TRANSFORMATIONS AND DISCOURSE ANALYSIS PAPERS

University of Pennsylvania

80.   Tense, Aspect, and Conjunction:

           Some Inter-relations for English

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I. Introduction

A. Framework and context of the study

During the present stage of inquiry in transformational grammar an increasing number of linguists are finding it necessary to undertake detailed descriptive studies in order to test certain proposed generative grammars and to suggest the types of revision necessary when the rules of these grammars fail to account for regularities of structure.

The partial study of English structure presented here is an attempt to contribute to the description of verb tense and the other features of grammatical structure which seem to be most closely related to tense, among them conjunctions of time (e.g., before, until), operators on verbs (e.g., begin Ving), and adverbial expressions of time (e.g., at 6 p.m., for three hours). Since these tense-related phenomena interact ultimately with a great many features of a formalized grammar, the description cannot be neatly presented nor can it be complete. But by considering the problem of co-occurrence in the environment of certain time conjunctions, the contributions of individual elements in the structural description can be made clearer. These co-occurrence data are particularly useful in determining the order of transformational operations in a generative theory of sentence structure.

The organization of the following chapters is closely related to the chronology of the investigation. The initial aim was to specify as compactly as possible the structural form of two sentences S_1, S_2 conjoinable by one of the subordinating time conjunctions C_t (i.e., before, after, until, while, as, when, and the anomalous since). Using the framework of a transformational system of operators described in the next section, it was possible to show that a primary condition for conjoinability by a C_t is that both S_1 and S_2 have the same tense morpheme (past, present, or future) for their main verbs. In order to support this claim it is necessary to show how in some cases the trace of sentence operators or zeroings on the conjoined $S_1 C_t S_2$ has obscured the existing tense conformity (see chapter II for details).

In addition to the tense restriction there is a complex set of additional restrictions illustrated by the following set of possible and impossible $S_1 C_t S_2$:

John left before Mary arrived.
*John left before Mary didn't arrive.
Fred ran until he reached the road.
*Fred started running until he reached the road.
*The bomb exploded until the police arrived.
John shook the rug until it was clean.
*John shook out the rug until it was clean.

Normally, the expression of these restrictions in terms of existing transformational constructs (e.g., word classes and operators) would be lengthy and relatively unrevealing. It turns out, however,

that by introducing a construct called aspect[1] which can be defined tentatively in terms of co-occurrences of certain structures of the type for three hours, at 6 p.m., the description of these conjoined sentences is considerably simplified. Chapter III deals with this construct and its use in specifying the occurrences of sentences with C_t. Chapter IV illustrates how verb operators affect the aspect of the resultant verbal phrases, and chapter V likewise compares the effect of certain prepositional occurrences viewed as operators. Chapter VI adds more detail to the consideration of adverb-like phrases in conjoined sentences with the resulting conjecture for $S_1 C_t S_2$ as "adverb-sharing" constructions. Some residual problems involved in specifying the co-occurring S_1, S_2 in $S_1 C_t S_2$ sentences consist largely of stating the occurrences of t(be) Ving and t(have) Ven. Some of these problems are discussed in chapter VII. Finally, the string properties of S_1, S_2 are important in the treatment of performatives (questions and imperative constructions) (chapter VIII) and in the general problem of ordering of transformations (chapter IX).

The result of these individual sections is a small set of conditions necessary for the acceptable conjunction of two sentences by a C_t. Although the form of these conditions is immediately applicable to the formulation of an operator system which characterizes language such as Harris' system,[2] the data are relevant for any English grammar.

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[1] The term has been used for English before (e.g., by Martin Joos).

[2] Zellig S. Harris, Mathematical Structures of Language (New York: John Wiley, 1968), Interscience Tracts No. 21.

B. Goals and methodology

The main problem of syntactic description is to show which strings of morphs co-occur as sentences of normal acceptability[3] and what changes in individual morphs bring about systematic reductions in acceptability. In practice a number of rules and sub-categories are used as constructs so that revealing formalizations may be carried out. For the problem of time expressions[4] the descriptive question can be taken as follows: which selections from the morpheme classes called verb, tense, auxiliary, adverb of time, and time conjunction can co-occur in acceptable sentences and how can the description be simplified by modifying the sub-categorization of morphemes and morpheme strings or by taking new constructs (e.g., transformations or similar relations between sentences).

Although grammatical transformations have been used to simplify the description problem (and in fact make description theoretically possible), the choice of transformational rules is particularly complex and unclear for verbal strings. For this reason, the description of time expressions presented here will avoid using more than the established operators. Thus the choice of operators for tense and aspect

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[3]For a discussion of acceptability and transformation as well as the factorization of transformations into operators see Harris, op. cit., in particular pp. 51-84.

[4]For the term time expression and a general discussion of tense and time in English, see Otto Jespersen, Essentials of English Grammar, (republished by University of Alabama Press, 1964).

representation is largely left open.

The approach to linguistic material taken by this study assumes the methods and many of the results of Harris as presented in <u>Mathematical</u> <u>Structures</u> <u>of</u> <u>Language</u>[5]. In particular it assumes that there is an abstract system capable of characterizing the set of sentences of a language and that each sentence (or rather each paraphrastic reading of each sentence) is characterizable as a sequence of operations on a finite elementary set of assertions. In an important sense this work is an attempt to add linguistic detail to this system in such a way that a decision can be made as to the most efficient way of representing verbal constructions.

The form of the data for this investigation will be the relative acceptability of sentences containing certain time expressions. In addition to asking, for example, whether <u>John began reading the book until Mary returned</u> is or is not an acceptable sentence of English, we will also often ask whether <u>John read the book until Mary returned</u> is more acceptable. In many cases speakers react with sufficient uniformity so that we may mark the sentence with *
(non-occurring) , with ? (normal only in unusual environment), or with ✓ or ∃ or no mark (for normal acceptability). For a range of reactions, the limits of the range are juxtaposed (?* for questionable to unacceptable, (?) for normal to questionable).

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[5]Harris, op. cit.

In addition, considerable use will be made of the paraphrases of
a given sentence in determining the distribution and class member-
ship of various structures. The use of paraphrase in grammatical
studies has been treated in detail elsewhere.[6]

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[6]Henry Hiż, "Congrammaticality, Batteries of Transformations,
and Grammatical Categories" in Proceedings Symposium in Applied
Mathematics (American Mathematical Society, 1961) XII., and
"The Role of Paraphrase in Grammar" in Monograph Series on
Language and Linguistics (Washington, D.C.: Georgetown University)
XVII.

II.   The Single Tense Hypothesis

A.   The Hypothesis Stated

Let C_t be a member of the class of subordinating time conjunctions which contains at least the members before, after, until, while, as, and when (also, marginally, since). Let past be the name of the verb suffix morpheme which acts as a classifier[1] of all expressions like in the past, yesterday, one day last week, etc. Let present be the name of the verb suffix morpheme which acts as a classifier of all expressions like at present, now, at the moment, etc. Let future be the name of the morpheme which appears before the verb and acts as a classifier of all expressions such as in the future, next year, in three hours, etc. The future morpheme can be described as containing one phonetically zero form. Let tense be the name of the morpheme class containing exactly the past, present, and future morphemes. Then if $S_1 C_t S_2$ is an acceptable sentence of English and S_1 and S_2 both have the form of sentences, then the main verbs of S_1 and S_2 occur with the same tense morphemes.

When S_1 has a future morpheme and the form of S_2 is such that the tense morpheme is ambiguously present or zero-future, it can be shown that the sentence S_2 contains a zero future tense morph which is recoverable (for the purposes of description) on

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[1]This view of tense-affixes as classifiers of particular sentence operators is discussed in Harris, op. cit., p. 174.

the basis of the C_t and the tense morpheme in S_1. The traces of the verb operators t(have)...-en and t(be)...-ing are not classified here as tense forms but are shown rather to be partly conditioned by the particular C_t as well as the particular operand verb. In some cases (e.g., the had...-en form) this conditioning may take the form of co-occurrence with a zeroed C_t. In such cases the recovery of the C_t may be accompanied by the elimination of the operator, leading toward a regularization of the text in which the $S_1 C_t S_2$ appears.

B. The Tense Pattern of Acceptable $S_1 C_t S_2$

Support for the hypothesis stated in the preceding section comes from several sources: consideration of existing tense combinations in $S_1 C_t S_2$ from a large sample, consideration of various nominalized forms for paraphrases of $S_1 C_t S_2$, and the interpretability of the phonetic reduction of the second occurrence of the future tense morpheme in sentences conjoined by C_t.

The analysis of occurring tense pairs was carried out using representative test sentences in each of twelve "tense forms"[2]

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[2] Let us use the term tense (see p. 2) for the name of a class of morphemes whose necessity is dictated by the form of the transformational description. In particular, the existance of adverbial phrases like in the future, tomorrow parallel to in the past, yesterday make it desirable to take future as a morpheme of the same status as past despite its unusual allomorphic distribution.

listed by traditional grammarians [3] (e.g., eat: present perfect -

have eaten, etc.). Passive forms have been omitted since they

do not seem to add anything to the analysis. For each of the C_t

an evaluation of the acceptability has been reached for each of the

$12 \times 12 = 144$ tense form combinations. Seven charts (pp. 23-29)

give the results for each of the seven C_t under consideration here [4].

It is striking to note that only a small percentage of the combinatorial

possibilities have an occurrence as an acceptable sentence. The

choice of other test sentences does not raise this percentage or change

its distribution significantly.

As might be expected, the "logically inconsistent" combinations

(e.g., John will leave before he ate breakfast) are rated as non-

occurring (with exceptions which prove to result from the trace of

a subsequent sentence operator on a regular form -- see section VII.

A.). But the significant fact is that many logically consistent com-

binations do not occur where the verb of one S has a "past", "past

perfect", "past progressive", or "past perfect progressive" tense

form and the other S has a verbal construction in one of the corres-

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[3] See Jespersen, op. cit., for example.

[4] Other C_t such as now that were omitted because of tense dissimi-
larities and different transformational behavior generally.

ponding future or present tense forms. For example, we do not

have the logically consistent *John ate breakfast before he will leave

or *John ate breakfast before he is leaving or *John ate breakfast

before he leaves. As it turns out, with the recovery of the zeroed

future tense morpheme in the "present used as future" phenomenon

described below, tense forms of S_1 and S_2 never differ by more

than the operators have ... -en, be ... -ing. It is this fact that

makes the single tense hypothesis possible.

Temporal since[5] exhibits a deviation from this rule. If it were

not for the highly restricted occurrence of since, this would be a

serious threat to the hypothesis. The fact that (temporal) since

does not occur with future tense forms in contrast to the other C_t

suggests that the transformational behavior of since is anomalous.

In fact, in the vast majority of cases, since seems to occur with

the "present perfect" (i.e., have ... -en) form in S_1 and the "past"

form for S_2. Sections III.C.3. and VII.A. present additional

detail on the properties of since.

We may make a preliminary check at this point to see whether

the acceptability of highly deviant sentences can be improved by

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[5]Temporal since can be distinguished from causal since, often
a synonym of because, by the fact that the latter does not have
S_1 since $(S_2)_n$ as a paraphrase of S_1 since S_2. Here, as throughout
the remaining discussion, the subscripted $(S)_n$ stands for the nomin-
alization of the sentence S (e.g., when S is John drank milk, $(S)_n$ is
John's drinking of milk).

"adjusting" the tenses so that they conform. Consider the following

pairs of deviant sentences:

> * John bought a bottle of wine before five is a positive integer.
> ? John bought a bottle of wine before five was a positive integer.

> * Cats love fish until the bomb exploded.
> ? Cats loved fish until the bomb exploded.

It turns out that the acceptability of the sentence in which the tenses

of S_1 and S_2 are the same is in general no less than (and often is

greater than) the acceptability of the corresponding sentence in

which the tenses differ.

C. Support for the Tense Hypothesis

In order to test the tense hypothesis by using the charts on

pp.23-29, the proper correlation between tense forms and tenses

must be made. On each axis, the first four tense forms contain the

future tense morph <u>will</u> explicitly and hence each resulting S_i (i=1,2)

contains a future tense morpheme. The fifth through eighth forms

are given in the form of present tense and hence in the conjoined

sentence for which the acceptability decision is made, the occurrence

may be as the zero form of a future tense morpheme (cf. <u>comes</u> in

<u>John will eat before Mary comes</u>) as can be confirmed by testing

certain paraphrases or questions for appropriate response (e. g., <u>When</u>

<u>will Mary come ?</u>) or some such device. The present tense morpheme

is present if the addition of some classified adverb(e. g., <u>now</u>) is

acceptable or appropriate. The last four forms on each axis of each

chart represent verb phrases containing the past tense morpheme which is expressed explicitly and uniquely for each verb.

By using the charts given here and constructing similar ones for other test sentences it is possible to verify with increasing confidence the proposed hypothesis about conformity of tense morphemes. In actual practice this comes about by showing how the occasional sentences which deviate from this pattern can be differentiated structurally from other $S_1 C_t S_2$ sentences on the grounds of a phonemic stress on some segment or by a paraphrase which reveals that a zeroable sentence operator acts on the resultant of the C_t operation. For example, on p. 25 we have the deviant John has waited until Mary arrived which is read with stress on has and is paraphrasable by It has on occasion happened that John waited until Mary arrived. There are grounds, therefore, for saying that the sentence $S_1 C_t S_2$ is actually John waited until Mary arrived (which fits the tense hypothesis) and that has plus stress is the resultant of zeroing of the operator it has (on occasion) happened that. In general, the deviant sentences are few and seem to require some disruption of the normal unstressed sentence pattern.[6]

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[6] This suggests that normal sentence intonation may be the resultant of an operation following a single tense operation and that conjoined sentences with because, and, but, etc. may differ in their intonation patterns because of the possibility of carrying two tense morphemes independently.

The absence of any $S_1 C_t S_2$ which contain two obviously differing tense morphemes for the main verbs of S_1 and S_2 respectively constitutes the first indication that there is a conformity or dependency between the tense morphemes. Additional confirmation for this view comes from considering paraphrases of $S_1 C_t S_2$ which have one or both of the S replaced by the corresponding S_n. In particular, each of the C_t under consideration has a corresponding P_t (for most C_t, P_t has the same form as C_t, but the P_t for <u>while</u> is <u>during</u>) such that $S_1 P_t (S_2)_n$, $(S_1)_n V_c C_t S_2$, and $(S_1)_n V_c P_t (S_2)_n$ are all paraphrases of $S_1 C_t S_2$. The new V_c brought in with two of the paraphrases is one of a small class of container verbs (e.g., <u>occur</u>) or a replacer such as t(<u>be</u>). Because a nominalized sentence cannot carry a tense morpheme two of the nominalizing paraphrase forms have only one verb which can carry the tense morpheme(s) of the $S_1 C_t S_2$ form. If there were fewer paraphrastic readings of the nominalized forms with one verb than of the full $S_1 C_t S_2$ forms with two verbs, then this might be an indication that the two tense morphemes of $S_1 C_t S_2$ are independent. This does not seem to be the case. There do not seem to be any $S_1 C_t S_2$ forms which are not paraphrasable by one of the nominalized forms using one finite verb. Let us illustrate this with one example for each of the seven C_t:

(1) John left before Mary arrived.
   John left before Mary's arrival.
   John's leaving occurred before Mary arrived.
   John's leaving occurred before Mary's arrival.

(2) Max will eat dinner after the sun has set.
Max will eat dinner after the sun's having set.
Max's eating of dinner will be after the sun has set.
Max's eating of dinner will be after the sun's having set.

(3) John watched the ship until it disappeared.
John watched the ship until its disappearance.
John's watching of the ship continued until it disappeared.[7]
John's watching of the ship continued until its disappearance.

(4) John has been chewing gum since he returned from Mexico.
John had been chewing gum since his return from Mexico.
John's chewing of gum has been going on since he returned
from Mexico.
John's chewing of gum has been going on since his return
from Mexico.

(5) He will wait while you retrieve the ball.
He will wait during your retrieving of the ball.
His waiting will $\left\{ \begin{matrix} \text{occur} \\ \text{continue} \end{matrix} \right\}$ while you retrieve the ball.
His waiting will $\left\{ \begin{matrix} \text{occur} \\ \text{continue} \end{matrix} \right\}$ during your retrieving of the ball.

(6) I saw the fire as I was leaving.
I saw the fire upon my leaving.
My seeing of the fire was as I was leaving.
My seeing of the fire was upon my leaving.

(7) Fido came when Sam called him.
Fido came $\left\{ \begin{matrix} \text{at} \\ \text{upon} \end{matrix} \right\}$ Sam's calling him.
Fido's coming occurred when Sam called him.
Fido's coming occurred $\left\{ \begin{matrix} \text{at} \\ \text{upon} \end{matrix} \right\}$ Sam's calling him.

