in a paper read at the UCLA conference of August, 1966, I would not like as many levels as Dr. Allen suggests that we have because this involves a great deal of level skipping. It seems to me that in the kind of hierarchy which some of us have been working on we find more commonly a descending hierarchy (clause within sentence, phrase within clause, word within phrase) and recursive structure (phrase within phrase, clause within clause, sentence within sentence); but if we have as many levels as Dr. Allen suggested, it means that there will be a lot more level skipping.

ALLEN: I think that undoubtedly there is an advantage to using the term 'level' purely and simply for these hierarchies which you have in mind and then showing that you have basic patterns. But at the same time I do think that by doing so you frequently overlook something that may be going on in the language. For example, one of the interesting things in English seems to be a regular alternation between cluster and noncluster as one goes from the sentence level all the way down. I did not mention this because of the fact that I did not go into the predicate cluster versus predicate nucleus levels. There seems to be in English a very definite differentiation between clusters and nonclusters on different levels; and I think that if clusters and nonclusters are treated as being on the same level, this may result in overlooking certain things. You may be simplifying one part of the grammar but overlooking certain things in another part of the grammar.

BERNHART: I would like to agree with both of the last speakers. It seems to me that mathematically one has two quantities here: continuous variation and discrete variation. It seems to me that in spoken language you actually have a whole continuum of possible levels, like real number systems. Thus when one wants to describe it rationally one has to arbitrarily decide, depending upon one's focus and purpose, what levels one picks. So in a sense one is right either to make more levels if one is interested in greater detail or to make fewer if one wants to bring out certain linguistic features.

BRATTON: The notation that Dr. Bernhart suggests is based on a phonemic analysis of a language; and, as you pointed out, this is only relevant to one particular language. Of course, there are other ways of looking at phonemes: as clusters of
distinctive features. It is thought that by talking of features rather than phonemes you have a unit that you can reduce to a universal set and you can then bring together these features in some way by cross-classification. This generalization is missed by having one symbol. I think that this notation suffers from the same deficiency as the theory of phonemic analysis.

BERNHART: What I am trying to suggest is that frequently one has to identify certain things and one attaches labels. This can be done erratically; frequently you are attaching labels before it occurs to you that you ought to have some system to it. My suggestion is that if one starts to introduce a system as part of the label assignment frequently the notation will do some of the thinking for you. For example, in certain cities you can name streets that go north and south as 'streets' and the others as 'avenues' or you can name certain things in alphabetical order, as the order of the suits in bridge: clubs, diamonds, hearts, and spades. Sometimes these are just fortuitous instances, such as the order of some of the books in the New Testament.

BRATTON: I would like to ask a question of Mr. El-Ezabi. Are you considering the person that is contained in the Arabic verb to be a separate sector from the verb?

EL-EZABI: No. As I said, in some cases the subject sector is empty but its message is partly conveyed by the pronominal suffix which is attached to the verb.

ALLEN: Just as the _s_ in English he walks ties with the subject, there is agreement between the verb form and the subject, in a language where the subject slot is vacant the verb form ties with that unexpressed subject.

WERBOW: The question at what level a slot occurs must be taken into consideration.

BERBERI: The Arabic verb never occurs without a subject. The subject is always bound.

EL-EZABI: The explanation is that the agreement or tie between the subject, whether it is present or not, and the verb is obligatory in Arabic. In terms of position the subject is optional.

ALLEN: I think every grammar has a right to its own definitions. If you will define subject as a unit filling a certain position, I think you can say there are many Arabic sentences in which there is no subject.

MAHMOUD SINI: In the Arabic present tense the verb has prefixes, not suffixes; but in the past tense we usually have a suffix to indicate subject. My point is that maybe in the present we could say that the prefixes are not subjects but in the past the
prenominal suffixes could be said to be the subject of the verb. This has been used by all the classical Arabic grammarians.

EL-EZAB: I do not really see any difference between the prefix and the suffix. Why should we consider one of them as the real subject and the other as just an affix? I do not think there is any basis for this. This kind of description recurs in every grammar of written Arabic and the contribution of sector analysis is that it defines positions.

COOK: I have a comment on this matter of levels, picking up Dr. Longacre's suggestion. What we do here at Georgetown actually is break down the five levels which we call the natural units of language, treated in traditional grammar, into geological layers so that the phrase level would have a relational stratum, a coordinate stratum or a multiple head construction, and an endocentric stratum, subordinated. Dr. Allen, would you define cluster for us and could you anticipate for those of us who are studying tagmemics in the orthodox tradition what problems we would have in taking some of these ideas from sector analysis and formulating them in a tagmemic description.

