TRANSFORMATIONAL GRAMMAR AND THE NATIVE SPEAKER: SOME ELEMENTARY ISSUES

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1. INTRODUCTION

This paper deals with a number of elementary issues which invariably arise in the course of explaining the main concepts of transformational-generative grammar to students of linguistics.[1] The issues, though elementary, are none the less important for that. However, those already familiar with the transformational approach will find little that is new here, except perhaps a way of looking at and presenting certain problems, and the discussion of data from a New Guinea language which appears in the final section.

In the first few sections I outline what I think are the most important features of transformational grammar, using as little as possible of the technical jargon and complex notation that in my opinion obscures many introductory treatments. In particular I try to discuss such notions as "phrase structure rules", "deep structure", "transformationally related sentences" and "ordering of rules" in terms of their significance to the native speaker of the language under study, with minimal reference to the technical functions of these constructs as part of the mechanics of a generative grammar. Sec.5 deals with some recent and still controversial developments in the theory of grammar. The final section attempts to show how recent hypotheses about the semantic and syntactic structure of words and sentences, based on the study of English, can be supported by observations on a New Guinea Highlands language.

2. The Subject Matter of Transformational-Generative Grammars.

Most transformationalists (and many other linguists today) hold that the job of a grammarian is to try to define what it is that someone knows when we say he "knows a language". In learning his native tongue, a person acquires a set of skills most of which he shares with the rest of his speech community; in a sense what he has learned is a code

of customary ways of behaving, and by following this code he is able to communicate fluently and creatively with other speakers of the langugage.

The question is, what are these skills or customs which underlie competence in a language? Unlike many customs, most linguistic ones are learned subconsciously, more or less as a child learns to see, to walk, to sing or to play a musical instrument "by ear". The behaviour of fluent English speakers, for instance, leaves little doubt that they have mastered a very complex set of habits, perceptual processes and concepts, but precisely what these entities are, the ordinary speaker of English is unable to explain. It must be admitted that most of their knowledge is tacit, and some scholars prefer a word other than 'knowledge' to refer to the psychological processes involved in the use of language: perhaps 'habits' or 'percepts'. The terminology is not important, however, for it is only a matter of names, and the real problem is to define precisely what the abilities are that underlie fluency in a language.

Transformationalists have laid particular emphasis on the creative aspect of language use. They are fond of pointing out that there are at least 10^{20} possible English sentences 20 words long, and that it would take a person something like four thousand billion years just to listen to them all. They add that most of the millions of sentences we actually hear and utter during our lifetime are sentences which we have never previously heard. It seems clear enough that the ability to put together and to comprehend all these novel utterances must involve the mastery of some quite complex patterns and principles.

It is the grammarian's task to make explicit what the ordinary language user knows tacitly but cannot explain, and to describe his findings in the formal language of grammar books. It would seem that the linguist is in much the same position as the child learning a language, yet from this he has to work out the principles by which utterances in the language can be constructed and understood. The chief difference, as noted, is that the linguist has to be able to explain these principles to his audience. So far linguists have had only limited success in achieving this extremely formidable aim. Later we will consider a few of the specific abilities which have been observed to be characteristic of speakers of English, and which linguists have tried to 'explain' in detail.

At this point it is as well to clarify what is meant here by the term 'explain'. What the linguist observes are bits of speech behaviour - noises and other actions. He is not, however, primarily interested in the physical properties of this behaviour. Rather he knows that the noises and reactions to these noises have to do with the conveying of messages or meanings between individuals, and hopes to work out the relationship between the observed behaviour and the meanings which are communicated. When he has worked out this relationship he can claim, in a sense, to have 'explained' the system of communication - he has revealed the principles on which it is based. For instance, he may begin with the theory that certain sound differences affect meaning. He observes that by slightly changing the form of utterance, as in the series bit, pit, kit, lit, etc. the native speaker's understanding is affected. He sets up a theoretical construct, a series of "phonemes", which are capable of affecting meaning, even though they themselves do not carry meaning. If subsequent observations confirm that phonemes do indeed seem to play this role in communication, the phoneme can be considered a useful explanatory concept. Like any other theoretical construct, its existence can never be proved beyond all doubt, but insofar as the evidence suggests that phonemes are among the perceptual mechanisms (percepts) which are involved in the conveying of meaning then they must form part of the explanation of the relationship between sound and meaning.

For a time linguists used to think that the relationship between observable bits of speech behaviour and the meanings communicated was a simple and direct one. Each utterance was thought of as divisible into structurally significant units on a number of levels - phonemic, morphemic and syntactic. These structural units, each of which carried a meaning or was capable of changing meaning, were in every case directly realized as an observable segment of the speech noise (noun phrases realized as a sequence of morphemes, with these morphemes manifested in a sequence of phonemes, and each phoneme represented by a phonetic segment.) An adequate description of any utterance involved cutting the speech noise into segments and assigning each segment to the appropriate higher level unit. Exactly how the user of the code correlated sound and meaning was not discussed in much detail, but I think it is fair to say that the relationship was conceived of as involving the connection of the meaningfully significant structural units with particular segments of sound in a fairly simple and direct way.

Recent work, much of it by transformationalists, has shown that this view oversimplifies the problem. The processes by which sound and meaning are correlated are evidently highly complex. To account for certain awarenesses displayed by the language user we must postulate that he operates with a very complicated set of perceptual processes, which connect sound and meaning only in a very indirect way.

Transformational-generative grammar takes its name from two features of the approach. The first is the postulation of "transformational rules" as one of the perceptual mecahnisms involved in the production and understanding of utterances. More will be said about this in Sec.4. The second feature is the emphasis on "generative capacity", a term which requires careful definition because it has more than one meaning.

When developing the early versions of transformational grammar, Noam Chomsky asked what is the least we can expect a grammar to try to do. He concluded that a grammar should at least try to specify which utterances in the language are grammatical and which are not. A grammar that can do this has 'weak generative capacity'. That is, its statements will predict grammatical utterances but no ungrammatical ones.

Weak generative capacity is of rather limited interest to linguists, however, and its importance has been greatly overemphasized by some writers. It is a very minor feature of the transformational approach, and indeed is not really a new idea. Many pre-transformational grammars (both traditional and structural) were, at least in spirit, intended to predict grammatical utterances while excluding non-grammatical ones. What transformationalists did was to emphasize that there is no limit to the number of possible sentences in a language, that the linguist can never hope to observe more than a small number of these, and therefore, much of his effort must go into trying to predict which of the theoretically possible but unrecorded sentences will in fact be accepted as grammatical by users of a language. It was also pointed out that existing grammars were not quite explicit enough in their claims to actually be predictive. A predictive or generative grammar must give completely explicit instructions about how to achieve the desired final result – an output of grammatical sentences.

However, a grammar may achieve the right result by the wrong means. Even if an exhaustive generative grammar were available which would predict all grammatical utterances while excluding all ungrammatical ones (and such exhaustiveness has, of course, never been attained), there is no guarantee that it would tell us why certain utterances are grammatical or ungrammatical. A much more interesting grammar, then, is one which will correctly describe the internal structure of grammatical utterances, i.e one which describes the concepts which allow the native speaker to make such judgments as "This utterance is English; that one is not English", "This utterance is completely grammatical; that one is not quite right (even though I understand it)", or "This utterance is ambiguous; it can mean either X or Y". A theory which can not only predict judgments of grammaticality but can also explain why these judgments are passed (e.g an utterance is wrong because certain words are placed in the wrong order, that some essential word has been left out, that an object has been used after an intransitive verb, etc.) is said to have 'strong generative capacity', or to be 'descriptively adequate'.

This requirement of strong generative capacity must be placed on generative grammars to ensure that the constructs which it uses, in sorting out grammatical from ungrammatical utterances, are linguistically significant entities. Any theory concerned with predicting an infinite number of sentences must obviously break these sentences down into units and state how these units are combined into sentences (or equivalently, how sentences are analysed into units). But some of the steps in the generative process may involve the manipulation of completely artificial constructs, concocted by the linguist to simplify the predictive process. Such artificial constructs, insofar as they cannot be shown to correspond to some aspect of the native speaker's linguistic judgments, tell us nothing about the language and therefore are of no linguistic interest. A linguistically significant construct is one which explains some feature of the language user's speech behaviour, and the adequacy of a grammar must always be measured in terms of how wide a range of linguistic behaviour it can explain.