The fact that nominalizations preserve the essential meaning

preserved in any paraphrase while obliterating tenses (and perhaps

shifting the tenses to other carriers) indicates strongly that only one

tense specification is really necessary in a sentence with a C_t. It is also interesting to note that in many cases the operator traces of t(have)... -en and t(be)... -ing remain in the nominalization after the past, present, or future tense morpheme has been zeroed or shifted to another carrier.

A third kind of support for the single tense hypothesis comes from a closer look at the reduction of repeated future tense morpheme in S_2. To show that, for example, John will eat before Mary comes actually does contain a phonetically zeroed future tense morpheme in S_2, we have argued on the basis of appropriate tests of consequences or paraphrases. Consider now the paraphrases with nominalizations for sentences (2) and (5) above. Certainly if S_1(future)$C_t S_2$(present) and S_1(future) $C_t S_2$(future) both existed and had different meanings, there would be an ambiguity in the corresponding paraphrases where the S_2 is nominalized. This does not seem to occur, i.e., from the nominalized form one normally uses the present form for S_2 in giving the full paraphrase for sentences like (2) and (5). Moreover, there does not seem to be any difference in meaning (in terms of paraphrases given by native speakers) for the form with two future forms to the extent that it is accepted.

If the occurrence of present form in S_2 following future form in S_1 actually is the resultant of a zeroing operation on the phonetic

content of a future tense morpheme, why then is the unzeroed

S_1(future)$C_t S_2$(future) usually less acceptable ? The situation

seems somewhat analogous to that of pronouning:

? The man in the gray hat returned home before the man in the
    gray hat went out to the party.

   The man in the gray hat returned home before he went out to
   the party.

? John will eat before Mary will arrive.

   John will eat before Mary arrives.

It seems that tense-zeroing, like pronouning, is virtually obligatory when

it is recoverable[8] on the basis of the environment and when the

resulting sentence is shorter. It is significant that for cases where

the predicate construction is the same for S_2 as for S_1, the unzeroed

form seems as good as the zeroed. They are also paraphrases:

   John will see that film before you will see that film.
   John will see that film before you will.
   John will see that film before you do.

For the last sentence with zeroing of future tense morpheme, the

zeroed form does not give a resultant shorter than the partially zeroed form

since the insertion of <u>do</u> is automatic for sentential S_2. The fact that

there should be a difference in the acceptabilities of the forms which

is dependent on only the identity of the predicates indicates that the

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[8]For a discussion of recoverability see Harris, op. cit., p. 67.

difference between the forms is only phonetic.

D. Patterns in the occurrences of some tense forms

Some general statements can be made after a survey of the data on tense form pairs. Aside from the conformity of tense described above, the occurrence of the t(be)...-ing and the t(have)...-en operators seems to be limited by some general restrictions:

1. The operator t(be)...-ing does not occur in S_2 following before, after, until, or since.

For the large majority of examples, this statement holds. Certainly, we do not have:

* John left before Mary was arriving.
* They watched the ship until it was disappearing.
* He'll call them after they are returning.
* He hadn't seen his brother since he was getting married.

It is necessary, however, to describe two kinds of exceptions to this statement. First, there are cases where t(be)...-ing is a replacer for t(begin)...-ing or some similar operator:

John kept playing poker until he was winning.
(cf.: John kept playing poker until he began winning.)

Sam was practicing law before Max was practicing medicine.
(cf.: Sam was practicing law before Max began practicing medicine.)

A second kind of exceptional occurrence of this operator is more difficult to resolve:

(?) John didn't come until the party was breaking up.
    I haven't seen Jack since (the time) we were fishing in Canada.

These are definitely unusual occurrences of the $t(\underline{be})\ldots\underline{-ing}$

operator and such paraphrases as the following are usually preferred:

> John didn't come until after the party started breaking up.
> By the time John came the party was already breaking up.

> I haven't seen Jack since (the time) we went fishing in Canada.
> The last time I saw Jack was when we were fishing in Canada.

In general the restriction (1.) above characterizes the vast bulk of

normally acceptable $S_1 C_t S_2$.

> 2. The operator $\underline{be}\ldots\underline{-ing}$ with present tense morpheme does not occur in S_1 preceding $\underline{before}$, $\underline{after}$, $\underline{until}$, $\underline{since}$, and $\underline{when}$.

In particular a good test frame is as reply to the question

What's going on? or What is he doing? . The following responses

are inappropriate because of the combination of tense morphemes

and/or because of the use of the present tense morpheme with the

operator $\underline{be}\ldots\underline{-ing}$ in S_1 :

> *Jack is reading the instructions before he is swallowing the medicine.
> *She is crying after he left.
> *She is watching the film until it finishes.
> *They are using our swimming pool since the summer began.
> ?*He is telling jokes when we are all sleepy.

When some C_t has a function also as a C_o or causal C_s (with

differing environment, of course) it is often the case that the

appearance of the conjunction in violation of a restriction for C_t

such as (1.) or (2.) above forces the interpretation as a C_o or C_s.

For example, <u>I am eating your ice cream since John came in</u>

must be understood with <u>since</u>≈<u>because</u> even though the causal

connection may not be clear. Temporal <u>since</u> simply does not

occur with this distribution of tenses and operators. For the more

difficult separation of <u>while</u> see section III. C. 4.

3. The operator <u>have</u>... -<u>en</u> with present tense morpheme does

not occur in S_2 following <u>before</u>, <u>after</u>, <u>until</u>, <u>since</u>, <u>as</u>, and <u>while</u>.

Although present tense form occurs frequently in S_2 with <u>have</u>... -<u>en</u>,

this can always be shown to be the reduced (i.e., zeroed) form of the

future tense morpheme. Occasionally there may occur such forms

as:

> ? I've seen John before you have.
> ? I've met Mary before I've met John.

Normally, however, these sentences are less acceptable than the

corresponding sentences with past tense.

4. The operator <u>have</u>... -<u>en</u> with present tense morpheme does
   not occur in S_1 preceding <u>before</u>, <u>after</u>, <u>until</u>, <u>while</u>, <u>as</u>, and
   <u>when</u>.

It is not always easy to distinguish cases of <u>have</u>... -<u>en</u> which

have been introduced as the trace of an operation on $S_1 C_t S_2$ (and

hence do not belong to the S_1 -- see section C above) from cases

which are properly resultants of the operation on the S_1 alone.

Sentences like <u>She has listened to that record until She is (was) blue in</u>

<u>the face</u> might be paraphrasable by <u>It has occurred that she listened</u>

to that <u>record until she was blue in the face</u> which is then a sentence

operator on a regular $S_1C_tS_2$ or, with a different reading, by

<u>She has listened to that record so much that now she is blue in the</u>

<u>face</u> . In the latter case, that is with the latter paraphrase as its

reading, the form with <u>until</u> violates condition (4.) above, although

the marginal acceptability seems to indicate that this is an extension

of a more restricted general rule.[9]

E. Restrictions viewed as co-occurrence restrictions on C_t

Several additional comments can be made at this point about

the distribution of operators in the environment of the C_t. In the next

chapter each C_t is treated in detail with regard to these restrictions

and the notion of <u>aspect</u> is used to simplify this description.

Although the description of what C_t and what tense forms

appear in the same $S_1C_tS_2$ constructions can be made directly only

by stating what co-occurrences are actually found, the indirect kind

of description made in terms of sequences of operators gives a view

of sentences as being 'generated' or 'decomposed' from other sentences.

Taking the view of sentences being the resultants of processes on

other sentences, we may choose to represent the $S_1C_tS_2$ sentences

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[9]For a description of how deviant sentences (and language change)
may result from extensions of domains and operations see Harris, op.
cit., particularly p. 198 and p. 215.

as resultants of a binary φ_{C_t} operation on a specified domain of sentence pairs, or, alternately, as a kind of unary operation on S_1 which brings in a restricted kind of $C_t S_2$.[10] For the immediate purposes of description it is convenient to consider φ_{C_t} as a binary operation which may be followed (i.e., operated on) by a φ_S which adjoins adverbs of time, and hence tense morphemes to the $S_1 C_t S_2$ at specified points. Thus the problem of specifying what S_1, S_2 can be C_t-conjoined is the problem of specifying the domain of a binary operation in terms of traces of preceding operators. A more complete discussion of some of the alternative formulations is given in chapter X.

The occurrence of the present tense morpheme with $S_1 C_t S_2$ sentences can be classified as either general present tense (e.g., John (usually) eats two eggs before he goes to school) or now-present (e.g., John is eating an egg (at this moment)). It is interesting to note that for those C_t which function as inequalities (e.g., March came before April did, , Winter will come after summer does , Autumn will last until winter begins), the now-present is not used:

  *I am digging this hole (now) before I am planting this tree (now).
  *He is reading (now) until he is getting sleepy (at this moment).

In terms of the sequence of operators which represent sentence differences, we would say that adverbs like usually are brought in

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[10] See Harris, op. cit. , p. 104.

by φ_S which operate on all φ_{C_t} (not the marginal since). On the other hand, the φ_S which bring in at this moment, now, currently, and others do not operate on before, until, and after viewed as φ_{C_t} operators.

F. Some consequences of the single tense hypothesis

For those C_t which do not occur with adverbs of the now-present, namely at least before, after, until (if not all C_t except while), any occurrence of present tense morpheme in sentences with C_t-conjunction must be derivable from either S inside the operand of a φ_S operator verb with non-present morpheme or from some operator applied to the resultant of φ_{C_t} and hence adjoined to S_1. Of course, as already mentioned, the zeroing of future will leaves apparent present form in S_2. In particular, performative verbs in present tense (e. g. , ask, command) cannot appear in S_1, S_2 themselves, but only as part of sentence operators applied to strings which result from C_t-conjunction.

As outlined in the previous section, it becomes possible to view the tense operation as subsequent to the time-conjunction operation and hence to consider independently the traces of certain verb operators which, like be... -ing and have... -ing , which have traditionally confused the description of tense.

BEFORE / John	Mary	will have been coming	will be coming	will come	will have come	has been coming	is coming	comes	has come	had been coming	was coming	came	had come
will have been eating		*	*	?	?	#	#	✓f	✓f	#	#	#	#
will be eating		*	*	?	?	#	#	✓f	✓f	#	#	#	#
will eat		*	*	?	?	#	#	✓f	✓f	#	#	#	#
will have eaten		*	*	?	?	#	#	✓f	✓f	#	#	#	#
has been eating		*	*	*	*	*	*	*	*	#	#	#	#
is eating		*	*	*	*	*	*	✓f	?	#	#	#	#
eats		*	*	*	*	*	*	✓g	✓g	#	#	#	#
has eaten		*	*	*	*	*	*	✓h	✓h	#	#	#	#
had been eating		*	*	*	*	*	*	*	*	*	*	✓	✓
was eating		*	*	*	*	*	*	*	*	*	*	✓	?
ate		*	*	*	*	*	*	*	*	*	*	✓	✓?
had eaten		*	*	*	*	*	*	*	*	*	*	✓	✓

fContains zero future tense morpheme(s).

gIn general tense usage (e.g., with adverb usually, etc.)

hIn usage with sentence operator of occasional occurrence (e.g., It has happened on occasion that $S_1 C_t S_2$).

He ... here to live. \ AFTER (Troops ... the village.)	will have been destroying	will be destroying	will destroy	will have destroyed	have been destroying	are destroying	destroy	have destroyed	had been destroying	were destroying	destroyed	had destroyed
will have been coming	*	*	*	*	*	*	*	*	*	*	*	*
will be coming	*	*	?	?	*	*	✓^c	✓^c	*	*	*	*
will come	*	*	?	?	?	*	✓	✓	*	*	*	*
will have come	*	*	?	?	*	*	✓	✓	*	*	*	*
has been coming	#	#	#	#	*	*	?^h	?^h	*	*	*	*
is coming	#	#	?^f	?^f	*	*	✓^f	✓^f	*	*	*	*
comes	#	#	#	#	*	*	✓^g	✓^g	*	*	*	*
has come	#	#	#	#	*	*	✓^h	✓^h	*	*	?^h	?^h
had been coming	#	#	#	#	#	#	#	#	*	*	?^g	?^g
was coming	#	#	#	#·	#	#	#	#	*	*	✓	✓
came	#	#	#	#	#	#	#	#	?*	?*	✓	✓
had come	#	#	#	#	#	#	#	#	?*	?*	✓	✓

^{c}Acceptable in colloquial usage.

^{f}Contains zero future tense morpheme(s).

^{g}In general tense usage (e.g., with adverb usually, etc.)

^{h}In usage with sentence operator denoting occasional occurrence (e.g., It has happened on occasion that $S_1 C_t S_2$).

UNTIL / John	Mary	will have been arriving	will be arriving	will arrive	will have arrived	has been arriving	is arriving	arrives	has arrived	had been arriving	was arriving	arrived	had arrived
will have been waiting		*	*	?*	?*	*	*	?	?	#	#	#	#
will be waiting		*	*	?	?	*	*	✔	✔	#	#	#	#
will wait		*	*	?	?	*	*	✔	✔	#	#	#	#
will have waited		*	*	?	?	*	*	✔	✔	#	#	#	#
has been waiting		*	*	*	*	*	*	?*	*	#	#	#	#
is waiting		*	*	?[f]	?[f]	*	*	✔[f]	✔[f]	#	#	#	#
waits		*	*	*	*	*	*	✔[g]	✔[g]	#	#	#[h]	#
has waited		*	*	*	*	*	*	*	?[h]	#	#	?[h]	#
had been waiting		*	*	*	*·	*	*	*	*	*	*	?	?
was waiting		*	*	*	*	*	*	*	*	*	*	?	*
waited		*	*	*	*	*	*	*	*	*	*	✔	✔
had waited		*	*	*	*	*	*	*	*	*	*	✔	✔

[f] Contains zero future tense morpheme(s).
[g] In general tense usage (e.g., with usually, etc.)
[h] In usage of sentence operator of occasional occurrence (e.g., It has happened on occasion that $S_1 C_t S_2$).

Sam ... an ascot \ He ... from Europe	will have been returning	will be returning	will return	will have returned	has been returning	is returning	returns	has returned	had been returning	was returning	returned	had returned
SINCE (from the time that)												
will have been wearing	*	*	*	*	*	*	*	*	*	*	?*	*
will be wearing	*	*	*	*	*	*	*	*	*	*	*	*
will wear	*	*	*	*	*	*	*	*	*	*	*	*
will have worn	*	*	*	*	*	*	*	*	*	*	?*	*
has been wearing	#	#	#	#	*	*	*	?	*	*	✓	*
is wearing	#	#	#	#	*	*	*	*	*	*	?	*
wears	#	#	#	#	*	*	*	*	*	*	?*	*
has worn	#	#	#	#	*	*	*	?	*	*	✓	*
had been wearing	#	#	#	#	#	#	#	#	*	*	✓	✓
was wearing	#	#	#	#	#	#	#	#	*	*	?*	?*
wore	#	#	#	#	#	#	#	#	*	*	?*	?*
had worn	#	#	#	#	#	#	#	#	*	*	✓	✓

WHILE → You ... the dishes. ↓ I ... the box	will have been washing	will be washing	will wash	will have washed	have been washing	are washing	wash	have washed	had been washing	were washing	washed	had washed
will have been opening	?*	?	?*	*	?[f]	?[f]	?[f]	?*[f]	#	#	#	#
will be opening	*	?*	?*	*	*	✓[f]	✓[f]	*	#	#	#	#
will open	?*	?	?*	*	*	✓[f]	✓[f]	*	#	#	#	#
will have opened	?*	?*	?*	?*	?[f]	?[f]	?[f]	?[f]	#	?	?	#
have been opening	#	#	#	#	*	*	*	*	#	?	?*	#
am opening	#	#	#	#	*	(?)	(?)	*	#	#	#	#
open	#	#	#	#	*	✓[g]	✓[g]	*	#	#_	#_	#
have opened	#	#	#	#	✓[h]	✓[h]	*	?[h]	#	?[h]	?[h]	#
had been opening	#	#	#	#	#	#	#	#	?	✓	?	?
was opening	#	#(?)	#	#	#	#	#	#	*	✓	?	*
opened	#	#	#	#	#	#	#	#	*	✓	?	*
had opened	#	#	#	#	#	#	#	#	?	✓	?	?

[f] Contains (phonetically) zero future tense morpheme(s).
[g] In general tense usage (e.g., with <u>usually</u>, etc.).
[h] In usage of sentence operator of occasional occurrence
   (e.g., <u>It has happened on occasion that $S_1 C_t S_2$</u>).

