

University of Pennsylvania

TRANSFORMATIONS AND DISCOURSE ANALYSIS PAPERS

76. Referentials

Henry Hiž

1968

Table of Contents

	Page
1. A few examples, a comparison with variables.	1
2. Reference within and outside, anaphora and anticipation.	5
3. The concept of referential as a semantic concept.	6
4. A definition of referentials.	9
5. Comparison with variables resumed.	14
6. Procedures for finding references in a text.	15
7. Anticipatories.	16
8. Zeros.	21
9. Quantifiers	22
10. Reflexives.	26
11. Relative clauses.	29
12. Relational nouns.	34

1. A few examples, a comparison with variables. One of the chief conclusions of the study of structural linguistics was that a discourse in each of its stages uses, in an essential way, what was just said or what will be said instantly. In phonology this mechanism is well known and some of its aspects were studied in syntax. The use of the environment is sometimes far more explicit than the use of different allophones or allomorphes as positional variants. The text semantically calls for a fragment of the text to interpret another place when only a "call" for this fragment appears and not the fragment itself. A pronoun is, perhaps, the best known phrase which stands for a phrase appearing in a nearby context. But there are also other kinds of phrases which refer the listener to specific fragments of the context. In the text

(1.1) Two roads lead to John's house. One of them goes through the woods. The other is shorter. Both are paved and he knows them well.

the occurrence of he refers to the occurrence of John, both occurrences of them are referentials for the occurrence of two roads, the occurrence of both refers indirectly to the occurrence of two roads by a tacit phrase of them. A tacit phrase of the two roads could be read after the other road and it refers to the occurrence of two roads. And shorter, again by a tacit occurrence of of them, refers to the occurrence of one of them. These connections, les renvois, are felt intuitively by everybody who understands the text, though the exact indication of the reference relations may leave some room for dispute (e.g. the tacit phrases just stated may be felt as somewhat artificial). The word reference is also used by many authors for a relation between a name and the thing named. Quine

translates by reference Frege's Bedeutung. But here I use the term reference in a more linguistic manner, as when one says that an asterisk refers to a footnote or when one speaks about cross references. To avoid confusion and to stress that a referential refers only to an occurrence of a phrase in the text, what I call here referentials should be perhaps called cross referentials. But after this warning let me retain the term referential remembering that; for this paper, if α is a referential for β , then α and β are occurrences of phrases in the text.

It seems to be of some interest to explicate the concept of a referential and to make a systematic description of referentials in a language. The treatment of this topic in the existing grammars is at best incidental. The reason for this neglect is mainly the fact that modern grammars deal mostly with structures of sentences and not with structures of segments longer than a sentence. The referentials, however, are referring often to places outside the sentence in which they occur. Systematic descriptions of referentials and their relations to phrases referred to, belong naturally to a theory of structures of texts, and not to the theory of sentence structures. Sometimes a referential does refer to occurrences within the same sentence. On other occasions a referential breaks the sentence boundary. Moreover, referentials are one of the main links between sentences of the text.

There is a similarity between referentials in a natural language and variables in a formal language of mathematics. Several occurrences of the same variable within the same formula are referentials to each other, provided they all occur within the scope of the same quantifier which binds them. In

$$(1.2) \quad \bigwedge x \bigwedge y (x > y \text{ or } x = y \text{ or } x < y)$$

the last three occurrences of x refer to the occurrence of x in the quantifier. The similarity of the role of variables and the roles of pronouns and other English referentials was noted by Quine (Mathematical logic pp.65 - 71). He renders (1.2) as

(1.3) Whatever number you select, it will turn out, whatever number you may select, that the latter is less than, equal to, or greater than the former.

He also renders

(1.4) $\bigwedge x(x = x)$

as

(1.5) Whatever you may select, it = it.

In mathematical practice, variables often refer to occurrences of variables in a different sentence. Thus in longer proofs we say: let x be a prime number, and then we use \underline{x} throughout the proof to refer always to the same starting phrase with \underline{x} . It may be concluded that an occurrence of a variable is a referential for its occurrence in the quantifier that binds it. One may note that some rules of logic require that we take into account that an occurrence of a variable is a referential to its occurrence in the quantifier and indirectly to its other occurrences within the scope of this quantifier. Such is the rule of substitution which requires that whatever is substituted for one occurrence of the variable be substituted for all its occurrences within the scope of the quantifier. An intermediate referring is also present in a natural language where a referential refers to a referend not directly, but only first to another referential which in turn refers to the referend. On the other hand there are rules of inference which disregard the fact that a variable is a referential, or - to word it differently - that a variable is a variable. Thus, a rule which allows the replacement of $\alpha = \beta$ by $\beta = \alpha$ is applicable everywhere, no matter whether or not α is a variable or whether it contains a variable as a part of it. Similarly, in English there are rules which take into account the fact that a referential refers to a phrase and there are rules which disregard this. A rule of the first kind is applied when one infers from (1.1) the sentence

(1.6) John knows the two roads

A rule of the second kind is involved when from (1.1) or from the last sentence of (1.1) one infers by extraposition

(1.7) It is he who knows them well

It must be admitted that only some cases of referentials are intuitively clear. Normally a text is full of allusions to and contrasts with its own fragments. The interconnections of sentences in a text being many, it calls for care to distinguish and define the phenomenon of cross reference from other links between words and sentences. Conjunctions like and, also, either, but, than, require that the sentences linked by them satisfy certain conditions, such as an occurrence of a common word in both sentences (explicitly or tacitly), or such as agreement or contrast in tense and in form with respect to affirmation or negation (e.g. either requires that both component sentences be in the negative; many though not all uses of but require that in one of the sentences there be involved a component which is a negative of a component in the second sentence.) A text has, as a rule, more consequences, more paraphrases, and it says more than its sentences taken separately. The set of consequences of a text is not the same as the sum of the sets of consequences of its sentences. The relation between what is said in the text and what is said in its sentences is complex, just as the consequences of a part of a sentence may be quite different from the consequences of the entire sentence. For, instance, the consequences of It is doubtful that the train will be on time are different from the consequences of The train will be on time. The relation between consequences of a text and consequences of its components must be a central problem of grammar, if grammar is to provide any useful analysis of the text or of its sentences. More about this topic will be said in the following sections. It should now be stated that only some of the differences between the consequences of a sentence alone and the sentence involved in a text are due to referentials.

2. Reference within and outside, anaphora and anticipation. There are methods of referring which, as a rule, refer to phrases occurring within the sentence in which they occur. English himself, her own, reflexive forms in French with se, me, etc. all make reference to an occurrence of a phrase in the same sentence. This reference may be to another referential which, in turn, may refer to the preceding sentence as in He did it himself. A great many words which occur typically as referentials are free to refer to the occurrences of phrases outside the sentence in which they occur. It seems that this is one of the main ways in which sentences in a text are linked. A systematic study of referentials cannot, therefore, be done in a grammar of sentences, in a grammar that tries to recursively enumerate sentences and give their structures sentence by sentence. In the present paper grammar is understood in such a way that among its tasks is a recursive enumeration of n-tuples of texts, each such n-tuple being a paraphrase set, i.e. a set of texts any two of which are paraphrases of each other. (See Hiz, Monograph Series on Languages and Linguistics, No.17, 1964, and Bellert and Hiz, Paraphrastic sets and grammatical analysis, TDAP. No.59 (1965). In his recent work R. Smaby presented a systematic study of pairs of texts.) In addition, grammar as understood here, is expected to give a recursive enumeration of sets each containing a text and its consequences. Thus there are references within a sentence and references outside the sentence.