Achieving strong generative capacity or descriptive adequacy is the hardest task in writing a grammar. Certainly many linguists fail to convincingly show that their theories do deal with linguistically significant units. To the extent that they fail to do this, they leave themselves open to the claim that they are only playing logical games with their data.

Transformationalists have tried hard to take the study of syntax out of the realm of "logical games" and place it on the same footing as phonemics, i.e. as a branch of linguistics that deals with the native speaker's perceptions. Few would claim that to date any theory has got to the bottom of syntax, but as Emmon Bach has observed, at least in terms of "the issues it has raised and the re-examination of basic assumptions it has stimulated...it would seem that transformational theory has been very successful indeed" (Bach 1964, p.186).

One criticism levelled at some expositions of transformational grammar is that their writers show too great a concern with "simplicity" (defined in terms of the number of symbols used) as a criterion for judging the adequacy of a grammar, and too little concern with thorough exploration of the native speaker's judgments as the means of choosing between two alternative theories (grammars) of a language. While simplicity, measured by some non-linguistic criterion such as number of symbols, may be an a priori argument in favour of any scientific theory, it by no means guarantees the correctness of a grammar. It may be that the language learner's brain is not capable of organizing speech material in certain logically possible ways, but must use processes that are more complex than the simplest logically possible mechanisms.

The question now arises how the linguist is to obtain information about the linguistic percepts of the language user. These percepts are not observable entities. The linguist can only infer their existence from the way people behave. (It may be noted here that a grammar is thus a theory, not a description; only things that are open to public inspection can be described).

Faced with a similar problem the psychologist or physical scientist turns to experiments to throw light on his subject matter. He devises a situation in which the number of variables are severly limited, so that he can be fairly confident that any events observed in the course of the experiment will provide information about the relationships between the variables.

Linguists have so far got on reasonably well with very little use of experimental techniques, although there is reason to believe that some areas of their subject will yield only to experimentation. There are several reasons why linguists have gained some substantial insights without knowing much about experimental methods. For one thing, even when he is working on a previously unrecorded language, the linguist is able to observe and take part in a great many conversations and other speech situations. Consequently he has easy access to a great deal of data, including

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many speech situations which are so highly structured that they are equivalent to a well designed experimental situation. Casual observation alone, therefore, will provide an enormous amount of information highly relevant to the problem of understanding the native speaker's linguistic abilities.

From such casual observation the linguist can form numerous hypotheses whose adequacy he can then check, if he wishes, by questioning his informants in a variety of ways. In some cases the informant may be able only to offer simple judgments about utterances ("same" or "different", "right" or "wrong"), without being capable of offering reliable explanations for his judgments. In other cases he may be able to verbalise his knowledge of the code and offer useful opinions about utterances ("the word X in that context means such-and-such"; "that sentence is wrong – the correct way of saying that is such-and-such"; "this sentence is ambiguous – it can mean either X or Y"; "if you say it like that (with that intonation) it is a question, but if you say it like this it is a command", etc.). Reliability of opinions has to be estimated in terms of consistency with other evidence that the linguist has obtained from independent observations.

Where the linguist is a native speaker, or a fluent speaker of the language then he can simply ask himself questions, i.e. introspect. Some psychologists object that introspection does not always yield reliable results and must always be supplemented by experiment. However, the fact is that at least for such well studied languages as English there is a huge body of introspective judgments about which native speaking linguists are in almost complete agreement. Indeed as Chomsky points out, "The critical problem for grammatical theory today is not a paucity of evidence but rather the inadequacy of present theories of language to account for the masses of evidence that are hardly open to serious question" (1965, pp.19-20).

What are some examples of the native speaker's abilities and judgments which linguists have tried to characterize and explain in formal terms? The next two sections deal with a number of examples which fall into two categories: those which can be explained by postulating the use of phrase structure rules and those that can be explained by postulating transformational rules which relate a deep structure consisting of a certain grammatical-semantic representation to a surface structure of somewhat different form.

3.　On Phrase Structure Rules.

'Phrase structure' refers to the way morphemes are grouped or bracketed together into larger syntactic or semantic units. Knowledge that certain groups of words or morphemes function as units is, of course, as old as the study of grammar itself. The main contribution of transformational grammar here has been (a) to provide a formal way of expressing this knowledge, (b) to show that most previous theories of grammar can be formalized as consisting only of phrase structure rules, (c) to provide a variety of new evidence showing that language users do operate with such rules, but that (d) there are many bits of evidence which a theory admitting only phrase structure rules cannot convincingly explain.

In determining that utterances consist of phonemes and morphemes (or strictly, of phones and morphs) we refer to the native speaker's judgments to confirm our theories. His reactions to sets of utterances like sing, sting, string, spring, sprang, etc. seem to support the theory that utterances are composed of segments of sound which, although themselves carrying no meaning, are capable of changing meaning. His reactions to such sets of utterances as Johnisabigman, Johnisaman, bigman, aman, man, John, is, nis, isab, ig, indicate that he operates also with meaningful units shorter than whole utterances, in some cases shorter than the smallest isolable utterances, which themselves cannot be further analysed into smaller meaningful units (morphemes).

Other observations require us to posit intermediate levels of structure between complete utterances and morphemes. One such observation concerns the ambiguity (on certain pronunciations) of such utterances as:

　(1)　(i)　　　They are boring students
　　　(ii)　　　They are hunting dogs
　　　(iii)　　　They are eating apples
　　　(iv)　　　It is a small boy's school

(1i) can be interpreted as meaning:

　　　(2)　(i)　　　Someone is boring the students

where students is the object of the sentence, suffering from someone else's tedious behaviour. This interpretation is structurally similar to:

　　　(ii)　　　They are killing the students
　　　(iii)　　　They are hurting students

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<div style="margin-left:30%">(iv)   They are talking to students</div>

(1i) can also be interpreted as meaning:

<div style="margin-left:20%">(3)   (i)   The students are boring (someone)</div>

where they and students of (1i) refer to the same people. This interpretation is structurally similar to:

<div style="margin-left:30%">(ii)   They are fat students</div>
<div style="margin-left:30%">(iii)   They are hungry students</div>
<div style="margin-left:30%">(iv)   They are thinking students</div>

In the case of (1i-iv) the only reasonable explanation of the ambiguities seems to lie in the way the meanings of the morphemes are understood to be grouped together. The first three examples involve a very common kind of ambiguity where a verb + ing suffix functions either as part of an inflected verb construction are boring, are hunting, are eating, or as an adjectival form qualifying the following noun, as boring students, hunting dogs, eating apples. Thus the ambiguity of (1i) may be formally characterized by stating that what we have here is really two sentences which happen to have the same phonemic shape (just as pair and pear are distinct morphemes with the phonemic shape); the two sentences involve different 'groupings of morphemes' or 'phrase structures'. The two groupings can be represented by two distinct tree diagrams:

(4)   and (5)

       they   are   boring   students   they   are boring   students
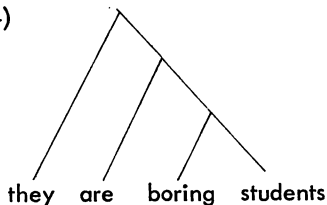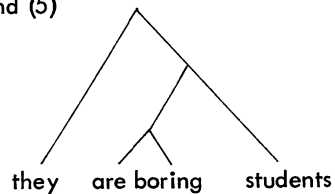
There is a great deal of other evidence which forces us to conclude that speakers of a language treat certain groups of morphemes or words as structural units. Only a few examples will be mentioned here.

    Sentences with nothing in common on the phonemic and morphemic levels are understood as having a certain kind of structural identity. Thus:

<div style="margin-left:25%">(6)   (i)   John played tennis</div>
<div style="margin-left:25%">   (ii)   My friend likes music</div>
<div style="margin-left:25%">and   (iii)   The little boy with the freckled face caught the ball thrown at him by the fat man with the red nose</div>

are all sentences which answer the question

(7)   Who did what?

or which fall into the class of sentences understood as meaning

(8)   Someone did something.