	He ... the house	will have been leaving	will be leaving	will leave	will have left	has been leaving	is leaving	leaves	has left	had been leaving	was leaving	left	had left
A S													
He ... the fire													
will have been seeing		*	?*	?*	*	*	✓[f]	✓[f]	*	#	#	#	#
will be seeing		*	?*	?*	*	*	✓[f]	✓[f]	*	#	#	#	#
will see		*	?	?	*	*	✓[f]	✓[f]	*	#	#	#	#
will have seen		*	?	?	*	*	✓[f]	✓[f]	*	#	#	#	#
has been seeing		#	#	#	#	?	✓	✓	*	#	#	#	#
is seeing		#	#	#	#	*	*	*	*	#	#	#	#
sees		#	#	#	#	*	✓[g]	✓[g]	*	#	#	#	#
has seen		#	#	#	#	?*	?[h]	?[h]	?*	#	?[h]	?[h]	#
had been seeing		#	#	#	#	#	#	#	#	*	?*	?*	*
was seeing		#	#	#	#	#	#	#	#	*	?*	?*	*
saw		#	#	#	#	#	#	#	#	?	✓	✓	?
had seen		#	#	#	#	#	#	#	#	✓	✓	✓	✓

[f] Contains (phonetically) zero future tense morpheme(s).
[g] In general tense usage (e.g., with <u>usually</u>, etc.)
[h] In usage of sentence operator of occasional occurrence
  (e.g., <u>It has happened on occasion that</u> $S_1 C_t S_2$)

	She ... the noise	will have been hearing	will be hearing	will hear	will have heard	has been hearing	is hearing	hears	has heard	had been hearing	was hearing	heard	had heard
WHEN / She ... the phone													
will have been picking up		*	*	?*	?*	?*^{f}	?*^{f}	?^{f}	?^{f}	#	#	#	#
will be picking up		*	*	?*	?*	?*^{f}	?^{f}	$\checkmark^f$	?^{f}	#	#	#	#
will pick up		*	*	?*	?*	?^{f}	?^{f}	$\checkmark^f$	$\checkmark^f$	#	#	#	#
will have picked up		*	*	?*	?*	?*^{f}	?*^{f}	?^{f}	?^{f}	#	#	#	#
has been picking up		#	#	#	#	?^{h}	?^{h}	$\checkmark^h$	$\checkmark^h$	#	#	#	#
is picking up		#	#	#	#	*	*	$\checkmark^f$	*	#	#	#	#
picks up		#	#	#	#	?^{g}	?^{g}	$\checkmark^g$	$\checkmark^g$	#	?^{h}	#	#
has picked up		#	#	#	#	?^{h}	?^{h}	?^{h}	$\checkmark^h$	#	?*^{h}	$\checkmark^h$	#
had been picking up		#	#	#	#	#	#/	#/	#	?*^{h}	?*^{h}	$\checkmark$	$\checkmark$
was picking up		#	#	#	#	#	#	#	#	*	*	$\checkmark$	?
picked up		#	#	#	#	#	#	#	#	?^{g}	?^{g}	$\checkmark$	?
had picked up		#	#	#	#	#	#	#	#	?*^{h}	?*^{h}	$\checkmark$	$\checkmark$

^{f}Contains (phonetically) zero future tense morpheme(s).
^{g}In general tense usage (e.g., with <u>usually</u>, etc.)
^{h}In usage of sentence operator of occasional occurrence
    (e.g., <u>It has happened on occasion that</u> $S_1C_tS_2$)

III. Aspect and the Description of Time Conjunctions

A. Aspect in Polish

Before describing the rather covert role of aspect in English let us sketch briefly the use of aspect in Polish where this notion has traditionally been used in the description of the verb system. Schenker[1] describes Polish verbs as being either imperfective or perfective. Imperfective verbs are used when the context does not call for stressing the completion of the action; instead they emphasize the progressivity or repetition of the action.[1] Perfective verbs are used to stress the completion of the action.[1] Such distinctions are called verbal aspect.

There is a very significant set of relations between tense and aspect. Both perfective and imperfective verbs occur with past-tense forms. Both types of verb also occur in present tense forms, but denote present tense only for imperfectives. The perfective form of a verb in present tense form specifies completion of the action in the future.[1] It has the distributional characteristics of a future tense form.

Generally Polish verbs occur in aspect pairs with one perfective and one imperfective verb which do not differ in meaning except for the difference in aspect.[2] Only a few verbs do not occur in such pairs. Although the members of each pair may differ by a prefix or infix, they may also be suppletive so that they are paired on the basis of similar occurrence (i.e., meaning) and not on morphological grounds.

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[1] Alexander M. Schenker, Beginning Polish Volume I (New Haven: Yale University Press, 1966) p. 257.
[2] Schenker, op. cit., p. 259.

Since many Polish perfective verbs are formed from their corresponding imperfectives by the prefixing of a morpheme which also appears independently as a preposition, let us give a fairly typical such verb pisać (write) in some of its usages:

Imperfective Usages: pisać

(past tense)   On pisał do domu codziennie.
(He wrote home every day.)
On długo pisał list do siostry.
(He took a long time writing a letter to his sister.)
On pisał list jak ja wszedłem do pokoju wczoraj.
(He was writing a letter when I entered the room
                                    yesterday.

(present tense) On teraz pisze list.
(He is writing a letter now.)
On pisze zabawne listy.
(He writes amusing letters.)

(future tense) On będzie pisał często.
(He will write often.)
On będzie pisał ten list przez dwie godziny.
(He'll be writing that letter for two hours.)

Perfective Usages: napisać

(past tense)   On napisał długi list wczoraj
(He wrote a long letter yesterday.)
On napisał list wczoraj jak wróciliśmy do domu.
(He wrote a letter when we returned home yesterday.)

(present tense)   - - - - - - - - - - - -

(future tense) On napisze krótki list.
(He'll write a short letter.)
On napisze książkę jak wróci do Stanów.
(He will write a book when he returns to the States.)

With adverbs and other modifiers signifying regular or habitual repetition the normal imperfective form is used. However, some verbs have a second kind of imperfective verb for the description of action which is "sporadically recurrent".[3] For these verbs, the imperfective aspect has a subdivision into <u>actual</u> and <u>frequentative</u> verbs used as follows:

Actual Imperfective

(action in progress)   Jan pisał listy cały dzień.
                              (John was writing letters all day.)
(habitual action)   Jan pisał do domu codziennie.
                              (John wrote home every day.)

Frequentative Imperfective

(sporadically   Jan pisywał do domu od czasu do czasu.
  recurrent)   (John would write home from time to time.)

Another distinction is made for some imperfective verbs of motion between <u>determined</u> imperfective aspect and <u>non-determined</u> imperfective aspect where regular repetition is described with the non-determined imperfective usage:

Determined Imperfective (Motion Verbs)

(action in progress)   Jan jechał ostrożnie.
                           (John drove carefully., John was driving
                                          carefully.)

Non-Determined Imperfective (Motion Verbs)

(habitual action)   Jan jeździł codziennie do pracy.
                         (John drove to work every day.)

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[3]See Schenker, op. cit., p. 333.

(sporadically   Jan jeździł czasem do miasta.
  recurrent)   (John drove to the city occasionally.)

For these distinctions within the imperfective aspect, the usage of
one form over the other corresponds closely to the possible co-
occurrence with certain adverbs such as <u>codziennie</u>,(<u>every day</u>),
<u>czasem</u> (<u>occasionally</u>), and similar expressions such as <u>w tej chwili</u>
(<u>at this moment</u>). Likewise, certain environments preclude or require
the occurrence of perfective verbs. For example with operator verbs
which specifically denote a beginning or an end, the imperfective is
normally used:[4]

    Zaczął pisać.   *Zaczął napisać.
    (He began to write.)
    Skończył jeść.   *Skończył zjeść.
    (He finished eating.)

For requests which are not negated, perfective verbs occur more
frequently than imperfectives, whereas for negated requests, the
imperfective form is more frequent:[5]

    Niech pan napisze ten list.   Niech pan nie pisze tego listu.
    (Write that letter.)   (Don't write that letter.)

Also, for habitual actions, the imperfective is customary:[6]

    Palę papierosy.   Lubię pisać listy.
    (I smoke cigarettes.) (I like to write letters.)

It is significant for the function of aspect that a few common

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[4]See Schenker, op. cit., p. 264.
[5]Schenker, op. cit., p. 263.
[6]Schenker, op. cit., p. 264.

Polish verbs do not have perfective counterparts:[7]

    mieć -- have
    wiedzieć -- know, be aware of
    musieć --- must, have to
    życzyć -- wish
    woleć -- prefer
    potrzebować -- need

The fact that none of the English counterparts of these verbs occur

in the imperative form will turn out to be significant for the study of

English aspect undertaken in the following chapters.

It is also sometimes the case that a given imperfective form may

have several perfectives related to it morphologically but only one of

them is paired with it as differing only in aspect.

Imperfective	Perfective	
pisać	napisać	(write)
podpisywać	podpisać	(sign)
przepisywać	przepisać	(copy down)

B. The Use of Aspect in English

The relevance of aspect to a formal description of English

structure can only be made convincing if it can be shown that the

distinction between perfective and imperfective verbs in English goes

beyond the problem of describing the conjoinability of sentences. In

fact the distinction seems to hold a good deal of promise for organizing

a formal description of language.

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[7]Schenker, op. cit., p. 262.

Let us begin by outlining a class of perfective verbs and verb

occurrences which fit certain simple frames giving acceptable

sentences, and then outline similarly a class of imperfective verbs

which do not fit the perfective frames and do fit certain other frames.

For the most part, we will be working under the assumption that

aspect can be treated as a binary distinction, and at least there should

be no verb occurrence which is both perfective and imperfective. The

question as to whether two aspects will suffice for English description

is left open and the fact that different kinds of imperfectives can be

differentiated in Polish should make one particularly cautious in

formulating English structure. The aspectual status of the t(be) Ving

structure in English is particularly unclear although there are good

reasons for distinguishing it from the class of perfectives.

Consider first the verbs which normally occur with expressions

of the kind at a particular time, at that time, at 6 a.m., and sometime

next week. For many such verbs or verbal occurrences, the adverb

suddenly is also natural. Such occurrences are explode, die, leave,

hit, get up, and notice in:

> The bomb exploded at 6:47 a.m.
> The queen died suddenly this morning.
> John left the room suddenly.
> The cruiser hit the rocks at dawn.
> John got up suddenly.
> All of a sudden I noticed that there weren't any lifeboats.

Now let us try using the same verbs with expressions like for a while,

for three hours, and <u>for a certain length of time</u>:

  ? The bomb exploded for a while.
  * The queen died for three hours.
  * For ten minutes John left the room.
 ?* For a certain length of time the cruiser hit the rocks.
  * For a long while John got up.
 ?* For a certain length of time I noticed that there weren't any
                    lifeboats.

In general the sentences immediately above are of low acceptability

and then only with a reading which allows the addition of <u>repeatedly</u>

and similar adverbs denoting iteration. Occurrences of the verbs

in the first group of sentences will be considered perfective.

  Let us now consider a set of verbs which occur freely with

expressions of the second type but less freely with expressions of

the first type:

   John waited for Mary for three hours.
 ? John waited for Mary at 6 p.m.

   He watched television for a while.
 ? He watched television at a particular time.

   I used the car for most of the week.
 ? I used the car at the crack of dawn.

   He practiced playing the piano for a few minutes.
 ? He practiced playing the piano a few minutes ago.

   We kept swatting mosquitoes for quite a while.
 ? We kept swatting mosquitoes just now.

In most occurrences, the verbs <u>wait</u>, <u>watch</u>, <u>use</u>, <u>practice</u>, <u>keep</u>

will be used imperfectively, i.e., with adverbs[8] in the group of

----

  [8]For the purposes of this description many PN phrases are
treated together with the adverbs of time in a class D_t.

<u>f or a length of time.</u>

Although we can enlarge the groups of perfective and imperfective verbs by finding more verbs most of whose occurrences fit these tests, there are still important classes of verb occurrences which do not easily fall into one or the other of these two groups. One important occurrence is the verb <u>be</u> in t(<u>be</u>) V<u>ing</u>. We have <u>She was watching television for three hours</u> as well as <u>At five o'clock she was watching television.</u> But we do not have <u>Suddenly she was watching television</u> except in the paraphrase <u>Suddenly she began watching television.</u> By the last test we would exclude <u>be</u> from the group of perfectives in this occurrence although it occurs with <u>at a particular time</u> much more easily than most imperfectives. Perhaps the crucial test comes in the nominalization form with certain appropriate verbs used in the nominalizations of conjoined sentences considered in section II. C.

    (The bomb's exploding) occurred at a particular time.
 ? (John's watching television) occurred   at a particular time.
                              happened
 * (John's being watching television) occurred at a certain time.
 * (John's being in the process of watching television) occurred
                                          at a certain time.

For all the perfective occurrences considered here, the sentence can be nominalized and inserted into the frame (   )<u>occur(red) at a particular time.</u> Since t(<u>be</u>) V<u>ing</u> constructions do not have an appropriate nominalization, we may consider an appropriate paraphrase given by Harris as <u>is in process of Ving</u>,i. e., <u>John is</u>

reading a book is paraphrasable by <u>John is in process of reading a</u>

<u>book</u> , so that we may test the acceptability of <u>John's being in the</u>

<u>process of reading a book occurred at a particular time.</u>[9] This is

quite low, and in particular is much lower that the relatively normal

<u>John's being in the process of reading a book lasted for a length of</u>

<u>time</u>. This last sentence uses a frame which fits most of the

nominalized imperfectives with relative naturalness. For this

reason we will tentatively group the t(be) <u>Ving</u> occurrences with the

imperfectives although some refinement of the classification will

almost certainly separate these occurrences from other imperfec-

tives.

Similarly, the bulk of the class of stative verbs, i.e., <u>like</u>,

<u>prefer</u>, <u>wish</u>, <u>need</u>, and similar verbs which do not normally occur

with the t(<u>be</u>) <u>Ving</u> operator, fit more naturally with the imperfectives

although they rarely occur with definite time descriptions <u>for ten years</u>,

etc. With the frames for distinguishing imperfectives from perfectives:

( )t(<u>last</u>) <u>for a length of time</u> as opposed to ( )t(<u>occur</u>) <u>at a certain</u>

<u>time</u>, the nominalized statives are acceptable only in the former.

Let us proceed with this approximate characterization of the

aspect of verbs through testing of the acceptability of certain

occurrences of these verbs in test frames such as those used above.

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[9] See Harris, op. cit., pp. 85-86.

C. Aspectual Restrictions of the Domain of Conjunction by C_t

A detailed survey of acceptable sentences of the form $S_1 C_t S_2$ reveals that the domain of C_t , considered here as a binary operator on sentences, is restricted in the aspectual occurrences which each of the S may have. Under this view of sentence conjunction by C_t, each such conjunction operates on a specific domain of sentence pairs restricted with respect to aspect. For example before operates with S_2 restricted to perfective occurrences and until operates on pairs where S_1 occurs imperfectively and S_2 occurs perfectively. The restriction on aspectual occurrence which each C_t imposes is o sufficiently strong that certain degeneracies are permitted in usage in much the same way that degeneracies, and hence ambiguities, of tense are permitted on the basis of the single tense restriction. In particular, specifically perfective occurrences of become, come to be, get to be, etc. are replaceable by be when in the environment of C_t. In order to show that was occurs perfectively as a replacer for some verb such as become in John soaked the spaghetti until it was soft, it is sufficient to show that it is paraphrasable (in its acceptable reading) by the sentence with a perfective verb (one which occurs only perfectively) and hence can occur with the kinds of modifiers (perhaps in apposition) which characterize the perfective occurrences. Since we have John soaked the spaghetti until it became

soft as a paraphrase, we can confirm the perfective occurrence of

be in the conjoined sentence. As will be shown in chapters IV and V,

English has a number of verb operators which give resultants which

do not occur in one of the two (tentatively stated) aspectual occurrences.

In effect, such operations "perfectivize" or "imperfectivize" their

operands by restricting the occurrences of the resultants. The

occurrence of such an operator (e.g., the perfective t(begin)) in

a non-matching frame usually results in a sentence of low accept-

ability, e.g., * He began loading bricks until the whistle blew.

Let us now look at the C_t individually and characterize their

operator domains in terms of the aspectual restrictions.

1. before and after

Since the domain restrictions for before and after are virtually

the same and since they are almost mirror images of each other

semantically, they can be treated together for this discussion.

Both before and after operate on sentence pairs where S_2 occurs

perfectively. For S_1 there seems to be no strict limitation although

perfective occurrences seem to be more frequent. Perhaps the

instances of imperfective occurrence in S_1 can be shown to be

in the resultant of some zeroed perfective operator, or characterized

in some compact way. No attempt has been made to do so here. Let

us consider some $S_1 C_t S_2$ of varying acceptability using C_t equal to

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before or after and check to see whether the hypothesis about aspect

is confirmed:

   (1) ? After Mary left the party, Tom was talking about her.
            S_2(perfective) S_1(imperfective ?)