ALLEN: I have thought of the possibility of perhaps speaking of 'layers of structure' instead of 'levels of structure' in order to distinguish the way I use the term 'level' from the way Dr. Longacre uses it. I think that something like 'strata' or 'layers of structure' would be well worthwhile. I do feel that there are intermediate layers within some of the levels; and I feel that these are worth pointing out, especially since we find that you overlook certain patterns, in English at least, if you do not notice these intermediate layers. It may very well be that the best thing to do—certainly in the present climate tagmemicists should stick together—is use two different terms such as 'levels' and 'layers' so that we can get together on this.

How do you define clusters? There is no very satisfactory definition. The trouble is a cluster cannot always be replaced by its nucleus. In a telegram usually it is possible to replace a cluster with only one item: its nucleus. Unfortunately in ordinary speech this is not possible because of the fact that cake is not the same thing as a cake so that you cannot say—and this is one of the things that is wrong with Bloomfield's definition of endocentric construction—that the whole cluster functions in the same way as its nucleus functions. A cluster then has a single nucleus—a single part that is obligatory—whereas these other elements, such as a prepositional phrase and so on, have at least two. This means that any time that you have anything modifying something
else where the modifier can be dropped you have a cluster, so that you have clusters on slots on different levels. I think that one thing we have discovered in sector analysis is several different kinds of modifiers in English which to the best of my knowledge have not been described yet in other grammars. I think that construction modifiers in English are a very important form class; and yet, to the best of my knowledge, Gleason is the only person who has discussed them. But he considers them very limited in their use whereas we find that they modify phrases (just at four o'clock), clauses (just after he'd gone), noun clusters (just those books on the table), and so on.

Undoubtedly any description tends to overlook certain things. Therefore, the more you can bring together from different descriptions, the more things you are likely to find out about all the facts of the language.

This is not so much a criticism of Longacre's analysis, but I think that when you treat the and pioneer's as two different slots, you are overlooking something in the language which you notice if you allow for these extra layers and then show that within them the pioneer's is a unit made up of the pioneer plus the possessive ending. I think that it is very interesting that all English sentences that we have analyzed so far consist of these nine or ten units nested within each other and always just these nine or ten units. The latest one of these we discovered was the discontinuous modifier—and it is amazing how many of these we have in English—and it is amazing that the initial element in every one of the discontinuous modifiers is a signal that the second part is coming. This explains why too is not the same thing as very and why the first as is not the same as the second as in as . . . as.

LAW: I think that the people interested in the problem of the Arabic subject might be interested in looking back at the concept of duplicative parataxis, which was in the earlier literature. If one thinks that the Arabic subject creates problems of this sort, one will quickly flee back to the Arabic subject when one looks at such languages as Nahuatl where we have not only a duplicated subject but a duplicated direct object and a duplicated indirect object. We have to treat this problem on the word level because a single verb can be equivalent, for example, to he hit him or he gave it to her. Each of these elements can then be, if you want, 'emphasized' on the sentence level by separate sentence-level elements duplicating for the word-level elements.

It is true that in much of the instructional material four levels in grammar are commonly talked about: word, phrase, clause,
and sentence. Occasionally the four levels are stem, word, phrase, and clause, with the sentence not referred to. I think of five as being really minimal, if we are going to talk about minimal in this sense: stem, word, phrase, clause, and sentence. I think that a large number of published studies in tagmemics have used the five levels. A paragraph level is usually implied, which adds a sixth; and as many as eight levels have been recognized.

I think that we should remember that 'layers' has been used, particularly in Elson and Pickett, as some type of difference between levels; within levels you have layers. I am wondering if we do not have a difference of emic versus etic levels in some of these cases. Would it be possible that some of the levels of sector analysis could be only etic?

ALLEN: I think not. I agree with Longacre that in immediate constituent analysis you often ended up with units which were not really units in and of themselves; but every one of the units that we find when we divide up any layer, level, or whatever you want to call it, is a construction of the language. And when you bring it down to the next lower level its internal construction is shown to be a construction of the language. As a matter of fact, it is this which enables us to diagram sometimes on a single level sentences taken from different authors to show how they have clustered these things together with each of these units being an emic unit.

LAW: I would like to make a serious proposal to the people connected with the preparing of this conference; it is a proposal for a symposium-workshop on tagmemics in which instead of papers being presented participants get together literally around a table and iron out problems, answer questions, and come to some type of understanding on things which we all agree need working on.