This fact is given formal recognition by stating what (whatever the other structural differences between them) (6i-iii) all share the common structure NP-V-NP.

Experimental studies have produced some interesting evidence suggesting that the concept of phrase structure groupings may represent a formal analogue of psychological units used in the actual process of constructing or interpreting utterances. Neal F. Johnson (1965) designed an experiment which tried to determine the extent to which subjects would use their knowledge of grammar to break a sentence into phrase structure units as they attempted to learn it. Subjects were shown eight numbered sentences for very short intervals and then asked to remember as much as they could of the sentences when presented with the numbers alone. They were then shown the sentences again, and trials proceeded until learning of the sentences was completed. The hypothesis was that, during learning, the errors made by the subjects should indicate the boundaries between the units used by him as he tried to reconstruct the sentences. A linguist was independently asked to assign a phrase structure analysis to each of the sentences. The results showed that errors, and failures to continue, were much more likely at the boundaries between major structural units than within these units.

Another ingenious experiment by Fodor and Bever (1965) involved roughly the following procedure. Subjects were presented with a number of sentences which they listened to through headphones. While listening to each sentence they also heard a click (which varied in position for different subjects). The subjects were asked to write the entire sentence and indicate where they thought the click had occurred. The hypothesis was that, although most of the clicks were not actually located at major structural boundaries, subjects would tend to subjectively hear them as occurring at such constituent boundaries. The shift in position should occur in such a fashion as to minimize the number of constituents the noise is perceived as interrupting. The results were consistent with the hypothesis, and were taken as supporting the more general hypothesis that the unit of speech perception corresponds

to the constituent isolated in phrase structure analysis.

In a generative grammar the phrase structure of a sentence is described by starting from a basic construct (such as the symbol 'S' for 'sentence') and applying rules of formation which represent the groupings of units within the initial unit S. Finally we arrive at units of the phrase structure which may be replaced by morphemes. We can assume at this point that the structural units which can be replaced by morphemes are such constructs as Noun, Verb, Adjective, and the other terms representing classes of morphemes, although in Sec.5 we will see that this assumption needs qualification.

The following grammar is an example of a simple phrase structure grammar. In each rule the unit represented by the symbol to the left of the arrow is analysed into (rewritten as) constituent units represented by the symbols on the right hand side of the arrow. The subscript symbols a, b, etc. indicate a block of rules that are not ordered relative to one another. Otherwise rules apply in order as numbered.

9.
1.	S	$\longrightarrow$	NP + VP
2a.	VP	$\longrightarrow$	Verb + NP
2b.	NP	$\longrightarrow$	T + Adj + Noun
3a	Verb	$\longrightarrow$	hit, saw, called, ate
3b.	Adj	$\longrightarrow$	big, small, young, tall
3c.	Noun	$\longrightarrow$	man, woman, boy, girl
3d.	T	$\longrightarrow$	the, one

The structure assigned by this grammar is shown in the form of a tree diagram as:

10.
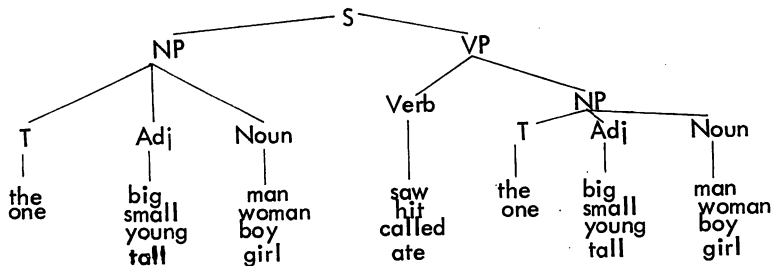
Notice that even this very simple grammar will predict and assign an internal structure to a very large number of different sentences: the big man saw the tall boy, the young girl ate the tall boy, the tall girl hit the big man, and several

hundred more.

Transformationalists emphasize that a generative grammar is a theory intended to explain the principles or knowledge which enables people to understand sentences the way they do, and is not an attempt to describe the sequence of mental processes which actually occurs when a speaker produces a sentence. It is possible that there is some connection between the derivational processes of a generative grammar and the mental events which occur in speech production; some psychologists have begun to test this hypothesis (see, for example, the experiments referred to above). For the linguist however, each rule in a generative grammar is a claim that certain groups of words are understood to function as a semantic or grammatical unit (the boundaries of grammar and semantics are difficult to draw; see Sec.5), and each tree diagram or "phrase-marker" is a representation of how a speaker understands a sentence. The psychological significance of rule ordering is a more difficult question. To some extent the ordering of rules is simply one of the logical requirements of a generative grammar, which must provide explicit instructions for deriving sentences, and which must therefore treat each phrase structure rule as a step in the derivational process. An early phrase structure rule is simply one which refers to a more inclusive unit, which is analysed into constituents by later rules. However, there are some cases where ordering is necessary to explain how the language user relates sound and meaning in producing or interpreting a sentence, i.e.where ordering represents a linguistically significant construct. This applies particularly to the ordering of transformational rules. Some examples are discussed in Sec.5.

Before leaving the topic, it is worth mentioning that there are two kinds of phrase structure rules: context-free and context-restricted rules. Context-free rules state that <u>in all environments or contexts</u> a particular unit can be analysed into (is realized as) a particular set of constituent units. For example, if the phoneme /p/ is always realized by the phone $[\,p\,]$, then this fact can be stated by a context-free rule: $/p/ \longrightarrow [p]$. Similarly, if Noun Phrases (NP) can always be analyzed into an article (T) plus an optional adjective (Adj) plus a Noun, this information is presented as a context-free rule: NP $\longrightarrow$ T (Adj) Noun.

If, however, the particular form which a unit can take is conditioned by its environment, we are dealing with a context-restricted rule. For example, if /p/ is realized in initial position by an aspirated stop $[p^h]$ but in all other positions by an unaspirated stop $\left[\, \bar{\bar{p}} \,\right]$ then the context-restriction is stated as:

$$/p/ \longrightarrow \left\{ \begin{array}{ll} \left[p^h \right] & \text{in the context} \quad \text{\#} \underline{\quad\quad\quad} \\ \left[\overline{\overline{p}} \right] & \text{elsewhere} \end{array} \right\}$$

All of the grammatical theories prominent in the 1940's and early 1950's utilized phrase structure rules. In fact, all the statements contained in these grammars were equivalent to phrase structure rules, and accordingly they were classified as "phrase structure grammars" by Chomsky (1957) and Postal (1964).

4. On Transformational Rules and Deep Structure.

Chomsky pointed out in <u>Syntactic Structures</u> that there are some aspects of the language user's knowledge that cannot be explained by a theory which admits only phrase structure rules. We need to assume the use of at least one other kind of rule: transformational rules.

Consider for example, the sentence:

(11)   The shooting of the hunters was terrible

This is yet another case where two different sentences happen to have the same phonemic form. One of the sentences means <u>it was terrible that someone shot the hunters</u> and the other means <u>the way the hunters shot was terrible</u>.

However, (11) is not a case of constructional ambiguity, involving two different phrase structure analyses (as was (1i) <u>they are boring students</u>). The ambiguity cannot be explained by assigning two different phrase structures to (11), for both meanings seem to involve the one structure (12):

(12)
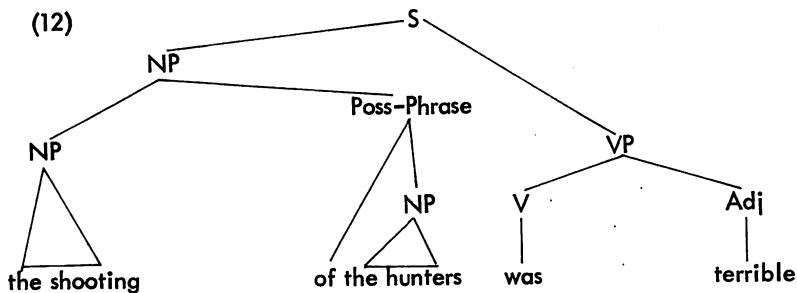
What, then, is the nature of the ambiguity? To answer this we must first consider an important insight of transformational grammar. It is essentially this:

the same grammatical relations and the same meaning can be expressed by a number of very different structures. It follows that certain structural features seem to be very important in determining meaning, while other structural features seem to make little or no contribution to meaning.