Decisions are reached on the aspectual occurrence of left and was

talking on the basis of paraphrases and near-paraphrases which

test the co-occurrence with certain modifiers. For (1) we have

After Mary left the party, which occurred suddenly at 11 p.m.,

Tom was talking about her , which indicates the perfective occurrence

of S_2 (which confirms the aspectual restriction given for after). In

determining that was talking occurs dn a non-perfective usage we

consider, for example, the fact that addition of suddenly to S_1 is

unnatural. Also, the addition of a second sentence in position

following S_1 can repeat the S_1 with an expression of time without

changing the way in which After S_2, S_1 is interpreted: He was talking

about her for ten minutes . Next we consider the fully natural:

   (2)   After Mary left the party, Tom started talking about her.
            S_2(perfective) S_1(perfective)

To establish that S_1 occurs perfectively here, we note that suddenly

may be added naturally to it. Also we note that Tom's starting to

talk about Mary occurred after she left the party is a paraphrase

of (2) which uses the perfective frame of previous tests for S_1.

Further explications of the aspectual occurrence can be carried

out in a similar manner for the following examples and will be given

explicitly only when the decision requires some special device or

involves an important ambiguity.

(3) ?* After Mary was leaving the party, Tom started talking about
S_2(imperfective) S_1(perf.)   her.

(4) ?* We met him after he was nice.
S_1(perfective) S_2(imperfective ?)

In S_2 of (4) we have several readings where be can be a replacer for a

perfective verb: He became nice, He started being nice, He stopped

being nice. But since He was nice rarely occurs with time expressions

at all, it does not readily take any of these readings and hence is not

normally in the domain of after.

(5) (?) They used to smoke before the medical warnings came out.
S_1(imperfective) S_2(perfective ?)

If S_2 is paraphrasable by The medical warnings came out together,

or The medical warnings came out all at the same time , then it

fits the perfective test frames. If it is paraphrasable by The medical

warnings came out, one after another , then S_2 fits the imperfective

test frames and does not belong to the domain of before.

(6)   They used to smoke before the medical warnings started coming
S_1(imperfective) S_2(perfective)   out.

(7) ?* They used to smoke before the medical warnings kept coming
S_1(imperfective) S_2(imperfective)   out.

(8) ?* They stopped smoking before the medical warnings kept coming
S_1(perfective) S_2(imperfective)   out.

Under certain conditions it is possible to say that S_1 before S_2 is an informational paraphrase of S_2 after S_1. Primarily, it is required that both S_1 and S_2 have perfective occurrences. Then for sentences like John came before Mary left we have the form Mary left after John came as a paraphrastic equivalent. This does not take into account, however, the fact that $S_1 C_t S_2$ often seems to assert S_1 and presuppose S_2 to be true along with asserting something about an inequality in the set of possible time expressions which can be added to the respective S. Thus even for these simple bi-perfective sentences the two forms are paraphrases only up to the difference between assertion and presupposition.[10] Also, for C_t which also have causal readings, these readings are not preserved by the reversal, e.g.:

(10) Mary fainted after she heard the news about John.
(11) Mary heard the news about John before she fainted.

In the causal reading of (10) after is replaceable by because , but the corresponding causative reading of before (i.e., so) is not nearly as strong a reading. Similarly (12) and (13) have additional causative readings, but they are not the same:

(12) The stores closed after Mary did her shopping.
(13) Mary did her shopping before the stores closed.

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[10] For a discussion of presupposition in English, see Edward L. Keenan, A Logical Base for a Transformational Grammar of English, in Transformations and Discourse Analysis Papers, (Philadelphia: University of Pennsylvania, 1969).

2. until

The conjunction until is particularly important because it

provides a frame which correlates well with other frames for

testing imperfectives. As a rule, until occurs with the domain of

S_1 restricted to imperfective occurrences and the domain of S_2

restricted to perfective occurrences. The frequent use of negation

in the S_1 before until raises some important questions about the

imperfectivizing effect of the negation operation and about the

scope of this negation in various kinds of conjoined sentences.

Some of these questions will be treated in sections IV.D. and V.

The regularity with which verbs occur imperfectively in S_1

preceding until allows us to test perfectivizing operations and

perfective occurrences of verbs as follows: To test that a verb

operator φ_v perfectivizes its operand verb effectively, we choose

S_1 such that both S_1 until S_2 and $\varphi_v(S_1)$ occur naturally as sentences,

but $\varphi_v(S_1)$ until S_2' does not for any S_2'. For example, up has the

effect of perfectivizing use in the sentence John used up Mary's

toothpaste because *John used up Mary's toothpaste until S_2

presumably does not occur for any S_2 but John used Mary's tooth-

paste until she bought him a tube does occur.[11] The fact that

$\varphi_v(S_1)$ until S_2 does not occur may, for some cases, not be enough

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[11]As it stands (without further modifiers) the reading as
John repeatedly kept using up Mary's toothpaste for S_1 is difficult.

to exclude $\varphi_v(S_1)$ <u>until</u> S_2' from occurring for some sentence as S_2' ; thus we do not require only that $\varphi_v(S_1)$ <u>until</u> S_2 not occur.

The relative uniformity of the <u>until</u>-frame allows us to look at a number of things closely, among them the difference between the t(be) V<u>ing</u> constructions which fit some of the imperfective frames and the "durative" verbs like <u>watch</u>, <u>listen</u>, <u>stay</u>, and <u>wait</u> which are the most naturally occurring verbs in the imperfective frames. Although a great deal of work remains to be done on these problems, many subtleties can be brought out by using this frame.

Let us look at a set of related sentences which use <u>until</u> as C_t:

(14) Alex danced until the music stopped.
     S_1(imperfective) S_2(perfective)

(15) Alex kept dancing until the music stopped.
     S_1(imperfective) S_2(perfective)

(16) Alex continued to dance until the music stopped.
     S_1(imperfective) S_2(perfective)

(17) (?)Alex was dancing until the music stopped.
     S_1(imperfective ?) S_2(perfective)

With the four variant forms for S_1 given in (14) - (17) all are classified as imperfectives by the possible addition of <u>for an hour</u> although this generally makes the <u>until</u> S_2 act as if in apposition to the new S_1' containing the modifier (for an interpretation of this fact, see chapter VI.)

(18) ?*Alex danced until the music was stopping.
　S_1(imperfective)　　S_2(imperfective ?)

For S_2 in (18) the addition of <u>suddenly</u> is not comfortable. The only

possible readings giving some degree of acceptability are like

<u>Alex danced until something happened at the time the music was</u>

<u>stopping</u> which is in support of the perfectivity restriction for S_2.

   (19)   Alex didn't dance until the music stopped.
　　　S_1(imperfective)　　　　S_2(perfective)

   (20) ?*Alex danced until the music didn't stop.
　　　S_1(imperfective)　　S_2(imperfective)

   (21) ?*Alex began to dance until the music stopped.
　　　S_1(perfective)　　　　S_2(perfective)

   (22)   Alex didn't begin to dance until the music stopped.
　　　S_1(imperfective)　　　　　S_2(perfective)

   (23) ?*Alex finished dancing until the music stopped.
　　　S_1(perfective)　　　　　S_2(perfective)

   (24)   Alex didn't finish dancing until the music stopped.
　　　S_1(imperfective)　　　　　S_2(perfective)

In examples (19) - (24) it is clear that negation is much more

comfortable in S_1 than in S_2. One interpretation of this in

accordance with the hypothesis about aspect restrictions is that

negation is an operation which gives an imperfective resultant. This

view will be elaborated upon in chapter IV, but here it can be shown

that negated verbs by and large satisfy tests for imperfectivity. We

note that <u>suddenly</u> cannot be added with normal acceptance to any of

the negated S. It is also significant that we may add time expressions

of duration (with resulting apposition) to these negated S:

(22') Alex didn't begin to dance for twenty minutes, (or) until the music stopped.

Also compare (19) with the following paraphrase:

(19') (Alex's not dancing) lasted until the music stopped.

We might also offer the paraphrase:

(19'') Alex refrained from dancing until the music stopped.

in which the verb <u>refrain</u> fits the imperfective frames well. Thus negation behaves in many ways as an imperfectivizing operation and will be considered alongside other imperfectivizing operators in chapter IV.

The preceding examples also support the notion that <u>begin</u> and <u>finish</u> function as perfectivizing operators and that <u>keep</u> and <u>continue</u> act to imperfectivize. There is also indication that the t($\underline{be}$) V$\underline{ing}$ operation is sufficient to imperfectivize, i.e., most resultants of this operation occur imperfectively. Also the trace of this operation occurs only rarely in S$_2$ following <u>before</u>, <u>after</u>, and <u>until</u>, all of which do accept perfective occurrences in this position. Some additional comments on the t($\underline{be}$) V$\underline{ing}$ operation are given in chapter VII.

Let us look at still another set of S$_1$ <u>until</u> S$_2$, this time where the S are of forms such as N$_1$ t($\underline{be}$) N$_2$ and N t($\underline{be}$) A:

(25) John was happy until he heard the news about Peter.
      S$_1$(imperfective)   S$_2$(perfective)

(26) He heated the horseshoe until it was red.
      S$_1$(imperfective)   S$_2$ (perfective)

(27)   These beaches were white until the oil washed ashore.
              S_1(imperfective) S_2(perfective)

(28) ? I raised that pine tree until it was coniferous.
              S_1(imperfective) S_2(perfective ?)

Examples (25) - (28) represent sentences using N t($\underline{be}$) A forms

for either S_1 or S_2. In (26) and (28) there are paraphrases with

N $\underline{was}$ A replaced by N $\underline{became}$ A where this $\underline{become}$ occurrence meets

the tentative requirements for perfectivity given previously. For (28),

however, this paraphrase is of low acceptability, primarily because

$\underline{coniferous}$ is used almost exclusively as a classifier adjective,

i.e., one which rarely occurs with any time expressions in contrast

with its use as a defining adjective. That is because any temporal

modification conflicts with the permanence of the classification.

In a secondary usage of $\underline{coniferous}$ as literally $\underline{cone\text{-}bearing}$ the

S_2 of (28) becomes marginally acceptable with perfective modifiers.

For the following N_1 t($\underline{be}$) N_2 usages, the **existence** of classifier

usages for some forms conflicts with both perfective and imperfective

frame environments. In many cases, however, there is an acceptable

reading with t($\underline{be}$) as replacer of t($\underline{become}$) or some other perfective

verb:

(29)(?) John was a musician until he resigned from the union.
              S_1(imperfective ?) S_2(perfective)

(30) ?* Atlantis was an island until it sank into the sea.
              S_1(imperfective ?) S_2(perfective)

(31)   John didn't learn to ski until he was a man.
        S_1(imperfective) S_2(perfective)

(32) ? I raised that pine until it was a tree.
        S_1(imperfective) S_2(perfective ?)

In each case, the acceptability of the occurrence of the N_1 t(be) N_2

in either S_1 or S_2 depends largely on the extent to which it has

readings in addition to the classifier reading.   For example, we have

the four corresponding paraphrases which preserve the acceptability:

(29) (?) John continued to be a musician until he resigned from the
        S_1(imperfective) S_2(perfective) union.

(30) ?* Atlantis continued to be an island until it sank into the sea.
        S_1(imperfective) S_2(perfective)

(31)   John didn't learn to ski until he became a man.
        S_1(imperfective) S_2(perfective)

(32) ? I raised that pine until it became a tree.

For (31) there still may be a reading in which S_2 is really imperfec-

tive. This seems to be related to the negation in S_1 and needs further

study. For (32') the possibility of other classifiers of a temporary

nature, e.g., That pine is only a seedling, not a tree, makes

possible the paraphrase with become. Likewise the possibility of

saying That pine became coniferous with marginal acceptability is

tied to the possibility of saying That pine wasn't coniferous because

it had no cones.

3. since

Temporal since (as opposed to causal since) represents a rather anomalous variety of C_t which discourages classification along with the other C_t. First of all, virtually the only usage of since as a C_t is with have Ven in S_1 plus past tense morpheme in S_2 or else had Ven in S_1 plus past tense morpheme in S_2. Although since gives the same kind of time inequality ordering in the set of time expressions as until, since does not appear with future tense in either S_1 or S_2 and never appears with imperatives. Furthermore, since does not appear with simple past tense in S_1 and does not appear in the "general present" tense usage with usually, always, etc. As mentioned earlier, since does not obey the tense conformity constraint since have Ven must be treated as a present tense plus t(have) Ven operation and S_2 is always in the past tense.

Thus the canonical form of a S_1 since S_2 is one of the following:

N_1 has been $V_1ing\,\Omega_1$ since N_2 $V_2ed\,\Omega_2$

N_1 has $V_1ed\,\Omega_1$ (n times) since $N_2 V_2ed\,\Omega_2$ or:

N_1 had been $V_1ing\,\Omega_1$ since N_2 $V_2ed\,\Omega_2$

N_1 had $V_1ed\,\Omega_1$(n times) since N_2 $V_2ed\,\Omega_2$

A study of existing usage shows that a simple N_1 has Ven N_2 does not usually occur without some expression of iteration for S_1. For example:

? I have seen John since I got back from Europe.

is almost unacceptable without contrastive stress or without some

iteration expression:

> I've seen John only once since I got back from Europe.
> I've seen him several times since I got back from Europe.

It also appears that the negation or question operator improves the

acceptability significantly:

> Have you seen John since you got back from Europe?
> L haven't seen John since I got back from Europe.

When the trace of the t(be) Ving operator is not present, since seems

to occur primarily with time expressions of iteration. Without such

expressions as seven times, (only) once, repeatedly, such verbs

occur more frequently with the past tense and a past time expression.

In general, the copulative structures under the have Ven

operation N has been N, N has been A (and the corresponding past

tense forms) fit in S_1 provided, as with until, that the addition of an

adverb of specific duration (e.g., for a certain length of time) to the

S_1 is possible. For example:

> Sam has been a carpenter since he got out of high school.
> Cuba has been a republic since it declared its independence.
> John has been sick since he returned from the tropics.
> Gambling has been legal in Nevada since it became a state.
> Crows have been black since the world began.
> ? Uranium has been an element since it was discovered.

The possibility of acceptability for the last example is due to the

paraphrase: Uranium has been considered to be an element since

it was discovered.

A wide variety of durative (i.e., imperfective) forms fit quite naturally in S_1:

> She has been on the phone since she got home from work.
> They have lived in Westport since they graduated from college.
> He has continued to feel well since he recovered from the operation.

Because have Ven does not seem to operate on many container verbs (e.g., believe) and other stative verbs (e.g., like), there are virtually no occurrences of such verbs in S_1 preceding since. This may not be true of all idiolects, however.

To the extent that since behaves as a C_t , it can be described as operating on the aspectually restricted domain where S_1 occurs imperfectively and S_2 occurs perfectively. Negated perfectives with the have Ven operation (perfective verbs under have Ven in turn negated) fit easily into S_1 frames:

> He hasn't budged since we arrived.
> He hasn't spoken a word since he saw the ghost.
> John hasn't hit Mary since we got here.

For perfectives which do not take expressions of iteration in their normal usages (in the same context) it seems inappropriate to use since:

(33) ?The bomb hasn't exploded since we arrived.
(34) ?We haven't invited him to the party since we decided to have it.

But again, the stressing of some element such as we in the sentences above does raise the acceptability. And such sentences usually

are replaceable by S_2. S_1 yet.:

(35)   We arrived (at some time). The bomb hasn't exploded yet.

(36)   We decided to have the party. We haven't invited him to it yet.

For the purpose of description, it may be possible to say that since is a part of the have Ven operation which has as a variant the form yet (with corresponding permutations, etc.) when applied to a certain subclass of perfectives. One must account, however, for such things as the fact that in (36) the perfectivity is related to the adjunction of a restrictive wh- clause.

For the present we can describe since along with the other C_t under the qualifications just mentioned. The fact that since does not obey the single tense constraint and the other anomalies in the behavior of this marginal C_t point to a different source for since in a transformational theory.

4. while

Although while exhibits occurrences in keeping with the single tense constraint, there is some difficulty in describing the aspectual behavior for while. Because of the existence of the co-ordinating conjunction (C_o) while$_o$, the properties of the S cannot be described as precisely as might otherwise be the case. Consider, for example:

Copper is an element while$_o$ brass is a mixture of elements.
John was resentful while$_o$ Max was absolutely spiteful.

Dinner was served while coffee remained on the buffet.
Mary read a book while Pete swam.
I saw the movie while you were in Washington.

These five sentences range from relatively unambiguous usage of co-ordinating while $\rightleftharpoons$ whereas $\rightleftharpoons$ but, to a relatively unambiguous usage of subordinating while $\rightleftharpoons$ during the time that in the final example. Normally, for ambiguous usages such as the third and fourth examples some intonation markers can distinguish one usage from the other. Indeed, the final example can be given co-ordinate reading by using the same stress pattern as occurs in the preferred reading of the first example.