CHAIRMAN: Thank you, Professor Law. I think that is an excellent suggestion.

MILLER: Dr. Werbow, in regard to your taxonomy of spoken German I would agree with you theoretically. I would not say that I am against you on a practical level. In general, when we are working with spoken varieties of language we like to refer to something else. We can describe the dialects per se within themselves; but we want to work them back to something else or compare them because to describe them per se is just to leave them in a vacuum. In English, I do not like to hear people talk about my New England English as being nonstandard nor do I like to
hear it referred to in regard to a standard English; but that is
the way it is done because it is easier that way.

WERBOW: This is of course a well justified comment. It al-
ways helps to refer the unknown to something which is known;
and if it happens to be a historical dialect which is known or a
standard dialect which is known, you get some benefit by refer-
ing to it.

FEAGAN: Dr. Bernhart, you were suggesting the adaptation
of mathematical order in linguistic symbols. Do you not think
that the real problem is the lack of order in our definitions?

BERNHART: It is a curious characteristic that spoken lan-
guage has to be linear; that is, you have to say one word and
then another. But the part of behavior you are trying to describe
may be other than that. Much of what a man is aware of in the
universe about him is because of his eyes. And his eyes, I think,
see a two-dimensional world. When you wish to describe in
utterance something you see you have to go through it something
like the artificial way a television works, where it scans, and
this always introduces a certain arbitrariness.

Mathematics in a sense discusses all possible orderings; and
natural languages have developed, historically, certain ways of
getting this job solved. The requirement to put something in
linear order is to me a necessity; and, if you start using sym-
 bols in written language with subscripts and superscripts, when
you read it orally you have to agree on where to put them.

FEAGAN: Are you suggesting an entirely new approach to
grammar?

BERNHART: I am simply saying that, given the problem, you
are going to have to arrange things in a linear order. There are
certain ways you can solve this. The computer, for example,
cannot accept subscripts and superscripts. It has to introduce
definite linearly arranged labels which will tell the machine what
to do next. A matrix, which is a rectangular array, has to be
linearized, so they usually read them by columns or something
like that. Such devices, which are compulsory when you want to
describe an essentially two-dimensional display in one-dimensional
form, certainly can be solved in certain ways. There are good
ways and bad ways—and there might be several good ways—and it
would seem to me worthy of a mathematical dissertation to ask
what are the possible patternings and which ones of these have al-
ready found realization in the natural languages. I am not trying
to think of something that you have to do now in order to solve an
immediate problem; but since we are both interested in patterning—
and this is the sort of thing that mathematicians ought to be able to do if they worked in consultation with the linguists something significant might come out of it.

ALLEN: Have mathematicians figured out a way yet to build in ambiguity? I think this is one of the most wonderful things about language.

BERNHART: Certain kinds of ambiguity can be built in. Mathematicians have discovered to their great surprise—the discovery is possibly sixty years old or so—that there are two entirely different kinds of mathematics: a mathematics where you speak of the existence of an element of a set without telling a person how to pick it and one in which you actually name it.

There are certain deeply rooted paradoxes in mathematical logic which are apparently due to a difference between adjective and noun. If you use Venn diagrams to represent adjectives and nouns the intersection of red and horse has the property of being a noun but the intersection of two adjectivals leads to a contradiction. Some of the recent books suggest 'set' to correspond closely to the nominal type and 'class' for the other.

DI PIETRO: To go back a moment to the matter of the subject slot, it seems to me that whether you call this an empty slot or a filled slot or whatever there is another problem which is involved here in Arabic as well as in several of the Romance languages: the matter of syntactical linkage. In Italian it seems much easier to expand Pietro corre from corre than from Pietro. I wonder what you would think, Dr. Allen, of calling the verb the center of the construction and the subject the complement.

ALLEN: Frankly when first starting out on sector analysis I spent some time reading all the articles, especially in European linguistics, where you find every shade of opinion. I think the reason I finally ended up with this kind of a description was because of the possibility of indicating the units about which predication is made; in some languages it is about a subject that was expressed in an earlier sentence. It seemed to me that the subject tended to cover a longer stretch than did the predication—for this reason I considered the predication as being added to the subject.

LONG: With regard to your description of Aunt Agnes dancing the twist at her age: if this is to be an object clausid you would have to make a possessive of Aunt Agnes; otherwise, it is a modifier of a noun cluster.