In this case there are many possible ways of expressing the first of the two meanings of (11). For example:

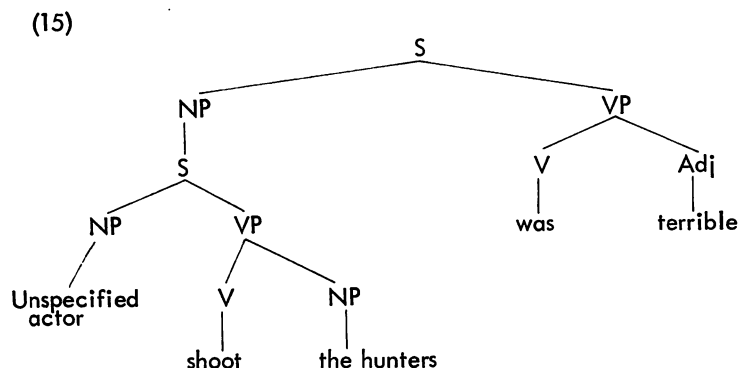|		
(13)	(i)	The shooting of the hunters was terrible.
	(ii)	That the hunters were shot was terrible.
	(iii)	It was terrible that the hunters were shot.
	(iv)	It was terrible that someone shot the hunters.
	(v)	That someone shot the hunters was terrible.

Similarly the second meaning of (11) can be expressed by several paraphrases:

(14)	(i)	The shooting of the hunters was terrible.
	(ii)	The hunters' shooting was terrible.
	(iii)	It was terrible the way the hunters shot.
	(iv)	The way the hunters shot was terrible.

Notice that we have mentioned only paraphrases which preserve the main lexical items and grammatical relationships. If we admit changes of lexicon and structure that do not affect the essential meaning, then the number of paraphrases possible for many sentences will probably run into the thousands.

One way of formally expressing this awareness of identity between a range of superficially different sentences is to sort out what is common to them all from what differentiates them. The features held in common – the fundamental grammatical relationships and meaning and certain lexical items can be expressed as a schematic structure. There is some argument as to precisely how underlying grammatical and semantic relationships should be represented (see Sec.5) but there is general agreement that they involve essentially the same sorts of relationships, and therefore can be expressed in the same way as superficial structures, i.e, by phrase structure diagrams ("phrase-markers" or "trees"). The two main grammatical features common to (13i–v) are the understanding (a) that the hunters is the object of the verb shoot, and (b) that someone shot the hunters, and the various paraphrases of this, act as the subject of the verb phrase was terrible. (What was terrible? That someone shot the hunters).

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The following phrase structure diagram indicates the fundamental grammatical relationships shared by (13i-v):