In characterizing the kinds of verb constructions with respect to aspectuality which may occur in S_1 while S_2 sentences, there are additional problems caused by the overlapping of while, as, and when. Within certain limits this overlapping may encourage analogical usage of one of these C_t in place of another. For the analysis of while, let us look at some usages which are characteristic for this C_t. In cases where while cannot be replaced by when or as, this will be indicated by *when and *as respectively.

(37) The table fell apart while you were away. (*as, ?when)

(38) We crossed the street while the light was red. (*as)

(39) We listened while Jim told the story of the Windigo.

(40) I found a table while John was getting a drink.

(41)   Bananas should be picked while they are (still) green. (*as)

(42)   John is reading while Mary does the dishes. (*as, *when)

Note that (42) represents the now-present as the common tense

usage for S_1 and S_2.

(43)   They stole his tools while he wasn't looking. (*as)

(44)   I noticed the fire while I was getting out of my car.

(45)   "There will be no tax increases while I am president." (*as)

(46)   Travel as much as you can while you're (still) young ! (*as)

(47)   Andy was sick while you were gone. (*as, ?when)

Looking at the form of S_2, we notice NVA structures ((38),(41),(46))

and N_1 be N_2 ((45)), both with non-permanent readings. Basically,

while operates on pairs where the verb of S_2 can occur with

durative time expressions such as for an instant, for a moment, etc.

though the verb may normally occur perfectively. For such perfec-

tive verbs, the occurrence in S_2 following while is usually under the

operator t(be) Ving . For (40), (42), and (44), the verb of S_2 normally

occurs perfectively: John got a drink , Mary did the dishes , I got out

of my car.   In addition,the verb be occurs following while usually with

the imperfective reading for the copulative structures which are not

classifier sentences. S_1 often has a perfective occurrence, but

imperfectives seem to occur as well provided that the durative time

expressions which can be added preserving paraphrase are a subset

of those which can be added to S_2. The use of negation in S_2 seems

limited to verbs which have a particularly strong durative effect,

e.g., wait, listen, watch, etc. We have difficulty with ? It happened

while I wasn't reading more than with It happened while I wasn't

listening.

According to the type of test used for determining perfectivity in

the discussion of before, after, and until, the conjunction while can

almost be classified as requiring imperfective S_2 with no specific

requirement on S_1 other than that the modifiers on any imperfective

S_1 be a subset of the possible modifiers of their respective S_2.

Certainly, for many speakers there is difficulty with:

> ? The bomb exploded while Jack opened the door.
> ? Mary read while Jack took a swim.
> ?* A shot rang out while Max began to eat.

In general, some imperfectivizing operator on S_2 has the effect of

raising the acceptability of these sentences. Where productive

perfectivizing operators (see next chapter) are responsible for the

perfectivity, acceptability is improved by removing them:

> The bomb exploded while Jack was opening the door.
> (?) Mary read while Jack swam.
> (cf. Mary read while Jack was swimming.)
> (?) A shot rang out while Max was beginning to eat.
> (cf. A shot rang out while Max ate, A shot rang out while
> Max was eating.)

The use of present tense (the now-present) with while may be marginally acceptable and usually gives a secondary reading of future tense due, perhaps, to the general non-occurrence of now-present tense with the other C_t. Still, it does seem to occur in current speech:

Q: What's going on ?
A: (?) We're waiting while he fixes the flat tire.

5. as

The usage of as as a C_t becomes a little clearer if the examples for while are used for comparison. Let us consider:

The bomb exploded as Jack opened the door.
(?) A shot rang out as Max began to eat.
I noticed the fire as I was getting out of my car.
I noticed the fire as I got out of my car.
He will mail this letter as he leaves.
(cf.*He will mail this letter while he leaves.)
(cf. ? He will mail this letter while he is leaving.)

A large number of occurrences of as operate on two perfective S and are often roughly equivalent to the corresponding S_1 when S_2 sentence conjunctions but not to the S_1 while S_2. The last group of examples give occurrences of this kind.

For some S_1 as S_2 we can add step-by-step or by degrees to both S_1 and S_2. For these in particular the occurrence of as is not replaceable by while or when:

As the campfire died down, the brightness of the moon became more noticeable.
? While the campfire died down , the brightness of the moon became more noticeable.

He became more and more aware of the contradictions in
   the system as he grew older.
? He became more and more aware of the contradictions in
   the system while he grew older.

In general, the aspectual restrictions for as are not clear,

but are close to a domain restricted to perfective occurrences for

S_2 and also (but perhaps less rigidly) restricted to perfective

occurrences for S_1. In addition to a lack of imperfectivizing

operator traces in S_2 (other than some t(be) Ving), there are

virtually no negated S_2, another sign of S_2's being a perfective

frame.

Unlike while, as seems not to occur with the now-present

(although it occurs naturally with the general present with usually,

frequently, etc.). It is, of course, clear that as conforms to the

single tense restriction. In fact, the appearance of S_1 as S_2 with

non-conforming tenses signals the interpretation of as as though or

because, neither of which behaves like C_t

   6. when

In a way the C_t when is one of the most revealing C_t, although

as a time conjunction it appears to be replaceable by other conjunc-

tions plus some other additional change. It is revealing because it

exhibits the wh- morpheme of who, which, what, and where.

This occurrence will be quite useful in supporting the view that

conjunctions of time mark the sharing of temporal adverbs in a way

similar to the way in which the wh- of who, what, and which marks

the noun sharing between two sentences in the relative clause forma-

tion. Other C_t can then be seen as equivalent to when—at the time at

which plus further ordering restrictions on the set of time expressions

which may be added to the two S.

Let us divide the two major usages of when into $when_1$, para-

phrasable by (immediately) after , and $when_2$, paraphrasable by

while plus reversal of S_2 and S_1. Let us dispense with $when_2$ by

giving some examples to illustrate this reading:

> I was walking down the street $when_2$ (all of a sudden) I slipped
> on a banana peel.
> I slipped on a banana peel while I was walking down the street.

> Max was shining his shoes $when_2$ Pete walked in.
> Pete walked in while Max was shining his shoes.

Naturally, the statement of equivalence or paraphrasability is

accurate only up to the difference between assertion and presupposi-

tion as explained in section B. 1. of this chapter for the discussion

of before and after.

The current usage of $when_1$ suggests that S_1 when S_2 is paraphras-

able by S_1 at the time at which S_2. Since $when_1$ often occurs in narrative

where causal modifiers may also occur (e. g. , because, consequently),

a primary usage is paraphrasable by (immediately) after:

> They cheered when they got the good news.
> **They cheered** (immediately) after they got the good news.

> She will open the door when you give the signal.
> She will open the door (immediately) after you give the signal.

A number of other usages, however, have a paraphrase much closer

to the explicit expression of identity:

> We had just finished dinner when the telephone rang.
> (cf. We had just finished dinner at the time at which the
>   telephone rang.)

For these usages, $when_1$ acts as an operation on pairs restricted to

perfective verb occurrences for both S_1 and S_2.

In some of its imperfective occurrences when seems to be

replaceable by other conjunctions or conjunctional phrases:

> They were tired when they arrived home.
> (cf. They were tired by the time they arrived home.)

> He sings when he drives.
> (cf. He sings while he drives.)

7. multiple usages: until after, since before

The compound $C_t C_t'$ usages which are not uncommon can

often be regularized as two separate conjunction operations, each of

which has the same domain as usual and such that the zeroed repeti-

tion of S_1 is recovered (with one operator trace) between C_t and C_t'.

Thus we have $S_1 C_t C_t' S_2 = S_1 C_t (neg(S_1) \ C_t S_2)$ where negation operation

neg (S) is a simple rule which removes the not operation or, if the

operand verb has not been negated, operates as t(stop) Ving before

after and as t(start) Ving preceding before:

I didn't see John until after the party ended.
I didn't see John until (I saw John after the party ended.)

I stayed until after the show closed.
I stayed until (I stopped staying after the show closed).
        (i.e., I left)

I haven't seen Joe since before he sailed to Australia.
I haven't seen Joe since (I saw him before he sailed to
                                        Australia).

This regularization procedure is effective also in preserving

certain adverbial modifiers:

I didn't find my ticket until just before the show started.
I didn't find my ticket until (I found my ticket just before
        the show started).

IV. Verb Operators and Aspect

A. The Function of Verb Operators

Let $\mathcal{O}_V$ be a verb operator if it is an operation of a string

$NV\Omega$ which leaves a trace of the form $NV'(P)V\Omega$ where V' is a new

verb which occurs as the carrier of the tense morpheme. The various

operators which fall into this class can be grouped according to their

general distributional co-occurrences (and hence characterized in

terms of modifiers) and also with respect to which verbs they take

in the operand strings. For the investigation of the time conjunctions

C_t, an important feature of the deformed resultant string is its aspec-

tual occurrence compared with that of the original (operand) string.

In addition to the operators which have the entire class V or most

of this class in their domain of operation, there are many which take

as operands certain verbs from a very small (perhaps unitary) class.

For the verb operators under consideration in this chapter, the

resultant string has a different aspectual occurrence of its verb than

the aspectual occurrence of the operand verb. Hence we may say

that such an operator "perfectivizes" or "imperfectivizes" its

operand verb if it changes the aspectual occurrence of the resultant

to perfective or imperfective respectively. As before, we may extend

this terminology to sentences containing the verbs.

Since the previous chapter has demonstrated, somewhat

implicitly, that the frame of S_1 preceding <u>until</u> correlates closely

with other frames used for testing imperfective occurrences, we

may now use this frame as one in which perfective occurrences are

impossible to roughly the same extent as they are impossible in

(S $)_h$<u>happened at a particular time.</u> Likewise, we may freely use

the frame of S_2 following <u>before</u> or <u>until</u> or <u>after</u> as a good perfective

frame since it **correlates** well with other perfective frames. For

example, as described in section III. C. 2. , we may test to see that

a putative perfectivizing operation changes acceptable S_1 <u>until</u> S_2

into unacceptable *$\phi_V(S_1)$ <u>until</u> S_2 under the assumption that de- im-

perfectivizing means the same for these purposes as perfectivizing.

When the operator has this effect, we can claim that the operator has

"blocked" the usual imperfective occurrence for that frame thus

giving a form outside the domain of operation for <u>until</u>. Likewise, we

may test a putative imperfectivizing operation by seeing whether

acceptable sentences of the form S_1 <u>before</u> S_2 are transformed into

corresponding unacceptable * S_1 <u>before</u> $\phi(S_2)$. This shows that the

operator acts to "block" the normal perfective occurrence. Of course,

an imperfective sentential string may be first perfectivized and then

in turn imperfectivized by a new operator as in <u>John ate strawberries</u>

which becomes perfective with <u>John started to eat strawberries</u> and

then imperfective with <u>John kept starting to eat strawberries</u>.

Although more than two such operations seldom appear in the same verbal string, there seem to be no length restrictions except, perhaps, that two consecutive words with <u>-ing</u> morpheme are unusual, e. g. , ?<u>John kept starting eating strawberries</u>. ·

For most $S_1 C_t S_2$ where S_1 and S_2 occurring in isolation may be ambiguous with regard to aspect (e. g. , <u>John ate until he was sick</u>, where <u>John ate</u> and <u>John was sick</u> are ambiguous) the occurrence in the frame itself is sufficient to give the preferred reading to the occurrence which fits the frame. Thus, we do not get <u>John ate until he was sick</u> paraphrased as *<u>John ate until he continued being sick</u>, or*<u>John began to eat until he was sick</u>.

It is possible to predict that certain verbs will not be used in an imperfectivizing operator and that certain other verbs will not be used in a perfective frame without an appropriate perfectivizing operator. For example, we do not normally get ?* <u>Mary shot John until</u> S_2 or ?* S_1 <u>before John enjoyed skiing</u>. But we may have <u>Mary kept shooting John until</u> S_2 and S_1 <u>before John came to enjoy skiing</u> or S_1<u>before John began to enjoy skiing.</u>

    B. Unrestricted   perfectivizing operators: <u>begin</u>, <u>start</u>, <u>stop</u>,
<div align="right">etc.</div>

The following operator verbs give perfective **occurrences** with

all or most verbs in the language:

begin: John read until he reached page 110.
　　　?*John began to read until he reached page 110.

start:　John listened to the radio until the program signed off.
　　　?*John started listening to the radio until the program signed
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　off.

stop:　They danced until the sun came up.
　　　?*They stopped dancing until the sun came up.

quit:　We smoked until we heard the ACS ad.
　　　? We quit smoking until we heard the ACS ad.

cease: We talked until we came to grandmother's house.
　　　? We ceased talking until we came to grandmother's house.

finish: We worked on the barn until the sun set.
　　　* We finished working on the barn until the sun set.

resume: We danced until the music stopped.
　　　? We resumed dancing until the music stopped.

The most striking feature of the aspectual verb operators is their

unique occurrence in only one of the two types of aspectual frame.

None of the above perfectivizing verbs seems to have any imperfective

occurrences:

　　*For five minutes the man began speaking.
　　　　　　　　　　　　(similarly for stop, finish, etc.)

In fact, all occurrences of these verbs including those where they

do not function as operators (or rather, operator traces) have the

same aspectual occurrence type and can be related to their operator

occurrences in terms of zeroing and permutation, etc. For example:

　　John began opening the gifts.
　　John's opening of the gifts began.
　　John began his opening of the gifts.

all contain perfective occurrences of the verb <u>begin</u> and can all be

related to one t(<u>begin</u>) V<u>ing</u> operation with differing paraphrastic

operations. One such sequential derivation might be[1]:

John opened the gifts. → John's opening of the gifts began. →

$$\varphi_V(\underline{begin})$$

John began his opening of the gifts. → John began opening the gifts.

$$\varphi_Z^{-1} \quad \text{(inverse of zeroing} \qquad \varphi_Z \quad \text{(on } \underline{his...of})$$
$$\text{which drops subject)}$$

Even occurrences which appear to act as other NVN verbs (<u>hit</u>, for

example) as in <u>John began the race</u> turn out to be the resultants of

operations on <u>John raced</u>, one of which is the t(<u>begin</u>) V<u>ing</u> operation.

A final comment on the scope or domain of the <u>begin</u> operator is

worth making here. <u>Begin</u> and other perfectivizing operators can

usually take perfective verbs in their domain of operation in addition

to the imperfective operands. For <u>John began shooting</u> where the

operand verb in this case is the perfective verb <u>shoot</u>, the addition

of modifiers for <u>shooting</u> shows that there is an iterative implication:

John began his repeated shooting.
John began the period of time during which he shot repeatedly.

This correlates well with the fact that such perfectives (without singular

noun object) can be found in imperfective frames when in the -<u>ing</u>

nominalized form: <u>John's shooting lasted for quite a while</u>.

C. Unrestricted imperfectivizing operators: <u>continue</u>, <u>keep</u>, etc.

Most English verbs can be imperfectivized by one of the following operators:

----

[1]See Harris, op. cit. for discussion of operator representations.

continue:
?* We listened to music before we continued eating dinner.
   We listened to music before we ate dinner.
* Our continuing to watch the show occurred at some time.
* Our continuing to watch the show occurred suddenly.

keep:
* John waited until the gun kept going off.
* John suddenly kept walking.
(Since no -ing nominalization of the resultant form of the keep
  operator occurs, we cannot test in the nominalized S frames.)

keep on:
?* I knew Tom before he kept on sailing to Tahiti.
 * Suddenly, John kept on reading.
 * John's keeping on reading occurred unexpectedly.

go on:
* At last he went on singing.
?* He went on talking at a particular time.

In a way analogous to the unrestricted perfectivizing operators, these

operators are also unambiguously determined in aspect. The im-

possibility of using the imperfectivizing operators in perfective frames

in all occurrences of these verbs (even in apparently different usages)

points to their role in the language as perfectivizers and not simply

perfectively occurring verbs.

    D. Negation

    There is one additional operator which has all verbs in its

domain and which has the effect of imperfectivizing the verbal

occurrence of the operand by the criteria of the foregoing tests.

Since the determination of the scope of negation for conjunctions is

often difficult, it should be assumed that the description of negation

in these terms is highly tentative and perhaps merely a step on the
way to a more effective description.

The existence of negated perfectives in imperfective frames is
easy to verify:

> John didn't arrive for four hours.
> John didn't jump until the train stopped.

But some other tests are inconclusive:

> ? John's not arriving lasted for four hours.

To be sure, some negated perfectives occur in perfective frames:

> The bomb didn't explode at 4:30.

But this is properly viewed as negation of the time predication which
is the last operator applied before negation and thus this means negation
on the entire sentence:

> It is not the case that the bomb exploded.at 4:30.
> It was not at 4:30 that the bomb exploded.