On the other hand it is useful to divide referentials into anaphoric and anticipatory. Anaphoric referential refers to an occurrence which is before the reference. The anticipatory refers to an occurrence after the referential. In The index is small compared to that in Frenkel's book the occurrence of that is a backward looking anaphoric referential within a simple sentence. In The index is small. That in Frenkel's book is larger the occurrence of that is an anaphora to outside the sentence. In As he was persuaded of his own rights, Peter asked for a raise, he is an anticipatory referential within the sentence and his own an anaphora (to he) within the sentence. In English it is

hard to find an anticipatory referential referring outside the sentence. A few structures of this kind, The following is what happened, Now John told the story, have the peculiarity that nearly any text can follow them. They are therefore rather like metalinguistic names of the coming phrases.

3. The concept of referential as a semantic concept. A native speaker of a language as such draws conclusions from texts. In a linguistic community there is an inherent logic. A man who departs from that logic may be accused of misusing the language of that community. Anyone who accepts as true the sentence The boy runs fast and yet claims that the sentence The boy runs is false, can be accused of departing from the rules of English. Just as some fluency in paraphrasing is required for the knowledge of English, so is some proficiency needed in drawing conclusions. Not everyone can be expected to be a master of paraphrase, although some people are; nor, similarly, can we be expected to make involved, abstract, drawn-out conclusions. It is reasonable to think that language should be structured by the consequences drawn from it, and by paraphrasing, and also that both of these should be of particular importance to a grammarian. To be sure, grammar will also have to deal with other semantic concepts, such as interrogation, denial and change of time. It is unreasonable to suppose that a linguistic community does not have some fairly specific arsenal of paraphrases and methods of drawing conclusions. Hence, paraphrasing and concluding appear to be properties of any language, and in studying a language, we can start with confidence by observing how people paraphrase and how they reason. Other semantic relations may not be universal, and we would not know how to look for them.

Although rarely explicitly stated, paraphrase is a crucial grammatical concept and has been recognized as such for some time. This concept seems to be commonly presupposed by the transformational grammarians. It is much less recognized that the concept of consequence must also play an important part in

grammar. The examination of such concepts as referentials on the basis of paraphrase alone seems difficult, if at all possible. Referentials are naturally linked with consequence. One's first intuition as to what a referential is, is that an amended text, with the referential replaced by its referend, follows from the original text.

To describe a language grammatically is, among other things, to give the facts about the semantic relations between texts, without stating which texts are actually true. Some texts (such as Newton was a physicist. He never married), in particular some sentences (such as Newton was a physicist), are true. Some others (Newton married) are false. Still others, such as questions or commands, although not true or false in themselves, are systematically connected with texts which are true or false. For instance, questions are related in a describable way to their possible answers or to their presuppositions. (Whom did Newton marry? presupposes a false sentence, Newton married). Of course a grammarian as such cannot say which texts are true and which are not. To grammar there may belong only the task of a systematic description of such relations among texts which hold, depending on whether each of the texts involved is true. Grammar, elementarily, asserts that a semantic relation holds between the texts; for instance, that two texts are paraphrases of each other (Being a bachelor, Newton could concentrate on his work is a paraphrase of Newton could concentrate on his work because he was a bachelor), or that a sentence is a consequence of a part of some other text. (He is a good driver is a part of I wonder if he is a good driver, and he can drive is a consequence of he is a good driver; he can drive is true if he is a good driver is true).

Semantic relations among texts are those which are definable by means of the concept of truth, together with syntactic concepts, and which are not definable by syntactic concepts alone. A relation between texts is syntactic if it holds between texts, when the texts differ in the composition and arrangement of their segments. Thus syntax speaks about the external

appearance of texts and does not openly allude to the meaning, or to the truth, of the texts. Some syntactic relations are of no importance for semantics, for instance a comparison of the length of texts measured by the number of phonemes. A grammarian, however, tries to find for each semantic relation a coextensive syntactic relation; thus he wants to find a purely syntactic relation which will occur between two texts precisely when one of them bears a given semantic relation to the other. If for every semantic relation studied in grammar one found a coextensive syntactic relation, then one would reduce sentences to syntax. The reduction of semantics to syntax is not to be understood as an elimination of semantics from grammar. Even if such a reduction were possible, it would still be of importance to know which syntactic concepts corresponded to which semantic concepts. Semantic concepts used in grammar are not only those of paraphrase and of consequence. On the basis of these elementary concepts (actually only on the basis of the concept of consequence, since the concept of a paraphrase is definable by the concept of a consequence), grammar constructs - and uses - other semantic concepts: a paraphrase set (a set of texts which are paraphrases of each other), a truth model (a set of sentences arbitrarily considered true), an interpretation of a text in a truth model, a set of pairs of texts with a constant semantic difference (the difference between the relation of one member of the pair to a truth model, and the relation of the other member of the pair to the truth model is always the same), etc.

It may be that while some semantic relations are syntactically describable, the entire grammar is not reducible to syntax. Nevertheless, grammarians have been trying for a long time, and are still trying to extend the realm of syntax as far as possible, to speak in syntactic terms about as many semantic relations as they can. Even if semantics is not in its entirety reducible to syntax, it should still be worthwhile to know exactly which part of semantics is reducible, and which is not.

4. A definition of referentials. Some illustrations of the forthcoming definition of referentials will be useful. First,

(4.1) John went home. He opened the door.

There is a rule of consequence

(4.2) $S_1 \cdot S_2 \vdash S_2$

This rule is, of course, extensively used. There are also cases of texts $S_1 \cdot S_2$ from which S_2 does not follow. The text (4.1) is such a case. Also, for instance,

(4.3) Suppose the government recalls the ambassador. This means trouble.

does not imply

(4.4) This means trouble.

Not only is there a referential, as in (4.1), which when detached from its referend becomes empty, but (4.4) in (4.3) is understood under the verb suppose. The referend of this is not the entire first sentence of (4.3) but only the government recalls the ambassador. But in both cases, in the case of (4.1) and in the case of (4.3), the replacement, in S_2 , of the referential by its referend leads to a consequence of $S_1 \cdot S_2$. In (4.3) we have, however, to adjust the referend to a suitable grammatical category; *The government recalls the ambassador means trouble is not an English utterance. It must be adjusted to

(4.5) The recalling of the ambassador by the government means trouble.

From (4.1) we get

(4.6) John opened the door.

He is a referential for John in (4.1). The result He opens the door of an automatic application of the rule of consequence (4.2), is such that the replacement in it of he by John gives a consequence (4.6) of (4.1), even though the rule (4.2) does not properly apply to (4.1). Similarly, this is a referential for the government recalls the ambassador in (4.3) because the rule (4.2) if automatically applied to (4.3) gives (4.4) which after the replacement of this

by the nominalization of the government recalls the ambassador leads to (4.5) which is a consequence of (4.3). Now take a case in which the consequence is also a paraphrase.