ALLEN: I am sorry to say that you just do not have to. Present-day English and the direction in which English is moving are against that. You find more and more examples of clausids being used rather than of predicatids modified by possessives.
CONCLUDING REMARKS

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1. It seems to me that one very unfortunate tendency among linguists today, both tagemicists and nontagmemicists, is the tendency to equate grammatical meaning, or situational role, with grammatical function. Specification of grammatical function seems to be a necessity in a complete grammatical description; specification of grammatical meaning is properly a part of the semological description.

The Spanish sentences

(1) Le di el libro a mi hermano.
   'I gave my brother the book.'

and

(2) Le quite el libro a mi hermano.
   'I took the book away from my brother.'

both consist of the same sequences of tagmemes: predicate (le di or le quité), direct object (el libro), and indirect object (a mi hermano). But although both of these occurrences of a mi hermano manifest the same tagmeme, their sememic relations with the other tagmemes are different: in (1) the indirect object shows the recipient of the direct object and in (2) the same tagmeme signals the one who parts with the direct object.
In the following English sentences:

(3) John told the doctor to examine Bill.
(4) John told the doctor that Bill was sick.
(5) John told the doctor an interesting story.

one and the same tagmeme, 'direct object', is manifested by (3) to examine Bill, (4) that Bill was sick, and (5) an interesting story. Also in

(6) John persuaded the doctor to examine Bill.

the same tagmemes are manifested as in (3), (4), and (5) above, although different allotagmas and direct objects are involved as is evidenced by the fact that *John persuaded the doctor an interesting story is not an English sentence.

Although in (3) and (6) the indirect object (the doctor) has the semological relation of actor or agent to the predicate (to examine) of the backlooping sentence functioning as direct object, there is no more reason to expect the grammar to specify this situational role than in the case of the different meanings signalled by indirect object in Spanish sentences (1) and (2) above. It is true that we normally choose a label for a tagmeme which refers to a situational role which frequently corresponds to manifestations of that tagmeme. And there seems to be no reason to abandon this practice.

If there is a one-to-one correlation between function and tagmeme—and this seems to be the case—why do we need the term 'tagmeme'? One answer is that tagmeme is used to refer simultaneously to a function and the class of items which manifest that function; but perhaps the main reason is that the theoretical constructs of linguistics which have combinatory variants have names ending in the suffix -erne with the prefix allo- used for the variants.

2. It is unfortunate that some still work under the assumption that the object of a sentence somehow forms a predicate unit with the verb. Some insist that, in English at least, almost all sentences can be analyzed as subject and predicate. This is a very questionable virtue since an all-inclusive system of classification, one which even shows things which are different to be sames, is a meaningless system. Neither is it valid to argue that, because some verbs do not cooccur with objects, those verbs which do in some way contain the object. In Spanish there are certain sentence
constructions in which there is no possible filler of a subject slot; but it does not follow that in those sentence constructions in which a subject occurs, the subject forms a predicate unit with the verb to the exclusion of the other sentence-level elements.

It is very interesting to observe that in English do it may be used as an anaphoric substitute for a sequence of tagmemes, such as a predicate (verb or verb phrase) and a direct object. From this possibility of multiple-tagmeme anaphoric substitution it does not follow that such a tagmeme sequence constitutes a unit in the absence of anaphora. English it happen -to can be used as a substitute for a sequence of tagmemes including subject and predicate, as in the sequence of sentences

The dean called John to his office yesterday.
It happened to Paul last week.

in which It happened to Paul last week stands for The dean called Paul to his office last week and the direct object is particularly not included in the anaphoric substitution. We must recognize the possibility of any sequence of tagmemes being united in anaphora without adopting the unwarranted assumption that such substitution possibilities have additional implications.

3. The term 'syntagmeme' has been the subject of some controversy. If syntagmeme simply means 'construction', then is the new term necessary? The usefulness of the term 'syntagmeme' seems to depend on our finding variants of constructions (allosyntagmas).

Allotagmatic cooccurrence restrictions can be handled easily in terms of allosyntagmas. In the sentences

(a) John told Paul a lie.
(b) John persuaded Paul to go home.

different allotagmas of bitransitive predicate and direct object are manifested. For, although it is possible to say John told Paul to go home, it is not grammatical to say *John persuaded Paul a lie—even though, if it were grammatical, there would be no reason that the latter sentence could not mean 'John made Paul believe a lie' in the same way that John persuaded Paul that he was sick can be paraphrased John made Paul believe that he was sick. On the other hand, John speaks French with no trace of a foreign accent and John speaks with no trace of a foreign accent several
important languages would not represent different allosyntagmas because the manifestations of different allotagmas of direct object (French and several important languages) are apparently dependent only upon their own internal structure.
APPENDIX I

LIST OF REGISTRANTS

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