Closer to verb negation is:

> The bomb didn't explode for two weeks.
> ? The bomb's not exploding went on for two weeks.
> Not for two weeks did the bomb explode.

Note that the form: *Not at 4:30 did the bomb explode does not
exist. To further demonstrate that negation of perfectives gives
imperfectives, consider the use of negated perfectives in perfective
frames:

> * Mary arrived before John didn't leave.
> * The troops will stay until the situation doesn't improve.
> * They arrived after the store hadn't closed.

The few bothersome examples, such as:

She sent for a doctor after John didn't respond to the treatment.

seem to be from zeroings of container phrases with verbs of cogni-

tion, e.g.;

> She sent for a doctor after (she ascertained that (John didn't
> respond to the treatment)).

It also seems to be the case that negation on imperfectives gives

imperfectives. For the usual frames, this does seem to be the

case:

> John didn't wait until the police came.
> Mary didn't watch TV for ten days.
> I didn't use the car until I finished the job.

The verb negations (perhaps to be described as conjunction negations)

are respectively:

> ? Not until the police came did John wait.
> Not for ten days did Mary watch TV.
> Not until I finished the job did I use the car.

Of course the negations of the full sentences are also possible read-

ings, ranging from preferred in the first sentence to non-preferred in

the third.

The fact that negations on verbs seem to be unfailingly imperfec-

tive and the fact that verb strings with the imperfective operators

continue, keep, keep on, go on are also unambiguous with respect

to aspect may help explain why they are infrequently used together.

Consider the following:

(?) John didn't keep on shooting after the war ended.
(?) Sue continued not smoking until the data were falsified.
(?) They didn't go on talking until the curfew bell rang.

For use in this imperfective frame the negation alone suffices:

John didn't shoot after the war ended.
Sue didn't smoke until the data were falsified.
They didn't talk until the curfew bell rang. (didn't stressed)

E. Restricted Perfectivizing Operators

Besides the unrestricted operators which have in their domains

essentially all verbs of the language, there are many verb operators

which act only on small subclasses of verbs giving resultants in the

form of a nominal related to the operand verb as the object of some

common verb such as make, take, do, give, and (marginally) have,

etc. Since most of these operator verbs have perfective occurrences

in their usage as NVN verbs , the effect of the operator is frequently

to perfectivize the operand verb. For example:

I talked with John for three hours.
? I had a talk with John for three hours.
(but I had a three-hour talk with John.)

and in the frame with conjunction:

I talked with John until the train came.
? I had a talk with John until the train came.

Almost always the resultant is unambiguously perfective (as is

supported by these examples) although imperfectivizing operators

may be applied on them, e. g. , I continued to have talks with John

until we agreed to co-operate.

Certain frequently used verbs of motion all undergo several similar perfectivizing operations:

$$V_m \longrightarrow \underline{\text{take a }}(V_m)_n$$

$$V_m \longrightarrow \underline{\text{go for a }}(V_m)_n$$

$$V_m \longrightarrow \underline{\text{have a }}(V_m)_n$$

$$V_m \longrightarrow \underline{\text{go }}(V_m)\underline{ing}$$

where $V_m \in \{\underline{\text{walk, run, swim}}, \underline{\text{drive, sail, hike, jog, ride, stroll,}} \underline{\text{fly,}}\dots\}$

and customarily $(V_m)_n \approx V_m$ (exception: $\underline{\text{fly}}$, $\underline{\text{flight}}$). The perfectivizing operations on the verbs of motion seem to have little other effect than the perfectivizing of their operand verbs. That is to say, all changes in the co-occurrence in the resultant correlate with the differences in the two kinds of aspectual frames.

Some additional perfectivizing verb operators have even more specific domains. In many cases, particularly where the V has a singular noun as object, the operand verb and the resultant are both perfective so that the two forms are essentially paraphrases:

He checked his bearings.
He made a check of his bearings.

Some representative operator constructions are:

John grinned.
John broke into a grin.

John restricted the operation.
John put a restriction on the operation.

John sniffed the perfume.
John took a sniff of the perfume.

John analyzed the drug's composition.
John made an analysis of the drug's composition.

John responded to the inquiry.
John made a response to the imquiry.

A more detailed listing (necessarily fragmentary) is given on the following pages. For many verbs, there is an appropriate, and usually highly specific, verb which can nominalize (and perfectivize) the original verb:

N_1 fine N_2 N_3 (amount of money) N_1 slap a fine of N_3 on N_2

N_1 tax N_2 N_1 levy a tax on N_2

For such cases, there is less interest in listing the operator verb, although most such cases act to perfectivize and may be productive on "semantically similar" verbs.

RESTRICTED PERFECTIVIZING OPERATORS

$$\begin{bmatrix} \text{speak} \\ \text{report} \\ \text{talk} \\ \text{lecture} \end{bmatrix} \rightarrow \begin{Bmatrix} \text{make} \\ \text{give} \\ \text{deliver} \\ \text{present} \end{Bmatrix} \quad a \quad \begin{bmatrix} \text{speech} \\ \text{report} \\ \text{talk} \\ \text{lecture} \end{bmatrix}$$

$$\begin{bmatrix} \text{breathe} \\ \text{sniff} \\ \text{gulp} \\ \text{whiff} \end{bmatrix} N \rightarrow \begin{Bmatrix} \text{take} \\ \text{have} \\ \text{get} \end{Bmatrix} \quad a \quad \begin{bmatrix} \text{breath} \\ \text{sniff} \\ \text{gulp} \\ \text{whiff} \end{bmatrix} \text{ of N}$$

$$\begin{bmatrix} \text{respond to} \\ \text{answer} \\ \text{reply to} \end{bmatrix} N \longrightarrow \text{give N a(n)} \begin{bmatrix} \text{response} \\ \text{answer} \\ \text{reply} \end{bmatrix}$$

$$\begin{bmatrix} \begin{bmatrix} \text{require} \\ \text{obligate} \end{bmatrix} N \text{ to } V\Omega \\ \begin{bmatrix} \text{restrict} \\ \text{limit} \end{bmatrix} N \text{ to } Ving\Omega \end{bmatrix} \rightarrow \begin{Bmatrix} \text{place} \\ \text{put} \\ \text{set} \end{Bmatrix} N \text{ under} \begin{bmatrix} \begin{bmatrix} \text{a requirement} \\ \text{an obligation} \end{bmatrix} \text{to } V\Omega \\ \begin{bmatrix} \text{the restriction} \\ \text{the limitation} \end{bmatrix} \text{that } NV\Omega \end{bmatrix}$$

$$\begin{bmatrix} \text{study} \\ \text{survey} \\ \text{count} \\ \text{measure} \\ \text{observe} \\ \text{describe} \\ \text{check} \\ \text{evaluate} \\ \text{read (instrum.)} \\ \text{record} \\ \text{determine} \\ \text{calculate} \\ \text{calibrate} \\ \text{assess} \\ \text{sample} \\ \text{analyze} \\ \text{enumerate} \end{bmatrix} N \rightarrow \begin{Bmatrix} \text{make} \\ \text{do} \end{Bmatrix} a(n) \begin{bmatrix} \text{study} \\ \text{survey} \\ \text{count} \\ \text{measurement} \\ \text{observation} \\ \text{description} \\ \text{check} \\ \text{evaluation} \\ \text{reading} \\ \text{recording} \\ \text{determination} \\ \text{calculation} \\ \text{calibration} \\ \text{assessment} \\ \text{sampling} \\ \text{analysis} \\ \text{enumeration} \end{bmatrix}$$

RESTRICTED PERFECTIVIZING OPERATORS
(continued)

$$\begin{bmatrix} \text{understand} \\ \text{believe} \\ \text{think} \\ \text{suspect} \\ \text{feel} \\ \text{regret} \end{bmatrix} \text{that S} \longrightarrow \text{come to} \begin{bmatrix} \text{understand} \\ \text{believe} \\ \text{think} \\ \text{suspect} \\ \text{feel} \\ \text{regret} \end{bmatrix} \text{that S}$$

$$\begin{bmatrix} \text{admire} \\ \text{respect} \\ \text{recognize} \end{bmatrix} \text{N} \longrightarrow \text{come to} \begin{bmatrix} \text{admire} \\ \text{respect} \\ \text{recognize} \end{bmatrix} \text{N}$$

appreciate   the fact that S $\longrightarrow$ come to appreciate   the fact that S

$$\begin{bmatrix} \text{realize} \\ \text{conclude} \end{bmatrix} \text{that S} \longrightarrow \text{come to the} \begin{bmatrix} \text{realization} \\ \text{conclusion} \end{bmatrix} \text{that S}$$

$$\begin{bmatrix} \text{know} \\ \text{like} \\ \text{understand} \end{bmatrix} \text{N} \longrightarrow \text{get to} \begin{bmatrix} \text{know} \\ \text{like} \\ \text{understand} \end{bmatrix} \text{N}$$

feel that S $\longrightarrow$ get to   feeling that S

$$\begin{bmatrix} \text{kick} \\ \text{shove} \\ \text{whack} \\ \text{look at} \\ \text{(perfectives)} \end{bmatrix} \text{N} \longrightarrow \text{give N a} \begin{bmatrix} \text{kick} \\ \text{shove} \\ \text{whack} \\ \text{look} \end{bmatrix}$$

$$\begin{bmatrix} \text{talk to} \\ \text{thrash} \\ \text{scold} \\ \text{(imperfect.)} \end{bmatrix} \text{N} \longrightarrow \text{give N a} \begin{bmatrix} \text{talking - to} \\ \text{thrashing} \\ \text{scolding} \end{bmatrix}$$

$$\begin{bmatrix} \text{fast} \\ \text{diet} \\ \text{rampage} \\ \text{crusade} \end{bmatrix} \longrightarrow \text{go on a} \begin{bmatrix} \text{fast} \\ \text{diet} \\ \text{rampage} \\ \text{crusade} \end{bmatrix}$$

V. Prepositional Operators

A. Prepositions as traces of perfectivizing operations

It is impossible to test a large number of sentences with regard to their aspectual occurrences without concluding that prepositions of a certain kind play an important part in determining these occurrences. Of special interest are stressed, separable prepositions, i. e., those which may, for transitive verbs, permute with the object noun phrase when this phrase is relatively short. This typically occurs when the object is a pronoun. For example:

> John used up the paint.
> John used the paint up.

are paraphrases replaceable by <u>John used it up</u> when the referent <u>it</u> is unambiguous. The preposition <u>up</u> receives stress at least equal to that on <u>used</u>. For separated occurrences the stress on the preposition is usually greater and the preposition is followed by a juncture or marked by an intonation phoneme. It is therefore possible to distinguish cases of stressed, separable P (for transitive verbs) from several kinds of similar prepositional and adverbial usages. For example:

> John dashed up the road.   (unstressed and inseparable
> * John dashed the road up.   preposition)
> * John dashed it up.

and: I asked her over.
> (cf. ?I asked over the lady we met last night.)

For the second pair of examples, the analogy is close and may be gaining in acceptability. Normally, however, the unzeroed form is used: <u>I asked the lady we met last night to come over.</u> There are also pseudo-separable cases such as:

We finally saw the guests off.
? We finally saw off the guests.

Since the paraphrase <u>We finally saw that the guests got off</u> is an unzeroed form representing a source different from the one to be proposed later in this chapter, it is reasonable to exclude these cases from the discussion. There are also anomalous verbs such as <u>own up</u> which do not behave like other stressed, separable VP. This may be related to the fact that they require an additional P before the object N. For example:

Mike owned up to the foul deed.
Mike owned up to it.
* Mike owned to it up.
* Mike owned to the foul deed up.

Normally a form like the one in the second example, where the pronoun is the final element, is not possible for stressed, separable P, e.g., * <u>John beat up him</u>).

Many verbs do not occur with stressed, separable P. For some of these V, this non-occurrence seems related to the structure of their verb complements. Some general characterization of these V will be given in section C of this chapter.

For those V which do take stressed, separable P, many seem

to be perfectivized as a result of the operation, i.e., the aspectual occurrence of VP can only be perfective whereas V has imperfective occurrences (see p. 78 for examples). For each V there are often several P which perfectivize it, each with a different semantic effect in terms of the paraphrases of the resultant:

> John turned up the volume.
> John turned down the offer.
> John turned off the electricity.
> John turned away the last six applicants.
> John turned on the light.
> John turned over.

Certain perfective frames, including $(V\Omega)_n$ was done by John[1], identify these sentences as occurring perfectively. In particular, none of the above six sentences fit naturally into the frame of S_1 preceding until, except with the addition of some imperfectivizing operation such as t(keep).

It is not true that all simple NVN verbs have imperfective interpretations while the corresponding VP all have perfective interpretations. Many V have perfective occurrences also. For example:

> The wounded man suddenly died.
> The children broke the Ming vase at a particular time.
> The guard locked the gate at 10 p.m.

Let us compare these sentences with some corresponding forms

----

[1] I am indebted to Henry Hiż for the suggestion of this frame.

Perfectivizing Effect of Stressed, Separable P in VP

V in imperfective frame	*VP in imperfective frame
John wore his brown suit until the buttons came off.	*John wore out his brown suit until S_2.
Mary used Sue's toothpaste until she found out about it.	*Mary used up Sue's toothpaste until S_2.
The horse drank the water until his belly was round.	*The horse drank up the water until S_2.
The chef cooked the meat until it was tender.	*The chef cooked up the meat until S_2.
We dragged the box until we came to a clearing.	*We dragged off the box until S_2.
John beat his little brother until his father came in.	*John beat up his little brother until S_2.
The sailor scrubbed the deck until it was clean.	*The sailor scrubbed down the deck until S_2.
She tore the dress until it was ruined.	*She tore up the dress until S_2.
The operator rang his number until he answered.	*The operator rang up his number until S_2.
He counted the sheep until he went to sleep.	*He counted up the sheep until S_2.
He shook the bottle until all the sediment disappeared.	*He shook up the bottle until S_2.
He slurped his soup until the waiter complained.	*He slurped up his soup until S_2.

which use prepositional operators:

    * The wounded man died out suddenly.
      The children broke up the Ming vase at a certain time.
   ? The guard locked up the gate at 10 p.m.

In general the last three sentences differ from their counterparts either in acceptability or appropriateness of certain adverbial modifiers. It seems that for V which generally have perfective occurrences by themselves, the VP occurs with process modifiers, e.g., <u>step by step</u>[2]. The occurrence of these VP with human or animate subject is often accompanied by modifiers such as <u>deliberately</u>, <u>on purpose</u>, etc. and not with modifiers such as <u>accidently</u>, <u>by chance</u>. For example:

     The children broke the vase accidently.
  ?*The children broke up the vase accidently.

and: *I broke that old chair for firewood.
       I broke up that old chair for firewood.

The usage of <u>break</u> here is analogous to that of a certain class of verbs such as <u>use</u>, <u>tear</u>, <u>cut</u>, <u>shake</u>, <u>tighten</u>, etc. in that it meets the following condition: When V and stressed, separable VP take the same subject-object noun pairs the following sentence is usually a paraphrase of NVPN: NVPN <u>by a process of repeated</u>   Ving.
                                         <u>continuous</u>

Consider the following paraphrase pairs:

---

[2]For the suggestion of this test modifier I am indebted to Henry Hiz.

The children broke up the vase.
The children broke up the vase by a process of repeated
breaking.

He locked up the house.
He locked up the house by a process of repeated locking
(of doors and windows).

He cut up the meat.
He cut up the meat by a process of repeated cutting.

He tightened up the cable.
He tightened up the cable by a process of continuous tighten-
ing.

She wiped up the spill.
She wiped up the spill by a process of continuous wiping.

For just this set of V we have the possible application of the

verb operator keep with the addition of repeatedly when NVN is

perfective and continuously when NVN occurs imperfectively.

As the previous examples and the lists on pp. 81-82 indicate, up is

the most frequently appearing operator. Except for cases where the

notion of direction is clear, as in blow up, stand up, stack up, the

preposition up seems to serve a general, abstract, and relatively

productive function as perfectivizer:

He's all spruced up.
She's all dolled up.
That really messed up my plans.
That grease will clog up the sink.
The cashier rang up the bill.
He scrounged up the money.