(4.7) Robert is happy when he drives fast.

It is an element of the paraphrase set

(4.7) Robert is happy when he drives fast.

(4.8) When Robert drives fast he is happy.

(4.9) When he drives fast Robert is happy.

The sentence (4.9) is related to (4.7) by the well known rule

(4.10) S_1 when S_2 \vdash When S_2 S_1

For instance from

(4.11) Robert is happy when it is raining.

follows

(4.12) When it is raining Robert is happy.

It happens that the application of this rule to (4.7) gives a paraphrase of (4.7). But also, and this is important for our definition, the replacement of he by Robert and simultaneously of Robert by he, i.e., (4.8) is a paraphrase of (4.7).

To state the intended definition of referentials we will speak about application of a rule when it does not properly apply. Rule (4.2) was forced on (4.3) to get (4.4). In such cases we will speak about an automatic application of a rule. When a rule R is applied (properly or automatically) to a text α and the result β contains an occurrence δ_1^* of a phrase δ^* which also has an occurrence δ_2^* in the source α , then it is natural to treat δ_1^* sometimes as "new", as "different" from δ_2^* and in other cases as "the same", as a preserved occurrence though moved to another place. For instance, in (4.5) the first occurrence of the is "new" while the second and third occurrences of the are preserved from (4.3). For some forms of rules it is easy to give a definition of preserved occurrences.

(4.13) R is applied to the text α in a way preserving the occurrence β_1 of β if and only if R is stated in such a way that it speaks about a string $\delta \hat{\delta} \hat{\epsilon}$ as its source and $\eta \hat{\delta} \hat{\nu}$ as its result and when applying R to α the substitution δ/κ is performed and κ_1 is an occurrence^{of κ} in α containing β_1 .

Next we need a notation for a replacement. We will write

$$\text{Repl}(\alpha; \beta_1/\delta)$$

for the result of replacing in the text α of a β_1 occurrence of β by a phrase δ . Note that a replacement is not necessarily a substitution. When substituting one replaces each occurrence of a free variable by an occurrence of the same phrase, while a replacement of an occurrence of a phrase may leave other occurrences of the same phrase unaltered.

Finally we will speak about grammatical adjustments. In the examples above we change the grammatical category of an occurrence of a phrase (of the referend) to the grammatical category of the occurrence of another phrase (of the referential). There may be hesitations and disagreements as to exactly which adjustments are to be taken as grammatical and which are outside the technique of grammar. Certainly, if we allow all possible changes of one phrase into another, then our grammatical concepts, including the presently studied concept of referentials, will go wild and useless. The grammatical adjustments, like nominalizations or adverbializations, are of use in many parts of grammar and we may now presuppose a theory of such adjustments. (Harris in Transformational theory, Language, 41, 1965, pp.175-176 speaks about "deformations".)

Now the following definition of referentials should be clear:

(4.14) In a text β , an occurrence α_1 of α is a referential for an occurrence δ_1 of δ (and δ_1 is a referend of α_1) if and only if

- (1) β is a text,
- (2) α_1 is an occurrence of α in β ,
- (3) δ_1 is an occurrence of δ in β ,

- (4) there is such a rule R of paraphrase (case a) or of consequence (case b) that if \mathcal{J} is the result of an automatic application of R to β in a way preserving α_1 , then with some grammatical adjustments f and g, $\text{Repl}(\mathcal{J}; \alpha_1 / f(\mathcal{J}_1))$ or $\text{Repl}(\text{Repl}(\mathcal{J}; \alpha_1 / f(\mathcal{J}_1)); \mathcal{J}_1 / g(\alpha_1))$ is a paraphrase, in case a, or, in case b, a consequence of β .

In English, usually, if both α_1 and \mathcal{J}_1 are preserved by R then both replacements are necessary. Also, in English, those rules which preserve both α_1 and \mathcal{J}_1 are useful for determining the references which result in the referential occurring before the referend, so that after the double replacement the referential appears after the referend. This is because anaphora plays a most important and fundamental role in the system of references in English. Whether or not anaphora plays a similar role in all other languages is hard to tell. The definition of referentials was a slightly abstracted description of the English system. If one limits oneself to English only, one can sharpen the definition by saying that if the rule R preserves both α_1 and \mathcal{J}_1 , it should put α_1 before \mathcal{J}_1 and then both replacements apply.

There is still a possibility that some additional refinements are needed for the definitions of referentials (4.14), and (4.15) which follows. A study of other languages may give new insights. A more detailed research into English may also force some improvements.

There will be cases where condition (2) will be violated; α will not occur explicitly in the text β . However there will always be reasons to suppose that there is a tacit occurrence of α in β and this tacit occurrence will be marked by \emptyset or more explicitly by α_1^\emptyset . The acceptance of tacit occurrences (or, as Harris calls them, zero occurrences) of phrases requires restraint and justification for each case.

There are rules of paraphrase which when applied to some texts with referentials (with respect to other rules) give texts which after replacement of referentials

by referends (and perhaps, in addition, vice versa) do not lead to paraphrases of the starting texts. Thus the rule of it-extraposition (see O. Jespersen, A modern English grammar, vol.VII, pp.223-225 and D. T. Langdoen, in the Monographs on Languages and Linguistics, No.19, 1966, pp.207-216) when applied to George likes his pupil gives It is his pupil that George likes (which incidentally is a paraphrase) and the replacements give It is George's pupil that George likes which either is not a paraphrase or else is a peculiar sentence, and It is George's pupil that he likes which is certainly not a paraphrase.

It is therefore an interesting question whether one can characterize those rules or those pairs of texts and rules which do ~~not~~ show the references of the texts according to the procedure described in the definition (4.14). What are the referential decoding rules?

Also it is an open problem how various concepts of referentials are related to each other. An occurrence of a phrase is a referential with respect to a rule, according to the definition (4.14). It is certain that we must use different rules as no rule applies to all forms of texts. But if two rules apply to a text and both are reference decoding, do they always show the same references? And if two reference decoding rules apply to exactly the same texts do they produce the same references always? Finally, is the intuitive concept of referential adequately covered by the relative concept of the definition (4.14)? One may suppose that

(4.15) in text β , an occurrence α_1 of α is an intuitive referential for an occurrence δ_1 of δ if and only if there is a rule R with respect to which, in β , α_1 is a referential for δ_1 .

The rest of this paper will provisionally suppose (4.15). One can take (4.15) as a definition of referentials not as relative to a particular rule, but generally.

The definitions (4.14) and (4.15) present the concept of referential as a semantic concept. But they do not say that a referential and its referend denote

the same object, or connote the same property, or name the same entity or have the same designation. In some grammars and in many philosophies of grammar such concepts are used. But there is no reason to assume ontological categories which would correspond to the grammatical categories or to postulate the semantical categories, i.e. relations between the grammatical categories and the ontological categories. The semantics used here is much less elaborate and much less presupposing. It is based on paraphrase and consequence as primitives, and those in turn, can be reduced to truth. Truth is a property of sentences, and more generally of texts. Truth can be predicated about a text if the text bears some relation to the world, to the facts. But we do not have to describe this relation, or to characterize specifically its converse domain. As a matter of fact the best way to say something precise about the relation of language and "reality" is to speak about truth; what texts are true and what are the formal properties of truth. The semantic position taken here is aletheism ($\alpha\lambda\eta\theta\epsilon\iota\sigma\mu\varsigma$ - truth); all semantical concepts reduce to truth and those which do not are illegitimate.