(15)

```
                                    S
                   ┌────────────────┴────────────┐
                  NP                             VP
                   │                        ┌─────┴─────┐
                   S                         V          Adj
            ┌──────┴──────┐                  │           │
           NP            VP                 was       terrible
            │        ┌────┴────┐
       Unspecified   V        NP
          actor      │         │
                   shoot   the hunters
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where there is also a general rule that the notions of "subject-of-sentence", "object-of-verb" are defined in terms of the position of the category NP in a configuration such as (15).

Although (13i-v) have the same meaning, or essentially the same meaning, it is also true that they vary greatly in their actual form. We have already noted that these differences in form cannot be very important in determining differences of meaning. These formal features that are significant in determining meaning are referred to as the 'deep structure' of a sentence, while those that can be varied without affecting meaning are regarded as 'superficial' or 'surface structure' features. 'Deep structure' by definition is what determines meaning, while 'surface structure' has to do mainly with how sentences are pronounced. Diagram (12) thus expresses the surface structure of (13i) while (15) expresses its deep structure.

The ambiguity of the shooting of the hunters was terrible can now be explained. It arises from the fact that there are always several ways of expressing any deep structure. Sometimes it happens that among the possible realizations of two distinct deep structures are two surface structures that are the same. In the present case, both the deep structure underlying (13i-v) and that underlying (14i-iv) can be realized as the shooting of the hunters was terrible.

We have discussed a way of expressing the fact that a single basic structure is understood to underlie a number of superficially different structures. The question now arises as to how it is that people are able to perceive that certain very different speech noises actually convey the same information (or in the jargon, how people are able to

relate different surface structures to a common deep structure). To explain this, the linguist postulates the use of transformational rules, rules that transform one structure (or set of ideas) into a different one.

The transformational rules of linguistics are regarded simply as a special type of a very general phenomenon: perceptual transformations. Whenever we perceive an identity between two physically different stimuli, we must be assumed to be applying such transformational rules. For example, when we perceive that a small figure seen from a particular angle is actually an object of the same kind (a cube) as a physically quite different figure seen from a different angle,

fig. I

then we must be assumed to use some rules of geometric perception to abstract out certain physical properties of the two stimuli (while ignoring others), and then compare the abstractions, noting their essential identity.

The same process must go on every time we recognize that <u>any</u> object is a member of some conceptual category of objects (every time we recognize that a certain furry object is a dog, for instance, and not a cat). In some cases we may recognize similarities between two stimuli that have <u>no</u> common physical attribute. In this case we must conclude that the common denominator is some <u>abstract</u> schema. Lenneberg in his discussion of this topic comments that "We can see similarities whenever we can transform two or more physically given patterns into the same, common abstract schema. In this terminology, similarities are due to transformations from the physically given (surface) to abstract (deep) schemata. Thus all similarities involve transformational processes." (Lenneberg 1967, p.298). He gives the following figures as an example of two patterns that are recognized as similar in some respects, although they have no topological qualities in common.

fig.2
(after Lenneberg 1967)

He adds that "It is not surprising, therefore, that when we discuss the perception of sentences, it is also necessary that we have to assume the existence of specialized transformational capacities" (299). Transformations apparently play a fundamental role in the perceptual processes of all higher animals, although there is variation from species to species in the capacity to perceive similarities and differences. There is also reason to believe that certain types of linguistic and non-linguistic transformations are beyond the capacity of the young child. It is only when he reaches a certain stage of maturity that his brain becomes capable of organizing certain material. There has been a good deal of study of the development of specific grammatical mechanisms in the child, which suggests that the abilities to perform certain kinds of grammatical operations appear in a quite specific order, and at much the same ages, in all normal human children.

We have outlined the theory that transformational rules as involved in the production and understanding of sentences are a special case of perceptual processes which relate perceived objects to abstract schema. Specifically, we have asserted that "transformationally related" sentences are physical objects which, although different from each other in physical form, are nevertheless perceived to be variant realizations of a single object-type, just as each member of a herd of cows of varying sizes, colours and shapes is perceived to be a cow.

It was also noted that the single abstract schema underlying a set of transformationally related sentences can be represented as a phrase structure diagram (phrase-marker or tree). The transformational rules spell out how this underlying phrase structure is transformed into the quite different phrase structure representation of the surface structure. They change one abstract schema (e.g (15) above) into another schema (e.g (12) which corresponds more closely to the physical object itself, the utterance. The derivation of some utterances may involve not just one, but a series of transformational rules (see some of the examples discussed in Sec.5).

Among the operations performed by transformational rules are substitutions, conjoining, permutations and deletions. Substitutions involve replacing one item in the phrase structure representation with a different one (e.g. the structure underlying John came and then John went becomes the structure underlying John came and then he went – with he substituting for John). Conjoining involves the linking of two sentences, as is achieved by adding and between John came and John went). Permutations switch the order of items (divide the loot up, divide up the loot). Deletions involve the

removal of an item (You go away! and Go away! have the same deep structure, but the pronoun is deleted in the second sentence). It used to be thought that some transformations have the function of "embedding" one sentence into a matrix sentence but it is now considered that embedded sentences are present in the deep structure. One of the possible constituents of a noun phrase, for instance, is a whole sentence; the noun phrase in this sentence may in turn contain an embedded sentence, and so on, so that very complex sentences such as (6iii) may be formed.

5.   Some Recent Developments in Transformational Grammar.

Chomsky's early work made it fairly clear that to characterize the language user's knowledge of his language, we need to do more than just describe the phonetic and phonemic form, and the meanings and structure of the morphemes and other constituents of the surface syntactic structure. Chomsky added a new level of linguistic representation – deep structure– together with the notion that deep structures are converted into surface structures by transformational rules.

Over the last few years linguists have taken a close look at this concept of deep structure, and have found some surprising things. The harder they have looked, the deeper the structures have become. There always seems to be good arguments for supposing that, underlying every deep structure, there are still deeper structures which we must postulate in order to account for the speaker's understanding. Consequently, it has been asked "whether there indeed is such a thing as 'deep structure'. As an alternative to Chomsky's conception of linguistic structure, one could propose that there is simply a single system of processes which convert the semantic representation of each sentence into its surface structure representation and that none of the intermediate stages in the conversion is entitled to any special status such as that which Chomsky ascribes to deep structure" (McCawley 1967, p.9.).

Critics such as McCawley are not, of course, proposing to abolish the distinction between deep and surface structures. Rather they claim that there are successively deeper levels of structure, which ultimately go back to some underlying representation of meaning, and that there is no one level of syntactic structure which can be called the deep structure. These ideas are, I think, finding fairly widespread acceptance among transformationalists and some other linguists. In this section some of the arguments for the fusion of semantic and syntactic theory are presented. Many of them are taken from an article by McCawley published in 1967, which summarizes developments over the previous two or three years.

19

P.S.Rosenbaum (1965) examined the behaviour of a number of English verbs like seem and want, which occur in superficially similar sentences such as

(16)   John seems to know the answer

(17)   John wants to know the answer

In spite of the apparent structural similarity, it is evident that these two sentences are quite differently understood. We can paraphrase (16) by It seems that John knows the answer , but it wants that John knows the answer is not a paraphrase of (17). We can say What does John want? but not What does John seem?, and we can say What John wants is to know the answer, but not What John seems is to know the answer. Want differs from seem in many other way. Want allows the infinitive to have a subject (John wants Harry to win the prize) but seem does not (John seems Harry to win the prize). Seem allows there as its apparent subject (There seems to be a man in the garden) but want does not (There wants to be a man in the garden).

" Rosenbaum observed that all these facts were explained if want is regarded as a transitive verb with a sentence as its object, and seem as an intransitive verb with a sentence as its subject, in deep structure" (McCawley, p.8), as in (18) and (19).
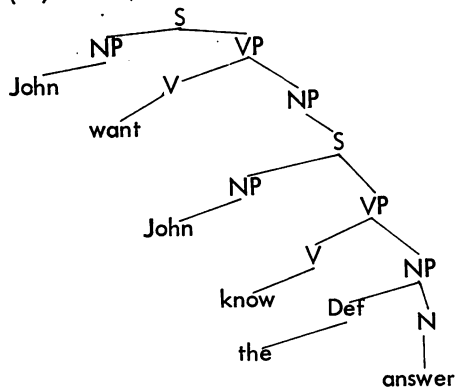
(18)   (19)
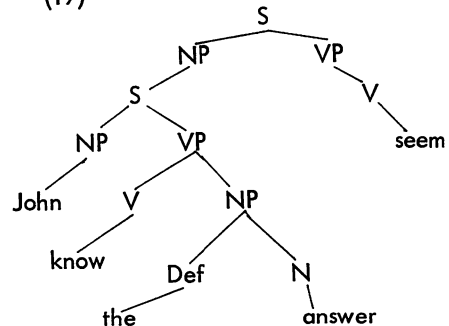
The superficial form of (18) is derived by a transformation which deletes the subject of the embedded sentence if it is identical to the subject of want. The superficial form of (19) is derived by a transformation which puts the verb phrase of the embedded sentence after seem. Roughly speaking, we get a conversion from John wants John to know the answer, to John wants to know the answer, and from John knows the answer, seems to

either <u>John seems to know the answer</u> or <u>it seems that John knows the answer</u>.

George Lakoff (1965) also pointed out that the sentence

(20)   John opened the door

which transformationalists once assumed to be a simple sentence (one in which the deep structure and the surface structure representations are nearly the same), in fact has a rather complex structure involving two embedded sentences. The underlying structure which Lakoff posited in order to explain our understanding of (20) is roughly:

(21)
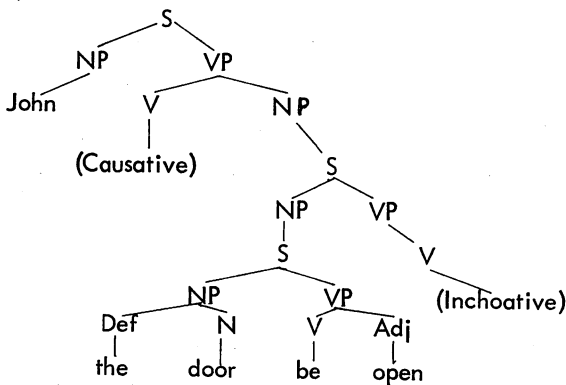
The behaviour of the elements in this sentence, observed here and in a variety of other sentences, indicates that we understand (20) as meaning <u>John caused something</u>, namely that <u>the door became open</u>, and that <u>the door became open</u> is itself understood as involving the proposition that <u>the door was open</u> and the understanding of an 'inchoative' marker which forms verbs of change out of adjectives like <u>open</u> (become open) <u>red</u> (redden), <u>hard</u> (harden), etc.

And so it is with most 'simple' sentences. Each of them turns out to have a rather complex meaning involving grammatical and semantic relationships not obvious in the surface structure.

One would be compelled to take the notion of a single level of deep syntactic representation very seriously if it could be shown that syntactic representations involve lexical items (morphemes) as their terminal nodes, i.e, if the way we understand sentences implied that the phrase structure rules start from S and gradually analyse each constituent unit into smaller units until finally the lexical items (morphemes) are reached. At this point the transformational rules come into operation and start converting the deep

lexical (morphemic) representation into surface structure. All lexical items, in this view, would be inserted into syntactic structures at one and the same point in the grammar. There would thus be a neat division between the rules of the base component (the phrase structure rules which account for the essential meaning of a sentence) and the transformational rules; this division would correspond to the boundary between deep and surface structure, and was in fact proposed by Chomsky (1965).

However, there is a growing body of evidence which indicates that this is not the case. The way people understand certain sentences, and the syntactic behaviour of certain lexical items (especially pronominal forms) suggest that lexical insertions are intermingled with other syntactic transformations, i.e that lexical insertions occur at several different points in the grammar. Some transformations must be logically understood as taking place before certain constituents are analysed into lexical forms. For example, McCawley (1967, p.23) points out that "words such as former and latter cannot be chosen until after all the transformations which change word order have been carried out. For example, in the sentence

It is obvious to John that Bill is a fool, and the former

dislikes the latter.

former refers to John and latter to Bill even though the sentence is derived from a structure in which that Bill is a fool is the subject of is obvious to John, and thus Bill precedes John." That is, the speaker cannot introduce the word former, until he has carried out the transformation that converts the deep structure underlying It is obvious to John that Bill is a fool, into a concrete surface structure. By 'concrete surface structure' I mean a structure in which words are represented as occurring in the particular order in which they appear in the actual utterance.

"Moreover, the insertion of personal pronouns must take place at two distinct points in the grammar. John R. Ross has pointed out ....that while one can say

Do you know John and Mary? He and she are a doctor and a

teacher respectively.

one cannot say:

Do you know John and Bill? He and he are a doctor and a teacher

respectively.

but only:

Do you know John and Bill? They are a doctor and a teacher
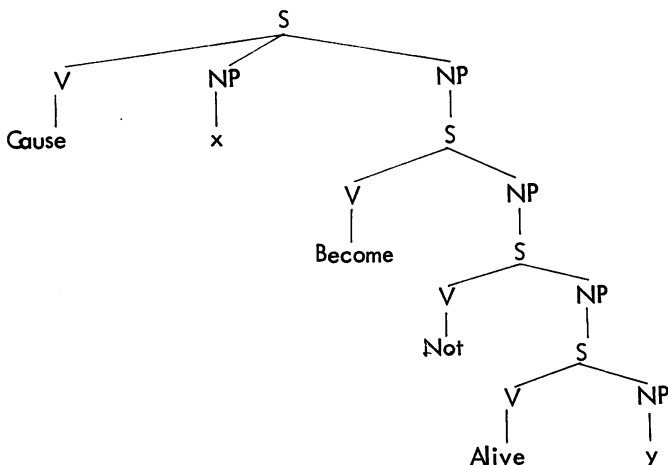
respectively.

English has a rule that if two superficially identical noun phrases are conjoined they must be collapsed into a single noun phrase. This rule must apply after the pronouns he, she, etc. are inserted [thus 'he is a doctor and she is a doctor' becomes 'he and she are a doctor.....'] ; but after the rule has applied it is necessary once more to insert pronouns in the places where this rule has collapsed and conjoined identical pronouns into a single constituent" [thus 'he and he...' becomes 'they...', and one lexical insertion procedes, then another follows a conjoining transformation.]

Apparently the "successive stages between the semantic representation of a sentence and its superficial form involve gradually more and more lexical material" (McCawley, p.24). McCawley argues that, as regards the precise form of the base or deep rules, there are no satisfactory grounds for distinguishing between syntactic and semantic rules. He and others suggest that they are both "ordered trees whose non-terminal nodes are labelled by syntactic category symbols...and that in each language there is a single system of rules which convert semantic representations of sentences into their superficial form; these transformations include 'lexical transformations', i.e. transformations which replace part of a tree by a lexical item."

The last remark is interesting. It implies that single words need not only replace "terminal" category symbols like verb, noun, adjective, adverb, etc. They may sometimes (perhaps usually) replace entire phrase or sentence structures. The word bachelor, for instance, can be substituted for the same structure as phrases like unmarried man, man who is unmarried, man who is not yet married, in most contexts. To the extent that these expressions are full paraphrases it is necessary to assign them the same semantic structure, and it is evident that this structure is a fairly complex one.

Another often quoted example is the verb kill. Kill means cause to be dead, and dead means become not alive, so that kill may be analysed as cause to become not alive. It also implies an agent and a sufferer, which need not be identified in all sentences involving kill, so that in tree form, the structure of kill can be given as

(22)