It is significant for the discussion of the sources (in terms of

PREPOSITIONAL OPERATORS
(a partial listing)

V	possible VP (domain may vary)
eat N	eat up N, eat out N
drink N	drink up N, drink down N
drink	drink up
use N	use up N
wear N	wear out N, wear off N, wear down N
wear	wear out, wear off
speak	speak up, speak out
? talk N	talk up N, talk out N, talk down N, talk over N, talk through N
tighten N	tighten up N
loosen N	loosen up N
sharpen N	sharpen up N
soften N	soften up N
brighten N	brighten up N
frighten N	frighten off N, frighten away N
scare N	scare off N, scare away N
work N	work out N, work up N, work off N
work	work out
sew N	sew up N, sew on N
tear N	tear up N, tear out N, tear off N, tear down N, tear away N
cut N	cut up N, cut out N, cut off N, cut down N, cut away N
break N	break up N, break out N, break off N, break in N, break down N, break away N
break	break up, break out, break off, break in, break down, break away, break through
shake N	shake up N, shake out N, shake off N, shake down N,
slow N	slow up N, slow down N
? speed N	speed up N , (*speed down N)
block N	block up N, block out N, block off N
lock N	lock up N, lock out N, lock in N
live N	live out N, live down N
stand	stand up
sit	sit up, sit down
die	die off
turn N	turn up N, turn out N, turn off N, turn on N, turn in N, turn down N, turn away N, turn around N, turn over N, turn under N
turn	turn up, turn out, turn off, turn on, turn in, turn away, turn around, turn over

PREPOSITIONAL OPERATORS (continued)

V	possible VP (domain may vary)
open N	open up N
open	open up
pass N	pass up N, pass out N, pass off N, pass on N, pass by N, pass around N, pass through N, pass over N
pass	pass out, pass on, pass by, pass through, pass over
try N	try out N, try on N
try	try out
help N +?	help out N
fold N	fold up N, fold out N
fold	fold out, fold up
blow N	blow up N, blow out N, blow off N, blow down N, blow away N, blow over N
blow	blow up, blow out, blow off, blow down, blow away, blow over
act	act up, act out
count N	count up N, count out N, count off N
wipe N	wipe up N, wipe out N, wipe off N, wipe away N
fake N	fake out N
buy N	buy up N, buy out N, buy off N
sell N	sell out N, sell off N
wring N	wring out N
bring N	bring up N, bring out N, bring off N, bring in N, bring over N, bring around N, bring through N
heat N	heat up N
cool N	cool off N, cool down N
pump N	pump up N, pump out N, pump off N
clear N	clear up N, clear out N, clear off N, clear away N
clean N	clean up N, clean out N, clean off N, clean away N
take N	take up N, take out N, take off N, take in N, take over N, take away N, take down N, take on N
make N	make up N, make out N, make over N

operators) that <u>up</u> alone often functions as a predicate meaning

<u>finished</u>:

> Your time is up.
> The jig is up.

B. Characterizing VP

It may be quite revealing to examine fairly extensive lists of

the verbs which do take stressed, separable prepositions as operators

on them to understand more exactly the extent of this class of opera-

tors, as well as the possible domain of operation for such an operator.

Certainly the description of VP as a class is related to certain

historical processes in the development of (American) English. The

bulk of the V_i which take P-operators are monosyllabic Germanic-root

verbs, although <u>finish up</u>, <u>polish off</u>, <u>divide up</u> indicate that this is

not a satisfactory characterization. In addition there is the problem

of specifying which monosyllabic Germanic root verbs do not have

VP forms. Moreover, certain intransitive verbs (e.g., <u>pass out</u>,

<u>die out</u>) seem to exhibit similar distributional properties, but since

the separable property depends on permutation with an object pronoun,

this defining test is not possible. For a large number of intransitive

occurrences (e.g., <u>The barn burned down</u>, <u>The ship broke up on the</u>

<u>rocks</u>) the VP can be derived from a correspinding transitive form

by zeroing of an indefinite subject (cf. <u>Someone burned the barn down</u> ,

<u>Something broke up the ship on the rocks</u> or <u>The rocks broke up the</u>

ship). Since the bulk of intransitives seem to be derivable in this

way from transitive VP (notable exceptions: die,speak), this may

prove to be an efficient way of representing all intransitive VP in

an operator algebra representation of language.

Returning to the question of characterizing which monosyllabic

Germanic-root verbs do not undergo P-operations, we note that

smile, laugh, grin, flee, and other possible candidates for the

perfectivizing P-operation show only weak tendency to appear as VP forms.

Since some of these verbs are reflexive in other IE languages

(cf. Polish: śmiać się=laugh, uśmiechnąć się=smile) the represen-

tation of intransitive VP as coming from transitive VP by zeroing

would also characterize this part of the set *VP. Presumably, a new

usage of one of these verbs as transitive would soon be accompanied

by an intransitive VP if the new usage permitted the subject to be

indefinite. The recent usage of laugh off and laugh down are examples.

C. Some Comments on *VP

The set *VP of verbs which do not have an occurrence with

stressed, separable P is interesting as such only for what clues

can be gotten for the decisions about operator domains and order of

operations. Assuming that new formations are usually monosyllabic

on analogy to the bulk of the VP, it is revealing only to look at

monosyllabic members of *VP. Like, love, own, wish, want are

all stative verbs which do not undergo the t(be) Ving operation. Since

these verbs are also difficult to perfectivize with the productive

perfectivizing operators, it is not surprising that they do not undergo

P-perfectivizing. One says I don't like him any more rather than

? I've stopped liking him or*I finished liking him. The only occurrence

of statives with perfectives seems to be certain devious and special

forms: She fell in love with him, I came to like her.

Since both want and wish are at least marginally in the operand

set of begin and stop, we must appeal to another set of facts to

account for the non-existence of want up, wish up, etc. The fact is

that in general no verbs which act as containers show any co-occurrence

with prepositional operators. In general, no verbs occurring with

complex objects, such as NVNPN, $NV(S)_n$ (container verbs),

NV that S, or double container verbs like cause are in the domain

of any P-operation. Presumably these complex objects make the

permutation complex or do not enter the domain of other operations

which may turn out to be integrally related to the permutation of

stressed, separable P. In general, then, the existing VP are all

characterized by simple NVN transitive occurrences (with arbitrary

adjunction of noun modifiers) or zeroings of these forms of the

following kind:

$$N_1VPN_2 \longrightarrow *VPN_2 \longrightarrow N_2VP \quad \text{for } N_1 \text{ indefinite (e.g., The barn burned down)}$$

or: $N_1VPN_2 \rightarrow N_1VP$ for certain indefinite N_2 (e.g., <u>John drank</u>
<u>up.</u>)

D. Imperative and Negative Imperative on Aspectual
Operators

Now that the basic types of aspectual operators for English

have been presented, we may look for the manifestation of the

analog of a phenomenon in Polish. We recall from the description

of Polish aspect in section III.A. that with negated commands in

Polish the imperfective form of the verb is more frequent and that

the perfective form is somewhat more frequent for non-negated

commands.

For English, there may well be an analog to this feature in

Polish, but it is pronounced only for the fully productive operators

and very weakly or not at all for the prepositional operators.

For the productive aspectual operators, consider the relative

acceptability of negated commands with and without the perfectivizing

operators:

> Don't run in those shoes!
> ?Don't take a run in those shoes!
> ?Don't go for a run in those shoes!

Likewise for other productive operators:

> Don't look at the sun!
> *Don't take a look at the sun!

And for some other operators which are clearly perfectivizing:

Don't joke about that!
?* Don't tell a joke about that!
(however: Don't tell jokes about that!)

For the prepositional operators which seem to affect very little other than the co-occurrence distribution related to aspect (e.g., shine, shine up), there are many cases where the negative perfective is definitely less acceptable than the negative perfective, i.e. Don't VP! is definitely less acceptable than Don't V! For example:

Shine up these shoes !   (?) Shine these shoes !
? Don't shine up these shoes!   Don't shine these shoes !

However, there seem to be at least as many verbs for which there is virtually no preferred form:

Open that box !   Open up that box !
Don't open that box !   Don't open up that box !

Thus for the prepositional operators the effect, if any, is too small or irregular to be described at this point. More information is needed about the varying scope of negation in particular.

E. Possible Operator Sources for VP

Among the verbs which take stressed, separable P as operators there is a small group, let us call them V_i, which are basically imperfective in that $N_1 V_i N_2$ usually occurs imperfectively according to the various tests proposed. The verbs of V_i are to be distinguished from other verbs which may be used easily in either frame. Thus a verb like use is differentiated from a verb such as

eat:

John used Bill's pencil for a few minutes.
?*John ate an apple for a few minutes.

John used Bill's pencil until it broke.
? John ate an apple until the bell rang.

A verb of V_i is characterized by its imperfective occurrence even when the object is a singular noun. Note that <u>eat</u> can become imperfective when the object is an indefinite or definite plural noun or a mass noun (in certain cases):

John ate apples for awhile.
John ate (things) until he became full.
John ate tree bark until spring came.

The verbs V_i which act like <u>use</u> form a relatively small group containing: <u>use</u>, <u>help</u>, <u>wear</u>, <u>turn</u>, <u>shake</u>, <u>walk</u>, etc. For $V_i P$ there is almost always a perfective occurrence although the domain of noun pairs may change:

We will use your name in the reference.
* We will use up your name in the reference.

For those $V_i P$ that do occur, a paraphrase may often be given as:

$$N_1 V_i P N_2 \longleftarrow N_1 V_i N_2 \text{ \underline{until} } (N_1 V_i N_2)_n \text{ } t(\underline{be}) \text{ \underline{complete}} .$$

In a way that is somewhat more marginal, this form paraphrases the perfectively occurring V as well, but with the reading that

$$N_1 t(\underline{keep}) V\underline{ing} N_2 \text{ \underline{until} } (N_1 V_i N_2)_n \text{ } t(\underline{be}) \text{ \underline{complete}} .$$

Thus in describing English structure, it may be possible to replace

the problem of describing VP forms (for stressed, separable P) with the problem of describing certain $S_1 C_t S_2$ forms where the P does not appear in either S_1 or S_2. More likely, however, a simpler operator source is possible. For many occurrences we get NVPΩ replaceable by NVΩ <u>to completion</u> or (NVΩ) t(<u>be</u>) <u>to completion</u>.[3] Since the fact is that many perfectivizing P change the meaning (i.e., co-occurrence restrictions) of the V in ways other than the aspectual deformation there may be serious limits as to how adequate a single source will be.

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[3] The suggestion of this kind of operation was made by Zellig Harris in a conversation.

VI. Tense, Aspect, and Adverbial Time Expressions

A. Types of Adverbial Time Expressions

Any decision made about the operator representation of tense and aspectual occurrence must ultimately take into account the variety of adverbial time expressions which accompany the aspectual occurrences as well as the possibility of their occurrence in conjoined sentences. As we have indicated, there are limitations on the kind of time expressions that can be added to a $S_1 C_t S_2$, and, of course, these limitations are related to the particular aspect (partially because of the definition of aspect through co-occurrence tests). In preparation for a brief discussion of the problem, let us name and describe several varieties of adverbial time expressions (where this term covers adverbs like <u>tomorrow</u> and more complex modifiers such as <u>at three</u>, <u>on the fifteenth</u>, <u>in March</u> and many others).

1. bin location

The past and future tense markers act as classifiers of two categories of time expressions (called <u>bin location</u> and <u>point location</u> expressions) between which there is no well-defined borderline. In terms of their mutual co-occurrence, they behave in a readily describable way. Expressions of <u>bin location</u> (e.g., <u>tomorrow</u>, <u>last night</u>, <u>in November</u>, etc.) serve (perhaps successively) to delimit other bin locations or point location expressions. In <u>On March</u>

15th, 1967, at 3 a.m., the bomb exploded , the successive (nested)
bin location expressions are 1967, March, 15th, a.m. Each bin
location expression has two point location expressions associated
with it as beginning and end, as indicated by usage of sentences
like When tomorrow ends (at midnight) she'll be far away , At the
beginning of 1967 the country awakened.

2. point location

Although most S do not contain an explicit expression of point
location (e.g., at that time, now, at noon, etc.), the tense marker
also classifies any point location expressions which may occur,
consistently, needless to say, with the bin location expressions.
It is significant that many C_t form point location expressions with
following S and their corresponding P_t form such expressions with
nominal phrases (e.g., when they dropped the bomb, as we crossed
the street). For the time being, we can exclude these from the
discussion. A defining property of a point expression is one which
cannot be further delimited. For one verb occurrence in a sentence
there may be several bin location expressions, but never more than
one point location expression without giving appositive reading to the
sentence.

3. duration

Expressions such as for three days, all day long, etc. are not
expressly classified by the tense markers, but normally occur

consistent with the bin location expressions which may be present, e. g.:

    * All day last month we watched TV.
      We slept all day Thursday.

Likewise there are restrictions against point and duration expressions

occurring with the same verb:

    * All day long at four o'clock we read.
    * For three hours at that time we played bridge.

    4. iteration

Expressions such as n times , twice, etc. are classified as

iteration expressions and do not normally occur with the t(be) Ving

operation and cannot occur in the same sentence (excepting under

container verbs) as duration expressions. Note:

  ? For four hours I sat there three times.
  ? I was talking to him twice.

There may be some exception for once which does occur in:

    Once I talked to him for five hours.

    5. customary time

The form of the simple present tense, besides serving as the

regular present for container and stative verbs, normally has

several usages including "customary time": He eats three meals

every day , He usually gets there before I do. Customary time

expressions can take forms such as every Tuesday, seldom, always,

never, rarely, etc. Although there is undoubtedly a whole new set

of problems involved in a detailed description of these constructions

used with general tense , they are not integrally related to the

description of tensed constructions except in their similarity of

source. This feature will be considered briefly in section C below.

B. Redundancy and Apposition in Modifying $S_1 C_t S_2$

Let us look at some pairs of sentences of the form $S_1 C_t S_2$

with and without the addition of certain time expressions:

> John came before Mary left.
> John came at 5 p. m. before Mary left.
>
> John read until the sun set.
> John read for four hours until the sun set.
>
> He phoned the library while she was doing the dishes.
> He phoned the library at 7 p. m. while she was doing the dishes.

For the imperfective S_1 in the second pair, the addition of an express-

ion of time duration seems to change the intonation and reading of

the $C_t S_2$, giving it a sense of apposition (comma required) such that

it is paraphrasable by two sentences :

John read until the sun set. John read for four hours. Likewise

for the first and third pairs, the perfective verb with both definite

point location time expression and $C_t S_2$ seems slightly less

acceptable and has a strongly appositive reading. Similarly for the

S_2, added time expressions contribute to a particular kind of redun-

dancy bordering on unacceptability:

(?) John came before Mary left at 5 p. m.
(?) John read until the sun set at 7.
(?) We waited until John came, just a few minutes ago.

To regularize these appositive expressions we would need the

addition of <u>the time at which</u> immediately following the C_t, and

<u>which</u> t(<u>be</u>) just before the added D_t. In each case, then, the sen-

tence $(S_2)_n$ t(<u>be</u>) D_t could be recovered from the non-restrictive

relative clause by established transformational procedures.

C. General Present Tense with C_t

A further word is in order regarding general tense expressions

such as:

Max kisses his wife before he leaves for work.
The lion waits until his prey starts to feed.

Since the modifiers for general tense sentences can frequently appear

as predicate adjectives, e. g.,

Max's kissing his wife before he leaves for work is usual.
The lion's waiting until his prey starts to feed is rare.

there seems to be motivation for considering these modifiers as

instances of a sentence operation which has been applied after the

conjunction operation (in the operator representation). This is quite

analogous to the introduction of tenses by means of single operators

on $S_1 C_t S_2$ forms which is possible as a consequence of the single

tense hypothesis. Whereas the tense operation allows the operation

of other time expressions subsequently, they must be the kind of

definite time expressions compatible with that tense. For strings

with no tense operation, the operation of general tense modifiers

can be carried out. A consequence of this view is that S_1 and S_2 do

not have <u>any</u> independent time expressions in them, but that all

time expressions for $S_1 C_t S_2$ expressions are predicated of the

conjoined string. No attempt to investigate this has been made as

yet.

VII. Special Problems with t(<u>have</u>) V<u>en</u> and t(<u>be</u>) V<u>ing</u> Operations

1. <u>have</u> V<u>en</u> allows addition of <u>since</u>

In dealing with the operator traces which remain in S_1 or S_2

when the common tense is factored out of the operator representation

(however we may care to formulate this) a number of residual

problems arise. One would like to know to what extent the traces of

the t(<u>have</u>) V<u>en</u> and t(<u>be</u>) V<u>ing</u> operators are conditioned by the con-

junction environment and just how the verb subcategory and other

formally specifiable features interact to determine the specific

structures which may occur. The discussion of the deviant appear-

ance of the <u>have</u>-operator trace before most C_t can be referred to

chapter II where we paraphrased, e.g.:

> John has (on occasion) waited until Mary arrived.
> It has happened that John waited until Mary arrived

so showing that there is conformity of tense morphemes under the

operator: t (<u>have</u>) V<u>en</u>.