5. Comparison with variables resumed. In §1 the comparison of pronouns with variables was mentioned. The similarity between the two as referentials is not very close. First, Quine compares variables with pronouns only, and does not consider the entire class of referentials. But surely classifiers (Jean and Peter went to the theatre. The man paid for the tickets), repetitions with a definite article added (I met a boy. The boy was playing marbles), comparatives (see (1.1)), superlatives (Out of all the books in the library you chose the most interesting), quantifiers (Jean and Peter went to the theatre. Both were bored; You read a book and I read one), promorphemes other than pronouns (2500 draftable men have burned their draft cards and face prosecution for doing so) are patently also referentials. They contribute as much to the system of references in English as do pronouns. To speak in this connection exclusively about pronouns is misleading, also because it presents language as if it operates

the and
 with \wedge nominal category as uniquely distinguished, \wedge as the only vehicle of
 generality. This is a view dictated more by some philosophers' philosophies
 than by linguistic facts. Not only pronouns refer. Moreover, some pronouns refer
 not to nominal phrases but to sentences: John visited us. It was a surprise.

The system of references is very different from the system of variables.
 Variables involve generality. The mechanism of the generality of variables is
 provided by the rule of substitution. For a variable one may substitute any phrase
 of the same grammatical category as the category of that variable. For many
 referentials one cannot substitute anything. On the contrary, most referentials
 are like constants, though the "meaning" of such patently referential phrases as
it varies with context, ^{yet} \wedge in a given context it is often uniquely determined. The
 most typical use of a pronoun (or of other referentials) is in place of a
 repetition of a phrase. Natural language often requires that a phrase be not
 repeated in its first form only by its referential. But this does not make the
 referential any less "constant" than the phrase to be repeated. The replacement
 of a referential by its referend (after an application of a rule) is not a
 substitution of a phrase from a large supply of substitutable phrases. The
 most essential features of a variable are, firstly, that it is bound by an
 operator, such as a quantifier or the λ -operator, and, secondly, that it has a
 range. Those features are not present with most referentials. In John took
his book the phrase his is not bound by John, as a variable by a quantifier,
 neither does it have a range any more than John has. John is a constant and so
 is his. Variables are referentials. But most referentials are not variables.

6. Procedures for finding references in a text. When we listen with
 understanding to a discourse we recognize the references, at least many of them,
~~references~~, correctly, and the recognitions are achieved mostly by syntactic
 means, i.e. by means which are in principle formalizable without taking into
 account which sentences of the discourse are true. It is reasonable to suppose

that there is a recognition procedure for references, a procedure which a syntax should describe and which imposes crossreferences on the text roughly in the same way as the listener does. The result of the procedure should approximate the intuitive referencing, and at least some of the main steps should agree with the intuitive understanding of the text. However, if there is a syntactic procedure for recognizing the references of any text as the listener does, it must often give inconclusive, ambiguous and conflicting results. Indeed, people are often wrong in the way they refer. The ambiguities and confusions of a text are in large part due to a lack of precision in referring. This imprecision is sometimes partly overcome by semantics. Some sentences of the text are commonly accepted by the speaker and by the hearers as true, as are many sentences which are not explicitly stated in that text, although they also help to understand it. Very careful syntactic studies of texts may even reveal some of those true sentences, but certainly not all of them. Therefore a syntactic procedure for finding references is hampered by the imprecision of speakers and by the lack of knowledge as to which sentences in a given discourse are true. Above all, before such a formalized procedure can be attempted, we must know the facts, the ways by which references are made, the kinds of referentials and their interrelations with other grammatical facts. In English, there are well known agreement rules which state that a referential - by and large - agrees in gender and number with the nominal phrase which is its referend. In the remaining sections some further selected facts about the English referring system are briefly mentioned.

7. Anticipatories. A fundamental fact about the English reference system is that, in a composite sentence, a referential cannot occur in the main sentence and its referend in the subordinate, unless the subordinate occurs to the left of the main sentence. If we mark by the degree sign, °, those texts which are not paraphrases of the remaining in a given set, we have:

(7.1) John asked what time it was, as though he did not know.

(7.2) As though he did not know, John asked what time it was.

(7.3) As though John did not know, he asked what time it was.

(7.4) ° He asked what time it was, as though John did not know.

In (7.4) the referend to he is not John; he in (7.4) is not an anticipatory but an anaphora. If each of (7.1) - (7.3) is preceded by

(7.5) John and Mary entered the room.

then both

(7.6) John and Mary entered the room. He asked what time it was, as though he did not know.

and

(7.7) John and Mary entered the room. As though he did not know, he asked what time it was.

are possible paraphrases of the rest. Similarly with that and a container verb;

(7.8) My wife mentioned that she had gone to a meeting.

(7.9) ° She mentioned that my wife had gone to a meeting.

(7.10) She mentioned that she had gone to a meeting.

(7.11) That she had gone to a meeting was mentioned by my wife.

(7.12) ° That my wife had gone to a meeting was mentioned by her.

The fact that (7.12) is not a member of this paraphrase set indicates that it is a simple transform of (7.9), while (7.11) as a similar transform of (7.8) is still a member of the set. The exclusion of (7.9) and of its modification (7.11), shows that the subordination is of primary importance while the order of occurrence is secondary. In subordinating conjunctions there are different degrees of freedom of placing the referend in the subordinate part of the sentence and the referential in the main part, as we have in (7.3) but not in (7.9).

Because in (7.9) she is not a referential for my wife (even the possibility that she is an anaphora for a previously occurring my wife is excluded), or because in

(7.13) He will go if Peter is free.

he is not a referential for Peter, we may assume that by and large

(7.14) In S_1 (ref (x)) C S_2 (N), $x \neq N$,

where S_2 is subordinated under S_1 . The exclusion rule also holds for the relative clause.

(7.15) Ann liked the book which she had read.

(7.16) ° She liked the book which Ann had read.

These are really derivatives of

(7.17) Ann liked the book after she had read it.

(7.18) ° She liked the book after Ann had read it.

by a general rule of forming the relative clauses

(7.19) S_1 (N) C S_2 (ref (N)) \leftrightarrow S_1 (N) wh (N) S_2^{-N}

Combining (7.14) and (7.19) the exclusion rule for the case of a relative clause is

(7.20) In S_1 (ref (x), N_1 wh (N_1) $S_2^{-N_1}$ (N_2)), $x \neq N_2$ unless ref (x) occurs after wh (see also section 11).

An apparent exception to the exclusion rules (7.14) and (7.20) is it. In

(7.21) It was expected of my father that he should take to a political career which was traditional in the Russell family

it is a referential for take to a political career which is not a noun. The rules (7.14) and (7.20) speak about sentences with N in that place. Still, the anticipatory it, being much freer than most other referentials, constitutes a difficult grammatical problem and many theories (that of Jespersen, that of Langendoen) try to explain its behaviour.

Similar restrictions to those stated in (7.14) and in (7.20) hold for shortened forms of subordinate phrases.

(7.22) By his crossing of the Rubicon, Caesar started the war.