```
                              S
          ┌───────────────────┼──────────────────┐
          V                   NP                  NP
          │                   │                   │
        Cause                 x                   S
                                        ┌──────────┴──────────┐
                                        V                     NP
                                        │                     │
                                     Become                   S
                                                    ┌──────────┴──────────┐
                                                    V                     NP
                                                    │                     │
                                                   Not                    S
                                                               ┌──────────┴──────────┐
                                                               V                     NP
                                                               │                     │
                                                             Alive                   y
```

where the capitalized items represents semantic constructs and x and y represent the
unspecified actor and sufferer.

Charles Fillmore's work on lexical entries for verbs (1968) has similar
implications. Fillmore argues fairly persuasively that many English verbs have extremely
complex semantic structures. Not only do verbs indicate a particular action or state but
they may also imply an agent, an instrument, an object, a place, a dative, and perhaps
other concepts which he calls 'roles' or 'cases'. These roles are based on the language
user's judgments "about who does something, who experiences something, who benefits
from something, where something happens, what it is that moves, where it starts out,
and where it ends up." (Fillmore 1968, p.382).

To cite a fairly simple case, the verb hit "requires an understanding of
some object and a place where this object achieves contact..."(p.383). These two
roles he calls Instrument and Place. Moreover, simple expressions using hit may contain
mention of an animate being that is responsible for the act of hitting, that is of an Agent.
The Agent role is optional however, so Fillmore symbolizes his observations with the
notation

HIT place, instrument (agent)

Other verbs, such as rob, steal and persuade involve a set of role or case relationships
that are much more complex than hit.

In the final section I cite some evidence from a New Guinea Highlands
language which I believe adds some force to the arguments of transformationalists
concerning the complex structure of lexical items, and the existence of deep syntactic-
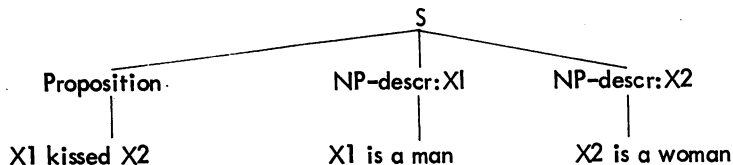
semantic structures, in English.

According to McCawley "One may...draw the conclusion that syntax
as a separate branch of linguistics does not exist: any generalizations about the way
words can be combined in a language is merely the result of constraints on the ways in
which semantic material may be combined and of the mechanisms which the language
has for the conversion of semantic representations into the superficial form of
utterances." (1967, p.25)

Some may consider this a mere relabelling of the problem. 'Deep syntax'
becomes 'semantics'. However, there does seem to be general agreement that the early
semantic-syntactic rules of the grammar differ in certain respects from the deep
structures postulated by Chomsky in Aspects (1965). In Aspects, deep structures are
depicted as phrase structures whose constituents are very like those of surface structures,
involving categories such as NP, VP, Prepositional Phrase, Noun, Verb, Adjective,
Adverb, Tense, Determiner, etc. It is now suggested that the deep representations of
sentences contain a much narrower variety of categories than appears in the surface
structure representations. Deep semantic-syntactic structures consist of only a few
elementary categories like 'S', 'predicate' and 'argument'. Predicates denote
properties and relationships, and are usually expressed in surface structures by nouns,
verbs and adjectives. Arguments identify the things the speaker is talking about, and are
usually expressed in surface structures by noun phrases. For example, in the sentences

(23)   (i)   John is a fool

         (ii)   John is stupid

         (iii)   John loves Mary

McCawley states that is a fool, is stupid and loves Mary all express properties of the
individual being referred to as John. If we don't know John's name we may still
identify him by a descriptive noun phrase such as the tall man with the limp.

McCawley prefers the terms 'NP-description' and 'Proposition' to refer the
things being talked about and what is asserted about them. The meaning of an utterance,
he claims, can be divided into a proposition and a set of NP-descriptions, as in the
following representation of the man kissed the woman:

25