The function of the <u>have</u>-operation with <u>since</u> has already been

touched on in III.B.3. In particular, there seems to be a lack of the

<u>have</u> trace without additional modifiers when the sentence is paraphrased

by adding <u>on one occasion</u> (i.e., the marginal acceptability is preserved

in the paraphrase:

> He has gone to New York.
> He has gone to New York on one occasion.

For the types of adverbial time expressions described in chapter VI,

the expressions of duration, point location, and bin location

rarely occur with the have-operation except with iteration express-

ions. With both have and be as operators we may have duration

expressions:

> You've been reading that book for a whole hour.
> ? You've read that book for a whole hour.   (with duration)

> ? You've opened the door at 8 p.m.   (with point location)
> ? You've opened the door today.   (with bin location)

but: You've opened the door three times today.

Certain adverbs (e.g., just, already) may suffice with these perfec-

tives to raise the acceptability to near normal. But basically the

"stock-taking" function of the have-operator indicates co-occurrence

with iteration adverbs of number (e.g., twice) or the progressive

sense of the t(be) Ving operation:

> I've eaten there twice this week.
> I've been eating there this week.
> He's been working there for seven years.

Although since generally occurs with the have-operator, not all

occurrences of t(have) Ven are accompanied by since S_2 :

> You've just won a prize.
> * You've just won a prize since S_2.

This seems particularly true when bin location expressions have

been added:

> * I've eaten there twice this week since S_2
> ?* I've been eating there this week since S_2
> ? You've won three prizes today since S_2

2. $\underline{had}$ $\underline{Ven}$ often allows replacement with $\underline{before}$ S_o (past tense)

Although $\underline{had}$ $\underline{Ven}$ is in many ways analogous to the corresponding present tense form, its occurrence with past tense allows a regularization using $\underline{before}$ which is not possible with present due to the impossibility of ordering now-present tense statements. In general, $\underline{had}$ $\underline{Ven}$ occurs only when there is an occurrence of past tense in the immediate discourse environment. This is difficult to show since the agreement on acceptability of discourses is not as good a datum as the agreement on acceptability of sentences. But using a certain regularization with C_t, this hypothesis may be checked.[1]

We claim that $\underline{had}$ $\underline{Ven}$ is an abbreviation for the metalinguistic ordering of two past tense statements. Thus:

John said he had (just) seen a flying saucer.
John saw a flying saucer (just) before he said, "I saw a flying saucer".

John was feeling bad. He had just eaten his sister's cake.
John ate his sister's cake just before he was feeling bad.

John had packed a lunch before he left home.
John packed a lunch before he left home (and this was before S_o).

In general, there is a close analogy between regularization to $\underline{before}$ S_o (past tense) and regularizing $\underline{have}$ $\underline{Ven}$ to $(S)_n \underline{is\ by\ now}$ proposed by Harris[1] or an analogous S(past) $\underline{before\ now}$.

3. effect of $\underline{had}$ $\underline{Ven}$ on S_2

The trace of $\underline{had}$ $\underline{Ven}$ seems to be eliminable in many cases by

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[1] These procedures were communicated by Harris in public and private discussion.

the paraphrase suggested in the previous section. For had Ven

in S_2, however, the mechanism does not seem to be the same.

With the exception of after, had Ven does not seem to occur in S_2

without occurring in S_1, in which case the single regularization

as for S_1 alone has the same effect. For after, had Ven in S_2

alone seems to be slightly preferable in some cases to the simple

past form (i.e., "past") although this may be related to the need

for excluding causal interpretations which after sometimes gives.

In cases where the difference seems substantial, we can often

substitute S_2 before S_1 as a paraphrase up to presupposition.

4. Adverbial Co-occurrences with t(be) Ving

There seems to be some promise of finding more exactly

which adverbs co-occur with the be-operator trace by using

the tests developed for aspect in this work. We note that with

point time expressions the operation is quite natural:

John is mowing the lawn now.
John was swimming when I came into the backyard.

In addition, the more refined perfective tests do not work:

* John was suddenly swimming.
* John's being in the process of swimming occurred at some time.

In general, the operator behaves as an imperfectively occurring

verb and operates on perfectives, so that it acts somewhat like an

imperfectivizing operator. Further study of the relationships with

while and as may prove fruitful.

VIII. Interaction of $S_1 \, C_t \, S_2$ with Performatives

A. Imperatives

A frequent occurrence of C_t is under imperatives in expressions like: <u>Look before you leap!</u> and <u>Don't fire until you see the whites of their eyes!</u>. In the view of Harris[1] and, more recently, others, imperatives and questions may be represented as resultants of the zeroing of performative container strings. In this view, the above two commands would be represented by the following source in terms of operators:

I $\begin{Bmatrix} \text{request} \\ \text{command} \end{Bmatrix}$ (of) you that you look before you leap.

I command (of) you that you not fire until you see the whites of their eyes.

With the zeroing of the container there is also a zeroing of the second person pronoun <u>you</u>.

Two additional comments will be made here in view of the claims being made about tense and aspect in the preceding chapters. The first regards the tense of the operand string under the imperative container operator. As was argued in chapter II, the appearance of present tense in the S_2 in the presence of a conjunction C_t such as <u>before</u> is not possible except as a zeroed future tense. This implies that the tense for S_1 (i.e., the tense for the conjoined sentence as a whole) also be future. It is entirely reasonable that commands be

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[1]Zellig S. Harris, "Transformational Theory" in <u>Language</u> Volume 41, No.3, 1965, pp. 391-392.

formulated as present tense performative operations with verbs

such as command and request and that these be restricted to

domains of sentences on which the future tense is present. Thus

in the operator system of Harris we would propose the following

source representation of the first imperative construction above:

I request (of you) that (you will look before you will leap).

The reduction of the second will to zero phonemic form would

precede the zeroing of I request (of you) that along with zeroing

of you will and the morphophonemic addition of special intonation.

The second comment regards the particular support available

for the zeroed performative representation on the basis of sentences

such as Don't shoot until you see the whites of their eyes. Note first

that we do not have Shoot until you see the whites of their eyes!

in the same context. (If necessary, shoot may be replaced by

drop the bomb to bring out the perfectivity.) This would violate

the imperfective frame before until. Rather, the sentence is produced

regularly from:

I command (of) you that (you will not shoot until you will see the
whites of their eyes).

Zeroing of the redundant second will and zeroing of the operator string

plus you will leaves:

Not shoot until you see the whites of their eyes!

which a generalized morphophonemic operation takes to:

Don't shoot until you see the whites of their eyes !

A final comment about the non-occurrence of commands under C_t is in order. Because commands are represented as phonetically zeroed present tense operators, it follows that for those C_t which never take the now-present tense, no command could appear in an operand sentence under that C_t. The fact that we do not get

John came before watch out ! or other commands as S_2 or true S_1

is simply in harmony with the single tense hypothesis and the inequality ordering for before, after, since, and until. For while, as and when, the only occurrence of present tense seems to be the occasional use of while with essentially durative S_2 and often S_1. Since the performative operator verb is not imperfective, it is not surprising that we do not get commands under while. In any case, the use of conjunctions for present tenses seems to be extensions (except for general tense with present tense morpheme discussed in VI. C.) and not among their central functions.

B. Questions

The treatment of questions closely parallels that of commands in that they are derived from a performative ask. But, unlike commands, questions are possible on any tense form and act to preserve that form in spite of other zeroings, permutations, and morphophonemic

changes. This is the reason why we have the C_t <u>since</u> in questions but not in imperatives: imperatives must operate on a future tense and <u>since</u> never appears with future tense.

Harris asserts[2] that questions requiring a yes-or-no answer are essentially double statements of the form:

I ask you whether S or not S

An independent confirmation of this fact comes from the study of C_t. In particular, why do we not have:

*Didn't the bomb explode until the police arrived?

but we do have:

The bomb didn't explode until the police arrived ?
You say the bomb didn't explode until the police arrived ?
Did you say the bomb didn't explode until the police arrived ?

as paraphrases. The non-occurrence of *<u>Didn't the bomb explode</u> <u>until S_2</u> can be explained from the non-occurrence of *<u>The bomb</u> <u>exploded until the police arrived</u> which violates the imperfective requirement for S_1 preceding <u>until</u>. The unzeroed source representation of the unacceptable question above is:

I ask (you) whether (the bomb didn't explode until the police
                                                    arrived)
                    or (the bomb did explode until the police
                                                    arrived).

The unacceptability of the second half of the question precludes the acceptability of the whole question or any form derived from it by

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[2]Harris, "Transformational Theory", pp. 391-392.

zeroing and permutation plus morphophonemic changes. The source of

the askable (acceptable) form is reconstructable from the three

listed paraphrases as:

> I ask (you) whether you {meant / said} that (the bomb didn't explode until the police arrived)
> or you didn't {say / mean} that (the bomb didn't explode until the police arrived)

Another (regular) paraphrase derivable from this source by zeroing,

permutation, and morphophonemic change is the frequent:

> Do you mean that the bomb didn't explode until the police
> arrived?

The fact that we have:

> Didn't the bomb explode before the police arrived ?

with before is consistent with the fact that both The bomb didn't

explode before the police arrived and The bomb exploded before the

police arrived are acceptable.

IX. Relative Position of C_t in the Ordering of Transformations

A. C_t Viewed as Binary Operation

Although there are strong reasons for classifying the operation φ_{C_t} as a kind of unary operation, it is quite useful to view the conjunction of two sentences by a C_t as a binary operation. Primarily, C_t conjoins two sentence forms of parallel structure (i.e., NVΩ) where the types of adverbial time expressions which may be present are strictly limited. (It appears at this point that no such expressions may be present in the operand sentences). Virtually all instances of string types appearing before C_t which cannot appear following it (e.g., the imperative VΩ structure) are the resultants of operations, usually of the class φ_S, which have been performed after the conjunction operation. This includes questions and imperatives which, according to the view taken here, do not appear in either S_1 or S_2 in the domain of the conjunction operation. The occurrence of any adverbial time expression as a modifier of just S_1 or S_2 (e.g., John waited until Mary arrived at 5 p.m.) is either added appositively, thus being equivalent to the adjunction of another sentence by means of zeroing part of a parallel co-ordinate form (e.g., John waited until Mary arrived and Mary arrived at 5 p.m.), or this occurrence is a modifier of the sentence as a whole and is thus the trace of a sentence operator whose application follows the conjunction operation, as in Yesterday (Max took a walk before he ate breakfast).

B. C_t Viewed as Unary Operator.

As Harris has suggested[1] there are reasons for considering conjunction as a unary operation since the choice of S_2 given S_1 is not entirely free. This is particularly true for the subclass C_t of the class C_S of subordinating conjunctions, since the selection of S_1 restricts the choice of C_t depending on whether or not the verb of S_1 is imperfective or perfective in its occurrence, and given $S_1 C_t$, the choice of S_2 is already determined with respect to tense and aspect as shown in the preceding chapters. As will be shown in section D below, there are also general restrictions on the form of S_2 such as to exclude _it_- extractions and certain permutations which disturb the NVΩ form of the operand string.

From the study of C_t it seems clear that the C_t conjunction operation is in many ways analogous to the _wh-_ conjunction of relative clause formation. First of all, the sharing of a time adverb position (plus an ordering specification for some C_t) parallels the noun-sharing of the C_{wh-}. In addition, the freedom of occurrence of the remaining sentence elements is of the same magnitude despite the difference in the domain of the selection restrictions. For example:

We met a man yesterday. The man owns a Ferrari.
We met a man who owns a Ferrari yesterday.

-- --

[1] Harris, _Mathematical Structures of Language_, p. 104.

I laughed at a time.   They showed me the picture at this time.
I laughed when they showed me the picture.
(cf. <u>I laughed at the time at which they showed me the picture.</u>)

Moreover, for certain logics, in both cases the structurally subordin-
ated S can be taken as a presupposition of the conjoined sentence and
the S_1 has the force of assertion.[2]   Thus in the above set of examples
both <u>A man owns a Ferrari</u> and <u>They showed me the picture</u> are
presupposed by the conjoined sentences.

C. Operators Which May Act on C_t

1. φ_S: Most types of φ_S seem to operate on sentences conjoined
by C_t:

That John went to a bar before he returned home surprised
                                                  Mary.
For him to quit before he gets his degree would be easy.
I doubt that Mary watched TV until Jack came home.
John decided that he will keep the apartment until he finds a
                                           house.
I asked him whether he came before the firetrucks arrived.

2. φ_V: Some may operate, perhaps with intervening operators:

I've given up looking before I leap. (on general present tense)
He tried reading until he felt sleepy.

3. φ_C: Most kinds of conjunction can operate on C_t conjunction;
<u>wh-</u> conjunction : (provided that $C_t S_2 = D_t = \Omega$)

I saw the man who hit John before I entered the building.
$$\varphi_{C_{\underline{wh-}}} (S_1 C_t S_2, \ S_3) \longrightarrow S_1 (\underline{wh-} \ S_3) \ C_t S_2$$

The man whom I saw before I entered the building hit John.
$$\varphi_{C_{\underline{wh-}}} (S_3, \ S_1 C_t S_2) \longrightarrow S_3 (\underline{wh-} \ S_1 C_t S_2)$$

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[2]Keenan, op. cit.

co-ordinate conjunctions:

> Mary returned home when it got dark, but Jack didn't come
> back until he got hungry.

subordinate conjunctions:

> John left before Mary came because he owed her five dollars.
> Mary was angry because John left before she came.
> I kept visiting Mary before I went to work until my colleagues
> > complained.
>
> I didn't see John until he came in with Mary after the party
> > broke up.

4. Paraphrastic operations

A number of zeroings, pro-wordings, and permutation operations

may follow conjunction by C_t. The most important permutation, perhaps,

gives $C_t S_2$, S_1 from $S_1 C_t S_2$ although there are some stylistic constraints

governing order preference. Besides the aeroing of <u>will</u> in S_2 , the

usual zeroings and pronounings under conjunctions occur:

> John will leave before Mary will.
> I didn't see the man until you saw him.
> I didn't see the man until you did.

D. Operators Which May Precede C_t

In general, S_1 and S_2 may have undergone any operations which

leave a NVΩ structure, including the (kernel) form of <u>it</u> of <u>It rained</u>

counted as N, but not the <u>it</u> of <u>It was John who came</u>;

> John arrived before it started to rain.
> * John arrived before it was Mary who left.
> ?* Several minutes passed before it was John who emerged.
> - (note that <u>It was John who worked until I came</u> is the resultant
> > of an <u>it</u>-extraction following the C_t <u>until</u>)

Certain permutations (and perhaps all of them) are also excluded

from the operand sentences:

John winced when she chose this dog.
?* John winced when this dog she chose.

Certain ϕ_S which have the effect of permutations are also excluded:

John was angry when the fact that Mary was coming surprised
Sue.
* John was angry when that Mary was coming surprised Sue.

X. Summary and Implications

A major goal of the work has been to specify as much as possible some necessary conditions that two sentences must meet to be conjoinable by C_t. After arguing on the basis of three separate phenomena that $S_1 C_t S_2$ sentences can be treated as one string under an operation of tense and that S_1 and S_2 cannot contain independent tense morphemes, we showed how some frequently used verb operators give resultants which have different aspectual occurrences, defined on the basis of co-occurrence with certain time expressions, from those of the operand verb. These operators, grouped in classes of unrestricted operators, restricted operators, and, as a subclass of the latter, prepositional operators, have very restricted aspectual occurrences (except when occurring as operands of other aspectual operators) so that they may be described as perfectivizing or imperfectivizing operators depending on the unique occurrence type of their resultants.

In making a choice between representation of time conjunctions as binary or unary operations, the comparison with the $C_{\underline{wh}-}$ operation should prove fruitful. The operations in each case give resultants which share a word position, although in the case of the C_t, the only trace of this sharing is the C_t itself. The operation of a single tense on $S_1 C_t S_2$ may prove to be an important factor in separating these C_S from elements in the remainder set such as

<u>because</u>. Both causal subordinating conjunctions and the co-ordinating C_o seem to be virtually free with regard to the tense dependency of the constituents.

If the regularization of the t(<u>have</u>) V<u>en</u> operation forms can be carried out along the lines mentioned for all cases despite the overlay of other subsequent operations, then the regularization of discourse with respect to time expressions will be enriched. It seems that tense might then prove to be representable as an operation over sections of discourse and that the changes in tense operations could serve as useful markers for the subsections of a discourse in some predictable way.

For Harris' algebra of operators, the work undertaken here gives support for the view that all time expressions arise from sentence operations. In particular it seems possible to generate sentence representations by sentential operators which leave a zeroable trace and which restricts the conjunction, adverbial modification, and tense operation of subsequent operators. There is no support for a view that tense is an operation on only a part of a sentence.

Perhaps the most significant result of the work here is the demonstration that aspect is a useful working construct in the formulation of grammar and that it correlates well with diverse features of the grammar in such a way that we may expect to simplify the description considerably through its use.