(7.23) Caesar started the war by his crossing of the Rubicon.

(7.24) By Caesar's crossing of the Rubicon he started the war.

(7.25) ° He started the war by Caesar's crossing of the Rubicon.

The same patterns as (7.22) - (7.25) apply to

(7.26) On his arrival John learned the news.

and for conjunctions which start with because of, in spite of, due to, thanks to, for the sake of, despite, in case of, by the time of, instead of. With some conjunctions and some choice of words the form similar to (7.25) does not exist at all:

(7.27) Except for her laziness, Jean is very amiable.

(7.28) *She is very amiable except for Jean's laziness.

In other cases the form similar to (7.25), though it exists, is not a paraphrase:

(7.29) Concerning his health, John is careless.

(7.30) John is careless concerning his health.

(7.31) ° Concerning John's health he is careless.

(7.32) ° He is careless concerning John's health.

Here whether or not (7.31) is a paraphrase of (7.29) may be subject to hesitation and may greatly depend on the environment. Note an exception where the form similar to (7.25) is a paraphrase of all the other three:

(7.33) Considering his age, John did fairly well.

(7.34) John did fairly well considering his age.

(7.35) Considering John's age, he did fairly well.

(7.36) He did fairly well considering John's age.

It is highly plausible that all anticipatory referentials can be snugly reduced to anaphora; every sentence which contains an anticipatory referential is transformable into a text which does not. Instead, there may be an anaphora within it. Presumably, moreover, a more rigid requirement holds; one can find such transformations that the text into which a sentence containing an anticipatory referential is transformable, is again a sentence, rather than a longer text. The anticipatory referentials occur in subordinate phrases like (7.22), (7.2), (7.11). The sentences (7.23), (7.3) and (7.12) uniformly reduce the anticipatory to an anaphora simply by the transformation

(7.37) $C S_2 S_1 \leftrightarrow S_1 C S_2$

In cases like (7.21) slightly more machinery is needed. One may replace my father by he and vice versa and reverse the order omitting it:

(7.38) That my father should take to a political career which was traditional in the Russell family was expected of him.

We have in (7.21) two different references to two different though overlapping central phrases. It refers to take to a political career, and which is a referential to a political career. In such cases, in particular if the central phrase is longer than in (7.38), we get a more comfortable paraphrase by splitting the second clause and adding a suitable conjunction, e.g.

(7.39) That my father should take to a political career was expected of him, for it was traditional in the Russell family.

There are many cases where the anticipatory referential appears only tacitly:

(7.40) On $\left\{ \begin{array}{c} \emptyset \\ \text{one's} \end{array} \right\}$ arrival one should go to the passport control.

(7.41) By a good deed $\left\{ \begin{array}{c} \emptyset \\ \text{of his} \end{array} \right\}$ Robin helped his sister.

Usually such zeros are replaceable by an explicit referential, even if such filling of the zero sounds somewhat forced.

The anticipatory referentials occur in many other kinds of subordination.

For instance,

(7.42) Tough-minded journalist that he was, Daniel Defoe would have blanched.

There are also anticipatory referentials which do not result from a conjunction.

In

(7.43) As for his health Harry is perfect.

there is no conjunction but there is a referential. There are no two conjoined sentences in it. Rather it is a transform of a simple elementary sentence

(7.44) Harry's health is perfect.

Other simple transforms of it are

(7.45) As for Harry's health he is perfect.

(7.46) As for Harry's health it is perfect.

If the supposition of eliminability of anticipatories is true, and indeed it seems rather plausible, a procedure recognizing referentials and their referends may begin by a reduction of anticipatory referentials to anaphoric. Such a reduction may be viewed as some sort of a regularization of texts. In this sense, perhaps a minor sense, a text is regular if it does not contain anticipatory referentials. Every English text is thus paraphrasable - in a prescribed and automatic way - by one which does not contain any anticipatory referentials. Some reduction patterns are illustrated above, e.g. by the step from (7.22) to (7.23). Recall also from section 2 that there are almost none of the anticipatory referentials referring outside the sentence.

8. Zeros. In (7.40) and (7.41) there were zero occurrences of referentials. There are many other types of tacit occurrences of referentials. A "complement" of a relational noun (such nouns will be discussed briefly in the last section) may be zeroed and to find the proper refill for the zero may depend not only on the relational noun but on further environment:

(8.1) I met a friend $\left\{ \begin{array}{l} \emptyset \\ \text{of mine} \end{array} \right\}$

(8.2) Peter met a friend $\left\{ \begin{array}{l} \emptyset \\ \text{of his} \end{array} \right\}$

Sometimes, however, the missing referential is supplied automatically by the "complement" P it. In

(8.3) John and Mary went to the theatre. The boy paid for the tickets. one can add for it where it is an anaphoric referential for John and Mary went to the theatre. The replacement of it requires the necessary grammatical adjustment:

(8.4) The boy paid for the tickets for John's and Mary's going to the theatre.

It seems that the presence of the in front of tickets in (8.3) enforces the reading of the sentence with a P it "complement".

With varying degrees of necessity we omit the wh-word:

(8.5) There are some women Hob thinks are witches.

(8.6) A man I know has a beagle.

In

(8.7) If free, Peter will go.

not only he is zeroed but also a form of the verb to be.

On the whole, zeros occur when there would otherwise be a repetition. And most repetitions can be replaced by a referential or by a phrase with a referential (as in (8.7) by he is). (About various zeros see Z. S. Harris, *Transformational Theory, Language*, 41, pp. 381-2.)

Those phrases which are not referentials themselves but which require as their immediate "complements", "objects", "supports" or "completions", a phrase with a referential which, however, may occur tacitly, are announcers of referentials. Relational nouns and quantifiers (discussed in section 9) are the most typical English announcers of referentials.

9. Quantifiers. In (1.1) there are two referentials which are of the quantificational kind: one and both. The first could be classed together with indefinite pronouns like anybody, each, every, someone, somebody, something. The second is a more "definite" pronoun. It refers to two occurrences which cannot be too "indefinite". We cannot say

(9.1) *Each painting was admired and everybody admired a painting. Both were in the same room.

Not only the indefiniteness of the two referends of both is inadmissible, but also the two referends should be of a similar grammatical category.

(9.2) *A person committed a crime. Both were in the same room is inadmissible. Some sort of singularity of each referend of both is required.

(9.3) Someone liked somebody. Both were in the same room is admissible though both referends are indefinite pronouns. There are cases of referends of both which are in the plural but explicable by reading after both a tacit occurrence of kinds, species, groups or the like.

(9.4) Rabbits and hares hate each other. Both eat the same food.

(Note also the use of each other which usually is, like both, a singulary referential but in (9.4) is used for generic plural referends.)

From a formal point of view both is an announcer of a referential. The referential which occurs tacitly after both is either a common classifier (in the plural) of the two referends

(9.5) Rabbits and hares hate each other. Both species eat the same food.

or a conjunction of repetitions of the referends each preceded by a definite article (proper nouns of course do not take the definite article) or some other suitable referential.

(9.6) Rabbits and hares hate each other. Both the rabbits and the hares eat the same food.

(9.7) A boy met his teacher. { Both
The boy and his teacher } were in the bus.

(9.8) John met his teacher. Both { \emptyset
the boy and the teacher
the former and the latter } were in the bus.
John and the teacher
of them

Some quantifiers, those more "definite" like both, are always used as announcers of referentials or announcers of nouns while other quantifiers, those more "indefinite", are sometimes used as announcers of referentials and sometimes as proper autonomous quantifiers. In

(9.9) There were four people in the car. I liked { everybody.
everyone. }

everyone or everybody is an announcer of a referential with tacit of the four or of them. But in

(9.10) Everybody likes somebody

neither everybody nor somebody is used referentially in a direct or in an

indirect way. Anybody is never used referentially. Therefore not all occurrences of quantifiers have to do with the reference system. Those as in (9.10) or one in

(9.11) The job requires that one has patience.

are proper quantifiers. Those as in (9.9) or like both are quantifiers in reference. (For a theory of the indefinite pronouns as proper quantifiers - though without the use of this terminology - see Harris, op. cit., pp.394-396; Harris' theory is not the only one possible.)

All three is a quantifier in reference similar to both but with three referends. However both, all three, one, can also be used as announcers of noun-phrases which are not referentials:

(9.12) Both my hands hurt.

(9.13) Peter has divorced { all three wives of his.
all his three wives. }

(9.14a) Mosquitoes are nasty. However one does not bother us.

(9.14b) Mosquitoes are nasty. However one does not bother them.

(9.14c) Mosquitoes are nasty. However one does not bother about them.

(9.14d) Mosquitoes are nasty. However they do not bother one another.

In (a) one is a general referential to mosquito. In (b) and (c) one is an indefinite pronoun not in the reference system. In (c) there is, perhaps, a zero occurrence of a reflexive referential oneself after bother. (d) contains an explicit reflexive supported by the referential they. One contrasts with the definite pronoun:

(9.15) I read a book and you read one.

(9.16) I read a book and you read it.

In (9.15) one refers to book. In (9.16) it is a referential for a book together with I read, so that it is replaceable by the book I read. The reference made by such a quantifier (one, few, many, two, some, any, none etc.) is not to a noun-phrase but to a particular noun in a noun-phrase. The referend does not include an article, a determiner, nor another quantifier. This is clear in such

texts as Peter gave me a green necktie but I would have preferred a red one.

As to exams, the hardest ones are still to come. (See Harris, Language, 33, 1957, p.303; also concerning other uses of one.)

Apparently there is a difference between British (9.17) and American (9.18) English in making a referential for one in the referend:

(9.17) One takes one's word seriously.

(9.18) One takes his word seriously.

Quantifiers used referentially may take the definite article :

(9.19) You read an interesting book. The one I read was not nearly as interesting.

(9.20) You read two books. I read the same two.

But "numerals" except those used referentially, or in relative clauses (which are transformationally connected with referentials, see §11) when used adjectively do not take articles.

The zeroing in other places of the text may depend on the quantifier used referentially:

(9.21) The team challenged their neighbours. { All
All of them
All members of the team }
played well but Bill.

(9.22) The team challenged their neighbours. { None
None of them
No member of the team }
played well but Bill.

At the end of (9.21) did not play well is zeroed, while at the same place in (9.22) played well is zeroed. (Note, incidentally, that in (9.21) the plural all refers to the singular (though collective) the team and not, in this reading, to the plural their neighbours). The negative quantifiers like none, neither (in contrast to both or to all three etc.) are used with singular verbs.

There are uses of quantifiers which externally resemble those in (9.21) but do not have clear referends:

(9.23) The various radical movements have all but disappeared.

10. Reflexives. When the referend and the anaphoric referential are in the same elementary sentence, often the referential takes the reflexive form

(10.1) I avoid committing myself.

(10.2) You talked to yourself.

(10.3) Someone thinks of himself as a genius.

(10.4) Everybody thinks of himself as being able to play the violin.

(10.5) He washed himself.

To put a non-reflexive form in (10.1), (10.2) leads to non-sentences. To put a non-reflexive form in (10.3), (10.4), (10.5) leads to non-paraphrases. The latter effect is due only to the fact that he is an indefinite pronoun whereas I, you and we are really proper names. If one replaces in (10.3), (10.4) and (10.5) he by you, himself by yourself, and everybody and some by you, and one deletes s in thinks, then the change of the reflexive to the non-reflexive forms leads to non-sentences. The fact that the referential occurs in the same elementary sentence as the referend is of primary importance. This is clear when you compare (10.3) and (10.4) with

(10.6) Someone thinks that he is a genius.

(10.7) Everybody thinks that he can play the violin.

which contain the referential he not in the same elementary sentence as the referend someone or everybody. The referential occurs in the contained sentence while the referend occurs in the container. Which sentences are elementary is here the crucial question. Harris' kernel sentences are perhaps a fair approximation to what is needed here. An elementary sentence can be part of another sentence:

(10.8) I think that you avoid committing yourself.

Or, it may appear in a modified form in another sentence:

(10.9) I disdain your avoiding to commit yourself.

In all cases (10.1) - (10.9) the object could be a referential to another subject, e.g. the subject could be Peter in each case. These are, therefore, open structures not like those verbs quoted by Jespersen (Ess. 11.5) which are always used reflexively.

(10.10) She prides herself on her good looks.

(10.11) He absented himself from all committee meetings.

If the referend is only a modifier of the object rather than the object itself, then the reflexive form is not obligatory:

(10.12) He washed his hands.

There are two possible theoretical approaches. The first possibility is to take some presupposed theory of elementary sentences, like Harris' kernel theory, and then to state that if the referential is exactly a stated part of an elementary sentence, e.g. the object, or the N of the object PN as in

(10.13) I looked at myself.

and the referend is exactly a stated part of this elementary sentence, for instance its subject, then the reflexive form is obligatory. An elementary sentence is altered by modifiers, by conjunctions, or by transformations into other sentences and one must clearly have in mind which elementary sentences are imbedded in the combined sentences. In (10.12) his is a modifier.

The other possibility of forming the theory is to start by fulh facts as the obligatory reflexivity and to take it as a criterion for the structure of the sentence. Wherever the referential takes necessarily the reflexive form we say that there is an elementary link between the referend and the referential. Then the paraphrastic transformations preserve the elementary links. The two theories may amount to the same and then the second will constitute an empirical substantiation for the first while the first will give a possibility of finding systematic connections between the elementary links by reflexivity and other

parts of grammar. There are obligatory reflexives which do not have the referend in the text as it stands:

(10.14) To have a good opinion of oneself is immodest.

A known transformation reduces (10.14) to a sentence in which the referend does occur

(10.15) If one has a good opinion of oneself, one is immodest.

The part of (10.15) with the elementary link

(10.16) One has a good opinion of oneself.

is not a sentence of the "kernel" form unless

$$NV \quad N^{\text{rel}} \quad PN$$

is taken as one of the forms in the kernel and an N can be an indefinite pronoun one without leaving the kernel level. We presumably can collect all sorts of sentences with obligatory reflexive referentials as

(10.17) The treaty provides for its own execution.

and, applying to them suitable transformations, adjust properly the class of kernel forms. For somebody who studies the reference system of the language, the second path is more natural, because, splitting the text into the kernel form sentences loses the connections between the referentials and their referends. He would prefer also to accept only such transformations which preserve the references of the text. This limitation is severe and many practised transformations would have to be abandoned by him.

Jespersen noted also that the obligatory referential occurs sometimes tacitly:

(10.18) We kept $\left\{ \begin{array}{c} \emptyset \\ \text{ourselves} \end{array} \right\}$ warm.

(10.19) Peter settled $\left\{ \begin{array}{c} \emptyset \\ \text{himself} \end{array} \right\}$ down in an easy chair.

This is in accordance with the often observed tendency that whatever phrase is obligatory is not necessary; if a phrase must occur it may be zeroed. Thus instead of (10.5) we say

(10.20) He washed.

and I played a record can be taken as a short for I played a record to myself in contrast to I played a record to her.

11. Relative clauses. A simple and most natural referential is a repetition of a word. When a mass noun is repeated there is no change whatsoever.

(11.1) The bridge is made of steel. Steel is stronger than wood.

A repeated count noun takes an article or another determiner.

(11.2) Jean bought a dress. The dress was blue.

In both cases, and in many others as well, the sentence in which the repetition occurs has as the preceding sentence one which is imbeddable as a relative clause.

(11.1) leads to

(11.3) Steel, of which the bridge is made, is stronger than wood.

Similarly (11.2) gives

(11.4) A dress which Jean bought was blue.

Of course in (11.1) and in (11.2) we can replace the repetition by another sort of referential, for instance by a pronoun, or by a classifier:

(11.5) The bridge is made of steel. { It
This material
That metal } is stronger than wood.

(11.6) Jean bought a dress. { It
The garment } was blue.

Therefore the sentences (11.3) and (11.4) with relative clauses could be viewed as consequences of (11.5) and (11.6) or of texts with any suitable referentials. In cases like (11.1) and (11.2) Harris speaks about noun-sharing; but when one studies the reference system the word 'repetition' is better.

The connection between a simple referential and a relative clause is of interest to some philosophers who would like to eliminate any sentence containing a relative clause within a noun-phrase and to replace it by a text of two

sentences, one of which contains a referential, joined by an appropriate conjunction. Instead of

(11.7) Only a person who has money has power.

they prefer

(11.8) A person has power only if he has money.

Russell, Wittgenstein and in recent years Geach have tried to eliminate "complex terms". (P.T.Geach, Journal of Philosophy, 62, pp.5-8 and 716-717; also his Reference and Generality, Ithaca, 1964.) Without entering into their philosophical motivations, one can say that presumably they are correct in their claim that the relative pronoun which binds the complex term together can be dispensed with in favour of a pronoun accompanied by one connective or another. If they are right, as they seem to be, this shows that a relative pronoun like who is a conjunction wh - followed by a promorpheme, in this case a pronoun -o, as Harris have suggested.

In a recent work Richard Smaby shows that all wh- relative clauses can be obtained in the ways similar to those which lead from (11.1) to (11.3) or from (11.2) to (11.4) or from (11.7) to (11.8). (University of Pennsylvania doctoral dissertation, 1968.) Previously, Beverly Robbins presented a detailed study of the relation between the definite article and the relative clauses of a noun. (in her book The definite article in English, The Hague, 1968.). In Robbins' book it is the repetition with the definite article which is shown to be related and reducible to the relative clause. The present paper is closer in the theoretical outlook to Smaby's work. This is so mainly because Robbins deals with the decomposition of a text into a set of separate sentences. Smaby considers the relation only between texts, so that all transformations are taken to have one English text on one side and one English text on the other and not a set of sentences on one side, as Robbins, following Harris, has.

Omitting all the details, complications and restrictions the transformation which leads from a text with a referential to a sentence with a relative clause can be stated thus:

(11.9) If

$$\delta = S_1 \cdot S_2$$

is a text and in the sentence S_1 there

is an occurrence α_1 of α and in the sentence S_2 there

is an occurrence β_1 which is a ref (α_1), then S_2

with the replacement of β_1 by

$$\alpha \text{ wh } (\alpha) S_1^{-\alpha_1}$$

is a paraphrase of δ .

More schematically and less accurately:

$$(11.10) S_1 (\alpha_1) \cdot S_2 (\text{ref } (\alpha_1)) \leftrightarrow S_2 (\text{wh } (\alpha) S_1^{-\alpha_1})$$

Many conditions must be added to (11.9). Some of them will be shown in the examples which follow.

In who, what, which, whom, as they occur at the beginning of a relative clause, a referential is already present. Such a wh-word may itself be a referend of another referential α_1 in the relative clause. It follows from the previous comments that when α_1 is in the same elementary sentence as is the wh-word, then it must have the reflexive form. When, however, it is not in the same elementary sentence, it can have a non-reflexive form.

(11.11) A man who taught himself Latin showed me his method.

In (11.11) himself is obligatorily in the reflexive form because it occurs in the same elementary sentence as who, but his is not in the same elementary sentence and therefore is not obligatorily a reflexive. Had it been a reflexive, the sentence would say something more than (11.11). The referend his occurs after who, in accordance with a condition on (7.20). Applying the exclusion rule (7.20) to (11.11) take N_1 to be the same as N_2 . Note also that when another subordination is present (7.20) does not hold any more:

(11.12) Though it is a difficult language I know a man who taught himself Latin.

In (11.12) N_1 of (7.20) is distinct from N_2 . By (7.37) the sentence (11.12)

transforms to

(11.13) I know a man who taught himself Latin though it is a difficult language.

which already agrees with the statement of (7.20).

When an adverb is present it may be necessary to change its place. You read a book. I would like to read it too gives I, too, would like to read a book you read. An adjustment is necessary when the referential is contrastive: You read a book. I read another gives I read another book than you $\left\{ \begin{array}{l} \emptyset \\ \text{read.} \end{array} \right\}$ When the

referential is not contrastive the adjustment of the form of the relative clause is different: You read a book. I read the same one gives I read the same book as you $\left\{ \begin{array}{l} \emptyset \\ \text{read.} \end{array} \right\}$ Still different adjustment is needed for (9.19) which results in

The book I read was not as interesting as the $\left\{ \begin{array}{l} \text{one} \\ \text{book} \end{array} \right\}$ $\left\{ \begin{array}{l} \text{which} \\ \emptyset \end{array} \right\}$ you read.

When a referential is not to a noun-phrase, but to a sentence, then instead of a relative clause one gets a subordinate clause. Compare

(11.14) You read a book. It was nice.

with

(11.15) You read a book. It was nice of you.

The text (11.14) gives

(11.16) A book you read was nice.

while (11.15) gives

(11.17) It was nice $\left\{ \begin{array}{l} \text{of you to} \\ \text{that you} \end{array} \right\}$ read a book.

When the reference is done by a phrase with a classifier the classifier may remain in the result of the relative clause transformation: I like actors. These are fine men gives Actors, whom I like, are fine men.

When the second sentence, the sentence which contains the referential and

into which we imbed the relative clause, is an interrogative or an imperative, the transformation goes essentially in the same way. I read his new book. Do you know it? results in Do you know his new book which I read? and I read his new book. Read it! leads to Read his new book which I read.

Note, finally, a form of relative clause to an anticipatory referential he (or one) expressing generality.

(11.18) He who reads much wastes his time.

It is presumably not a paraphrase of

(11.19) ° He wastes his time who reads much.

Rather (11.18) is paraphrased in

(11.20) $\left. \begin{array}{l} \text{Anybody} \\ \text{Everybody} \\ \text{Somebody} \end{array} \right\} \text{who reads much wastes his time.}$

In structures like (11.18), (11.20), he, anybody, everybody, somebody are interchangeable. But in the conditional form only somebody or one can be used with added one or he in the consequent: (Compare section 9.)

If somebody reads much he wastes his time.

If one reads much $\left. \begin{array}{l} \text{he} \\ \text{one} \end{array} \right\} \text{wastes his time.}$

If one reads much one wastes one's time.

12. Relational nouns. Relational nouns (i.e. nouns which have an explicit or tacit "complement", normally of the form PN) occur as referentials when they are classifiers, as the husband in

(12.1) Bob and Jean left their apartment. The husband carried the suit-case.

Also in the "complement" of relational nouns referentials occur regularly, though sometimes tacitly. If the "complement" of a relational noun is tacit, we can always take it as a preposition followed by a referential. Hence, relational nouns are playing the role of announcers of referentials. The analysis of the references in the text may depend on the fact that a given noun is relational. To illustrate, take the following sentence (Quine, From a logical point of view, p.92)

(12.2) I will now suggest a method of avoiding the contradictions without accepting the theory of types or the disagreeable consequences which it entails.

The it in this sentence is in agreement both with a method and with the theory of types. However, we know that the second, and not the first, is its referend. To explain the mechanism of our recognition of this reference, note first that the change of the verb entails to avoids or to forbids will result in an inclination to take a method as the referend of it. With the change, the sentence will be ambiguous; it could have two different referends. As it stands, the sentence is not ambiguous in that way. Therefore the explanation of the references in (12.2) cannot come from the string analysis which simply considers consequences as a noun and entails as a verb. The word consequence is a relational noun. Its regular appearance is in the form

(12.3) a consequence of x

The class of relational nouns contains such nouns as son, uncle, explanation, author, part. If any of them occur without of x, in x, for x or some other Px, we can search for an occurrence of x in the immediate environment, in accordance with some known transformation (Robert's uncle transformationally).

connected with the uncle of Robert in accordance with N_1 of $N_2 \leftrightarrow N_2$'s N_1 ; for this fact the explanation is simple transformationally connected with the explanation of this fact is simple in accordance with N_1 P_1 N_2 V $\Omega \leftrightarrow P_2$ N_2 N_1 V Ω). If the x does not occur in this way, we assume that it has a zero occurrence and usually we could say what the tacit phrase x is. Thus, had the sentence (12.2) ended after the word consequences

(12.4) I will now suggest a method of avoiding the contradictions without accepting the theory of types or the disagreeable consequences

we would know that at the end of it there will be a tacit occurrence of of it. Again, in (12.4) it could refer to the theory of types or to a method. Whichever is the case, it in (12.2) and the tacit it in the shortened sentence (12.4) have the same referend. This becomes clear, if one remembers that entails is a correlative of consequence. If

(12.5) y is a consequence of x

then

(12.6) x entails y

Here the correlatives are of two different grammatical categories. But there is also a correlative to a consequence which is a noun, e.g. a premiss, and a correlative to entails which is a verb, e.g. follows from. For the grammatical categories of correlatives as in (12.2) namely for N and V there is a battery of transformations which characterizes a small paraphrase set:

$$(12.7) \begin{array}{l} \left[\begin{array}{l} N_1 \varphi (V) N_2^{\text{rel}} \text{ of ref } (N_1) \\ N_1 \varphi (V) N_2^{\text{rel}} \text{ wh } (N_2) \text{ ref } (N_1) \varphi (\text{vrbcorrel } (N_2)) \\ N_1 \varphi (V) N_2^{\text{rel}} \text{ wh } (N_2) \text{ ref } (N_1) \varphi (\text{have}) \end{array} \right] \end{array}$$

Thus, a sentence composed of a nominal phrase followed by a form of a verb, then by a relational noun followed by of and a referential to the first noun, is paraphraseable by a sentence which starts in the same way, but which after the relational noun, has a relative clause composed of a relative pronoun suitable

to the relational noun, the referential for the subject and a form of verbal correlative to the relational noun. It is also paraphrased in a sentence like the last one except for having a similar form of have in place of a form of the verbal correlative. ^{Here is} an example of a paraphrase set according to the battery of transformations (12.7):

	George likes a pupil of his
(12.8)	George likes a pupil (whom) he taught
	George likes a pupil (whom) he had

The battery (12.7) and the paraphrase set (12.8) can be easily extended by adjoining other transformations to (12.7) and parallel transforms to (12.8), and similar batteries can be stated for pairs of correlatives in other grammatical categories. Also, in (12.2) one can replace entails by has preserving the meaning. On the other hand avoids and forbids are not correlatives of consequence, therefore the replacement of entails by one of them would not fit the battery (12.7) and we would not have any reason, as we do with entails, to identify the referend of it with the referend of a referential which tacitly occurs after consequences. Note that in (12.2) we cannot insert of it between consequences and which.

(12.9) I will now suggest a method of avoiding the contradictions without accepting the theory of types or the disagreeable consequences of it which it entails.

is not a paraphrase of (12.2), if it is a clear sentence at all. Therefore it in (12.2) is the transformed "complement" of the relational noun consequences just as the battery (12.7) indicates.

The problem of how to account for it as a referential for the theory of types and not for a method is now reduced to that of showing that the consequences are of the theory of types and not of a method. However we could not find indications in this sentence alone for the fact that the consequences are bound to the theory of types and not to a method. But in Quine's text the nearest precedingⁿ occurrence of the phrase the theory of types is in the ninth preceding

sentence and in the same sentence is the nearest preceding occurrence of consequences. In this ninth preceding sentence to (12.2) it is said that

(12.10) the theory of types has unnatural and inconvenient consequences which links the consequences with the theory of types and uses has which supports the applicability of the battery (12.7).

The outlined fragment of the procedure which may assign the proper referends to referentials requires that larger text than a single sentence be examined, even though the referend and the referential are in the same sentence. It also calls for correlatives. Knowledge of correlatives is not a small matter. The resolution of references in a text is not a small matter either.

To return to cases when relational nouns occur themselves as referentials rather than as announcers of referentials, like the husband in (12.1), it is to be noted that when a relational noun occurs as a classifier (i.e. a predicate of the subject), then it does not take easily its "complement" in the very same sentence. We cannot in (12.1) insert of Jean after husband, nor can we replace the by Jean's nor by her, without suggesting that Bob is not Jean's husband. Yet, if the husband in (12.1) is a referential for Bob, there is a consequence of (12.1) where the "complement" occurs:

(12.11) Bob is the husband of x

with, presumably, $x = \text{Jean}$.

(Aristotle, Cat V11 6 b 29 ff, spoke about relational nouns and about correlatives. However his comments do not go very far.)

P.S. Many thoughts of this paper were influenced by discussions with I. Bellert,

Z. S. Harris, D. Hiž, E. Keenan, L. Klevansky, B. Robbins and R. Snaby.

All took part in a research sponsored by the National Science Foundation.