```
                              S
          _____|_____
         |                    |                   |
   Proposition·         NP-descr:XI          NP-descr:X2
         |                    |                   |
   XI kissed X2         XI is a man         X2 is a woman
```

He goes on to give a number of more complex examples showing how these constructs play a role in syntax.

The conclusions discussed here seem to be a natural development of the idea behind deep structure: that the same grammatical relationships and meanings can be expressed in many different ways in the surface structure. As many of the categories that must be distinguished in the surface structure make no distinctive contribution to meaning, there is no reason to continue to distinguish them in the deep structure.

Recent work, then, suggests that the model of a grammar be simplified (a) by fusing the syntactic and semantic components into a single system of transformations which relate meanings to surface structure representations, and (b) by reducing the number of categories involved in deep structures. This conception of grammar involves an extension of the role of transformations and a reduction in the role of rewriting or phrase structure rules.

It should be noted that the problems discussed in this section are still being hotly debated, and that judgment on some of the proposals put forward recently by McCawley and others should be suspended until a wider range of evidence has been examined. These scholars are well aware of the tentative status of their claims. One of them writes: "I continue to think that the world must wait another two or three decades before it will see anything resembling a respectable grammar of English. I, at least, remain almost totally baffled by tenses, modals, determiners, quantifiers and adverbs. But I have the feeling that real progress can be made in understanding the elementary structure of the 'propositional' core of simple sentences, and in understanding the semantic and syntactic properties of the major parts of speech, by abandoning a conception of syntax that restricts itself to categories and sequences in favour of a conception of syntax-semantics that is based on a theory of the essential ways in which aspects of linguistically codable experiences are relatable to each other and to the experience as a whole" (Fillmore 1968, p.393).

6.   Deep Structures and Transformations in a New Guinea Highlands Language.

Most of the important developments in linguistic theory over the last ten or fifteen years have been based on intensive work on English and to a lesser extent, on a few other well known languages. However, enough of the world's languages have been studied in depth to indicate that there are no major differences between speakers of English, Chinese, Japanese, American Indian, Australian Aborigine, Austronesian or any other natural languages, in the way they construct and interpret utterances. The perceptual processes which we have labelled 'phrase structure rules', 'transformational rules', etc seem to be part of the use of all natural languages.

Moreover, work to date suggests that the fundamental ideas, the semantic primes, will probably turn out to be similar for all languages. At the same time, it is well known that languages differ considerably in the particular surface structures used to express the same meanings. Transformational linguists argue that, insofar as different languages express the same meanings, they must by definition share the same deep semantic-syntactic structures, and the differences between them only have to do with how these deep structures are converted into physical form. That is, they differ only in the presence or absence of particular transformational processes in particular languages.

It will perhaps be appropriate if I end this paper by discussing some examples from a New Guinea Highlands language which, I believe, lend some support to the transformational conception of grammar. First, the equivalents of some English simple verb stems will be discussed, then the equivalents of some English sentences with complex deep structures.

We are accustomed to thinking that such English verbs as see, hear, think, dream, speak, sing, steal, bring and take express simple ideas. In fact some linguists have postulated a unit of meaning, the 'sememe' which corresponds to the meaning of a morpheme, and like the morpheme, cannot be further analysed into meaningful components.

In the previous section, however, we cited recent work which suggests that many English morphemes have rather complex semantic structures, and indeed that these structures may be conveniently represented in the form of a tree. The tree structure representing the meaning of single morphemes are of the same kind as tree structures representing the meaning of whole sentences.

In particular the work of Fillmore on English verb stems suggested that their meanings involve a number of 'role' or 'case' relationships which can be fairly accurately denoted by such traditional terms as 'Instrumental', 'Agent', 'Object", 'Place',

'Dative', etc. It is interesting that in the case of Karam, a language spoken in the Bismarck-Schrader Ranges in the Western Highlands of Australian New Guinea, such an analysis is required not only for the deep structure but also for the surface structure of verbal forms.

Karam has only a small number of verb stems (about 100 in all) and many of these express extremely broad meanings difficult to translate into English. The following are some of the most highly recurrent verbs given approximate glosses:

ay-	'attain a stable condition'
pag-	'attain an unstable condition, cease to be stable'
pk-	'contact momentarily'
pwŋy-	'contact and remain stable'
am-	'move away from point of reference'
ap-	'move towards point of reference'
d-	'gain control of, get'
ñ-	'transfer, transmit'
ag-	'utter, make a sound'
nŋ-	'perceive'
ñŋ-	'consume'
yok-	'remove from contact suddenly'
tk-	'exist, be, remain'
g-	'to function, work, perform, do, make, be activated'

In spite of this very restricted range of verbs, with very general meanings, the Karam manage to talk about much the same range of quite specific events as English speakers. They do this by attaching to each verb an adjunct or adjuncts which contain specific information not in the verb stem. Thus while the verb nŋ - means 'to perceive', specific kinds of perceiving are indicated by adding one or more adjuncts to nŋ - :

English	Karam
to see	wdn nŋ - eye perceive (perceive with the eyes)
to hear	tmwd nŋ - ear perceive (perceive with the ears)
to think	gos nŋ - mind, thought perceive (perceive with the mind, perceive thought)

English	Karam
to dream	wsn nŋ – sleep perceive (perceive in the sleep)
to touch, feel	d nŋ – hold perceive (hold and perceive)
to nudge	pk nŋ – contact perceive momentarily (contacting momentarily and perceive)
to worry	gos konay nŋ – mind many perceive (perceive many thoughts)
to hate, dislike	gos tme nŋ – mind bad perceive (perceive badly in the mind)
to like, admire	gos tep nŋ – mind good perceive (perceive well in the mind)
to be learned, educated	skwl nŋ – lessons perceive (perceive lessons, school- learning).

The verb ag- means 'to utter, make a sound', while specific kinds of sound-making are denoted by adding one or more adjuncts to ag-, for example the following:

English	Karam
to speak	mnm ag- speech utter
to sing	kmap ag- song utter
to belch	mokbel ag- belch utter
to break wind	sb ag- bowel utter
to cry, weep	sy ag- weeping utter
to laugh	swk ag- laugh utter
to thunder	tmwk ag- thunder utter
to explode	bw ag- sound-of-explosion utter

English	Karam
to tell, inform	ag ñ– utter transmit
to ask, request	ag nŋ – utter perceive
to assert, claim, express an opinion	ag gos nŋ – utter mind perceive
to lie	esek ag– false utter
to tell the truth	nŋd/ ag– true utter
to tell secretly	ag weg– utter hide
to approve	tep ag– good utter
etc	

It should be noted even though it is the adjunct which carries the more specific meaning, the verb stem is not empty of meaning. There are many adjuncts which can occur with several different verbs, and the verb stem is what distinguishes them. For example the adjunct sy, which means 'illegal(ly)', occurs with several verb stems:-

to steal	sy d– illegally obtain
to trespass (by remaining)	sy md– illegally remain
to steal food, eat food illegally	sy ñŋ – illegally consume
to trespass (by coming)	sy ap– illegally come
to commit fornication adultery (of a woman)	waŋ sy d aŋ – penis illegally obtain copulate
(of a man)	mgn sy d aŋ – vagina illegally obtain copulate

Karam is thus a verb classifying language: it classifies every event or state as belonging to one of a small number of types: sound-making events, perceiving or cognitive events, events of momentary contact, transferring or transmitting events, events of attaining a stable condition, etc.

What is of immediate importance here, however, is that the syntactic and semantic structure which are made so explicit by the Karam correspond rather closely to the deep syntactic-semantic representation which linguists postulate to underlie English verb stems. Interestingly, there is also a fair correspondence between Karam verbal expressions and the conventional dictionary analyses of some English verb meanings. Thus my Concise Oxford Dictionary defines to see as "have or exercise the power of discerning objects with the eyes", which is very close to the Karam expression. To hear is defined as "Perceive (sound..) with the ear", to think is "Exercise the mind...", to sing is "to utter words...in tuneful succession,...utter (song, tune)...." to steal is "Take..without right or leave, take feloniously" (compare the Karam terms given above). The accumulated knowledge of generations of English lexicographers can't be wrong!

The Karam examples also support Fillmore's 'case' or 'role' analysis of English verbs. The adjuncts which accompany Karam verb stems do not fall into a single grammatical category. Certainly they share the privilege of (optional) occurrence immediately before the verb stem, and this fact together with the absence in Karam of functor morphemes corresponding to English propositions and case-markers give Karam complex verbal expressions a look of structural similarity. But in fact the semantic and grammatical roles played by adjuncts are extremely varied. Some adjuncts function as direct object, some as agent, some as place or location, some indicate manner, some are themselves verb stems, and so on. Their syntactic behaviour (selectional restrictions) varies correspondingly. Closer inspection reveals that in Karam adjuncts play much the same range of 'roles', quite explicitly, that Fillmore believes is characteristic, in a less obvious way, of English verb stems.

I want to turn, finally, to the Karam equivalents of certain English sentences, and to try to show briefly how Karam surface structures correspond not to the surface structures of the English sentences but to their deep structures. The inference is drawn that Karam lacks certain transformational rules that are present in English.

In English, the two utterances

(25)   I saw the bell
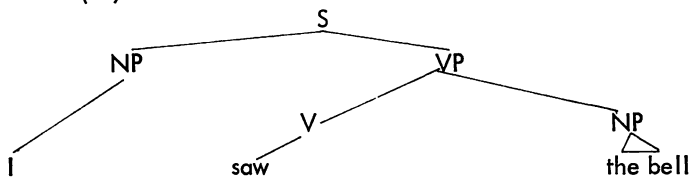
and   (26)   I heard the bell

are superficially alike. They both have the structure NP-V-NP, with the second NP (the bell) functioning as the direct object of the verb. But in fact (25) and (26) are understood quite differently, and therefore must be assigned different deep structures.
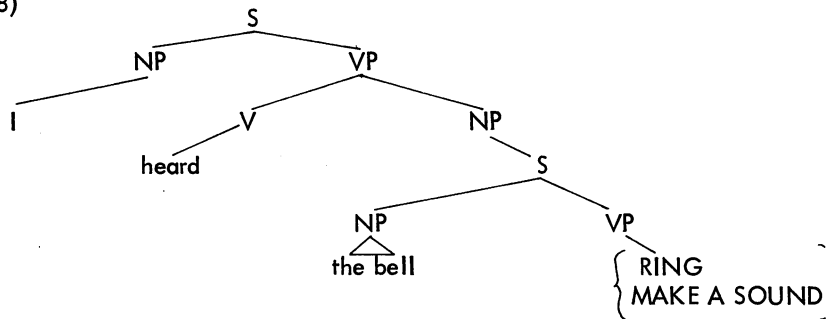
(25) involves the understanding that I saw an object which was a bell. (26) involves the understanding, not that I heard an object, the bell, but that I heard the sound made by the bell - I heard the bell ring. The verb hear always implies a sound, and in the absence of any other indication, the hearer assumes the sound to be the characteristic noise made by the object named; for example, I heard the singer (sing), I heard the thunder (thundering), I heard the announcer (talking, announcing), I heard the dogs (barking), I heard (the chopping sound of) the axes.

The distinct meanings of (25) and (26) can be represented by the structures:

(27)

```
                    S
         NP                  VP
                       V            NP
    I          saw              the bell
```

(28)

```
                    S
         NP                 VP
    I             V               NP
            heard                    S
                            NP              VP
                          the bell        { RING
                                          { MAKE A SOUND
```

(where RING and MAKE A SOUND are not actual lexical items, but represent the idea of the sound made by the bell). In the surface structure the idea that the sound of the bell is what is heard is obvious from the context; consequently the kind of sound made need not be named unless the speaker wants to say something special about it. In transformational terms this is described as an optional "deletion". That is, the object of hear in (26) is represented in the deep structure as whatever is common to the bell rings, the ringing of the bell, the sound made by the bell and other paraphrases. In converting this to a surface structure, a transformational rule "drops out" items which can be understood from the context. In this case the omission of the item is not obligatory, that is, it is possible to realize the deep structure as I heard the bell ring, I heard the ringing of the bell, etc. as well as in the form I heard the bell.

Karam does not allow such deletions. The surface structure of the Karam equivalent of (26) looks very like the deep structure (28) postulated for English. In Karam <u>I saw the bell</u> is expressed very much as in English (items in parentheses are optional), namely as:

(29)   (yad)   <u>bel</u>   (wdn)   nŋ -n-k
       (I)   <u>bell</u>   (eye)   I-perceived
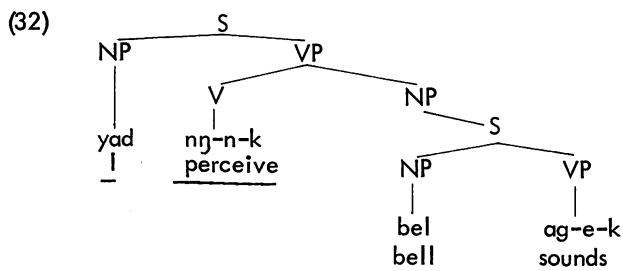
i.e as <u>I perceived the bell (with my eyes)</u>.

(30)   <u>bel</u>   <u>ag- e -k</u>   (yad)   (tmwd)   <u>nn-ŋ -k</u>
       bell   it-sounded   (I)   (ear)   I-perceived

or

(31)   (<u>yad</u>)   bel   <u>ag-e-k</u>   (tmwd)   <u>nn-ŋ -k</u>
       (I)   bell   it-sounded   (ear)   I-perceived

i.e <u>the bell sounded, I heard it</u>, or <u>I heard the bell sound</u>.

The deep structure of (30) and (31) does not differ much from their surface structure and can be represented (ignoring tense and certain other details not relevant here).

(32)

Since it is impossible to say <u>yad bel tmwd nnbyn</u> 'I perceived the bell with my ears' or to interpret <u>yad bel nnbyn</u> 'I perceived the bell' as meaning 'I heard the bell' it is assumed that Karam lacks the transformational rule which permits deletion of the verb phrase of an embedded sentence functioning as the object of a matrix sentence. Examination of other cases seems to support this assumption.

A similar restriction applies to the Karam equivalent of such English utterances as:

(33)   I saw him

which in response to a question such as Did you see him do it?, Did you see what he did? or He shot her, didn't he?, is understood as having the same meaning as I saw him do it, I saw him shoot her, etc. (Actually the contexts which permit these interpretations need not involve a preceding question, but may consist of some non-linguistic signal such as a gesture, a fact which underlines the point that the relationship between meaning and the audible linguistic signal is often an extremely complex one). The interpretation of (33) as meaning I saw him do something (where do something represents not actual words but the meaning 'perform some action') requires us to postulate a deep structure which is roughly (34).
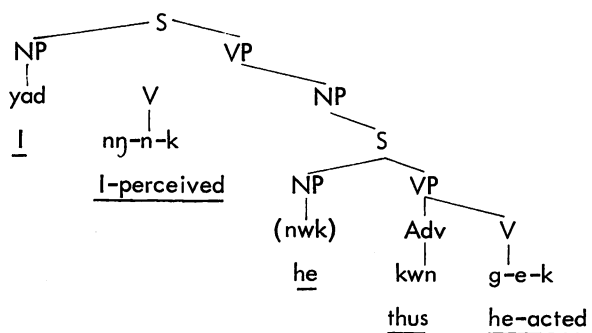
(34)
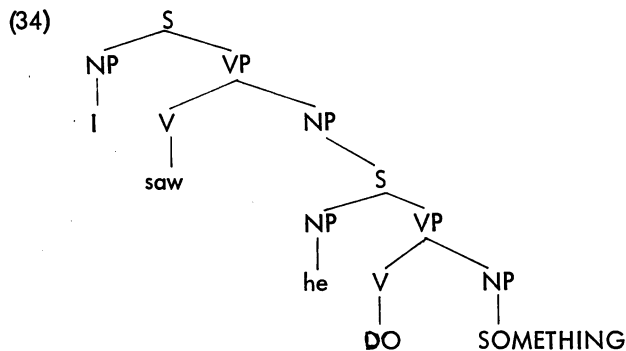
together with a series of transformational rules which allow us to derive a surface structure (35)

(35)
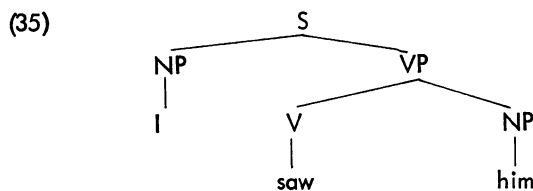
The derivation of (35) involves a transformation changing (34) to the structure underlying I saw him do something followed by a transformation which allows the VP representing the meaning DO SOMETHING to be realized as zero (i.e. to be deleted).

As with the example discussed earlier, Karam permits no such deletion or zero realization of a verb phrase. The meaning I saw him do something can only be expressed in Karam by a surface structure such as (36):

(36)

```
                  _____S_____
             NP                    VP
             |                  _____
            yad         V           NP
             |          |            ___
             I        nŋ-n-k          S
                     I-perceived   _____
                                  NP          VP
                                  |          ____
                                (nwk)       Adv    V
                                  |          |     |
                                 he         kwn   g-e-k
                                           thus  he-acted
```

Again the deep structure does not differ from this surface structure in any way relevant to the point at issue: unlike English, the Karam surface structure must retain the verb phrase of the embedded sentence.

Further examples could be cited from Karam (and other languages) where both deep and surface structures resemble the deep structure postulated for English. In some cases the likenesses between Karam surface structures and English deep structures are so strong that they cannot help but give reassurance that much recent work on English semantic and syntactic structure is on the right track. It suggests, moreover, that further insights into English might be obtained by the comparative study of semantic and syntactic structures in a variety of languages unrelated to English.

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Footnote: