the example sentences changed, would be perfectly applicable to French, point
by point. To what extent they are applicable to other languages, related and
unrelated, is of course a matter of further empirical study. The definitions and
principles that have been formulated here are probably not fully correct in their
present form, but they are claimed to represent at least approximations to some
aspects of linguistic reality. In particular, it is suggested that a rather abstract
view of the relations holding among constituents in a tree structure is relevant in
constraining the application of transformational rules.

On the Cyclic Nature
of English Pronominalization

JOHN ROBERT ROSS

In this paper, I will attempt to show that certain facts about anaphoric pronouns
in English can be easily accounted for if the rule which introduces them is an
obligatory, cyclically ordered 'transformation.' These facts are thus not only
interesting for their own sake, but also because they provide direct evidence for
the correctness of Chomsky's theory of grammar, for it is only within this theory
that cyclically ordered rules are countenanced.

I will assume that structures underlying sentences like (1a) must be converted
into those that underly (1b) or those that underly (1c) by a transformational rule
of PRONOMINALIZATION.

(1a) After John Adams, woke up, John Adams, was hungry.
(5b) After John Adams, woke up, he, was hungry.
(c) After he, woke up, John Adams, was hungry.

This rule replaces some noun phrase (NP) in a structure by a definite pronoun of
the appropriate gender and number, when the first NP is in the environment of

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The notion of the transformational cycle was first presented in Noam Chomsky, Aspects of the
framework of transformational generative grammar, which is presupposed in the present study,
should refer to the above mentioned work by Chomsky and its extensive bibliography.
another NP which is identical to the first. It is the purpose of this paper to provide a partial explanation for the illogical phrase in the preceding sentence.

Notice that pronounalization must be allowed to work in two directions: It must be able to replace an NP to the right of an identical NP with a pronoun (as in the conversion of (1a) to (1b)), and it must also be able to replace an NP to the left of an identical NP with a pronoun (as in the conversion of (1a) to (1c)). I will call this former forward pronounalization and the latter backward pronounalization. Both forward and backward pronounalization can apply to the (a) versions of examples (2)-(6), as is shown by the (b) and (c) versions:

(2a) John Adams, was hungry after John Adams, wake up.
(2b) John Adams, was hungry after he, wake up.
(2c) *He, was hungry after John Adams, wake up.

However, it is not always the case that pronounalization can work in both directions: In the sentences in (7)-(12), which are transformationally related to those in (1)-(6) by a number of rules which I will not describe in detail here, only forward pronounalization is possible:

(7a) John Adams, was hungry after John Adams, wake up.
(7b) John Adams, was hungry after he, wake up.
(7c) *He, was hungry after John Adams, wake up.

*As Chomsky points out, op. cit., pp. 145-146, the notion of identity that is of interest in linguistics includes identity of reference. The second occurrence of John Adams in the sentence John Adams injured John Adams is understood to have a different reference than the first, while himself in John Adams injured himself is understood to have the same reference as the subject. Chomsky suggests that certain lexical items be assigned referential features, any integers, and that rules which require identity between lexical items, such as REFLEXIVIZATION and TRANSPRINTALIZATION, may only apply to NP which have been assigned the same integer. Thus two occurrences of the NP John Adams will refer to the same individual if they have identical subscripts (as in (1a), but John Adams, and John Adams, can never refer to the same individual, for two equal to f).

[1] will use the location "sentence A is converted, (transformed, etc.) into sentence B" for the more precise, but cumbersome, phrase: "the structure underlying sentence A is converted (transformed, etc.) into the one underlying sentence B." No theoretical significance should be attached to this abbreviation.

*Ungrammatical sentences are prefixed by an asterisk, double asterisks by a question mark. Note that the string of words in sentence (7a) is only ungrammatical if the pronoun he is meant to refer to the same individual as the phrase John Adams in the subordinate clause. If he refers to someone else (Washington, for example) the string of words in (7a) is grammmatical. But in the latter case, he would have to have a different subscript, say, j, from the NP John Adams, by the conversion adopted in footnote 2 above. This is, in such a case, he would not be an anaphoric pronoun for some NP occurring elsewhere in the same sentence, but would rather be a substitute for some NP in an earlier sentence. In this study, I will only be concerned with pronouns which bear an anaphoric relationship to some NP occurring in the same sentence.
These facts suffice to reject the proposal that PRONOMINALIZATION should be ordered so as to precede all other transformational rules: it depends on, and thus must operate after, at least the two rules of ADVERB PREPOSING and PASSIVE. Since the latter rule can be shown to necessarily be in the transformational cycle, PRONOMINALIZATION cannot be a preycic rule. If it cannot apply before the cycle, it must either apply in the cycle or after all cyclic rules have been applied—rules of this last type are called postycic. Exactly what rules are preycic, or postycic, and why, is not directly relevant to the problem of PRONOMINALIZATION. What is relevant in establishing the claim that this rule is cyclic is the claim made in the present theory of grammar that transformational rules can only be preycic, cycic, or postycic. I have already shown that PRONOMINALIZATION cannot be preycic, and facts I will present below will prove that it cannot be postycic. The only remaining possibility is that it is cycic.

Examples (7)-(15) show that PRONOMINALIZATION cannot always be applied backward; example (14) shows that it cannot always be applied forward.

(14a) Realizing that Oscar, was unpopular didn't disturb Oscar.
(b) *Realizing that Oscar, was unpopular didn't disturb him.
(c) Realizing that he, was unpopular didn't disturb Oscar.

Note that (14) differs from (2), in which both forward and backward pronominalization are possible, only in that the former contains the word realizing and the latter

\[
\begin{array}{c}
\text{NP} \\
\text{S} \\
\text{V} \\
\text{S} \\
\text{NP} \\
\text{V} \\
\text{NP} \\
\text{S} \\
\text{NP} \\
\text{V} \\
\text{NP} \\
\text{V} \\
\text{NP} \\
\text{V} \\
\text{NP} \\
\end{array}
\]

In the course of converting (15) and (16) into (2) and (14), respectively, various transformational rules must apply. These rules have been intensively investigated by Rosenbaum, so I will not state them in any detail here, but merely describe their operation informally. If the optional rule of EXTRAPOSITION were to apply to (15), only forward pronominalization would be possible, and sentence (17) would be produced.

In (15), and throughout this paper, I have drastically simplified the constituent structures of the sentences under discussion where more detailed representations would not be relevant to the points at hand. In the case of (15) and (16), for example, I have not given the deepest structures, in which the complementizers that and Passive-ing would not appear, but have rather assumed that a transformational rule of COMPLEMENTER PROGRAM has already applied to insert them.

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PRONOMINALIZATION does not, of course, apply on the first cycle in the derivation of either (15) or (16). For in this cycle, the structure being operated on is the one underlying the simple sentence Oscar was unpopular, which does not contain two identical noun phrases. In processing (15), the first cycle on which PRONOMINALIZATION could be applied is the one on the highest S. If forward pronominalization is carried out, sentence (2b) will result. Backward pronominalization is also possible, however, for the clause that Oscar was unpopular is a subordinate clause, and if the rule applies in this direction, (2c) results. Comparison of all sentences in examples (1)–(6) with those in examples (7)–(12) will reveal that backward pronominalization is possible in the former group because in these sentences, Condition (ii) on rule (18) is met. Since it is not met in the latter group of examples, only forward pronominalization is possible there.

In processing (16), PRONOMINALIZATION does not apply on the lowest cycle, for the same reasons as above. It is not until the cyclic rules are processing the sentence whose main verb is realize that the structural description (SD) of PRONOMINALIZATION is satisfied. At this point the input structure to the rule of PRONOMINALIZATION is the one underlying (19).

(19) *Oscar, realized that he was unpopular.

I have prefixed (19) with an asterisk to indicate that it cannot occur as a grammatical sentence of English if the two occurrences of Oscar are taken to refer to the same individual. In other words, PRONOMINALIZATION must apply to (19) and hence, on the cycle in question, to (16) as well. PRONOMINALIZATION can apply forwards to (19) (cf. (20a)), but not backwards (cf. the ungrammaticality of (20b)), because in (19) the conditions under which backward pronominalization could apply are not met: the lastmost identical NP, the subject of the entire sentence, is not contained in any clause, subordinate or otherwise, which does not contain the second identical NP.

(20a) Oscar, realized that he was unpopular.
(20b) *He, realized that Oscar, was unpopular.

After PRONOMINALIZATION has converted (19) into (20a), the cycle of rules which applies to the sentence whose main verb is realize is completed, and the rules reapply to the next higher sentence in (16). When the highest sentence in (16) is reached, before any cyclic rules have applied, the structure being processed is the one underlying (21).

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By the same token, the (a) versions of sentences (1)-(14) must also be indicated as being ungrammatical—I have left them unstoresh only in the interests of expository simplicity. There are various problems inherent in claiming that PRONOMINALIZATION is always obligatory.

J. E. Endicott has called to my attention such sentences as the following:

Willy disteed his car and then he polished it

in which, for most speakers, PRONOMINALIZATION is optional, I do not at present know under what conditions the rule is optional, but in all cases I have found so far, a coordinate structure was involved. However, for the purposes of the present argument, it is not required that the rule be obligatory under all circumstances, for it is sufficient that it is obligatory in such cases as (19).
(21) *Oscar's realising that he was unpopular didn't disturb Oscar.

For most speakers, (21) is ungrammatical: the noun phrase Oscar's must be deleted, producing (14c). The rule which accomplishes this I will refer to as EQUI NP DELETION—it deletes the subject NP of an embedded complement clause which contains the complementizers Possessive—'s or for—to, subject to the constraint that this NP be identical to some NP in the matrix sentence. Exactly which NP of the matrix sentence the embedded subject must be identical to is a complex and exceedingly interesting problem which has been investigated by Rosenberg.11

After EQUI NP DELETION has applied, no more rules of concern to us here apply. In particular, PRONOMINALIZATION cannot apply, for the subject of the VP was unpopular is the pronoun he, and the structural description of rule (18) requires that neither NP be a pronoun.

Thus it can be seen that (14c) can be derived very simply from (16) if PRONOMINALIZATION is a cyclically ordered obligatory rule, constrained in the way stated in (18).

Sentence (14b), which exhibits forward pronominalization, must now be shown not to be derivable under the formulation of the rule given in (18).

(14b) *Realising that Oscar, was unpopular didn't disturb him.

But this is easy to demonstrate, for the only way (14b) could result would be for the input structure for the last cycle of (16) to be the one underlying (22).

(22) *His realising that Oscar, was unpopular didn't disturb Oscar.

If such NP deletion were now to delete his, the subject of the embedded sentence, under identity with the occurrence of Oscar which is the object of the main verb, disturb, (23) would result.

(23) *Realising that Oscar, was unpopular didn't disturb Oscar.

If forward pronominalization were to apply now, (23) would become converted into the ungrammatical (14b).

Notice that this derivation of (14b) depends crucially upon it being possible to have derived (22) as a possible input structure to the highest cycle of rules for (16).

But it is easy to see that in order for (22) to be the input to the last cycle, PRONOMINALIZATION must have incorrectly applied backwards on the cycle processing the sentence whose main verb is realize. In order to derive (24), the subject NP of (22), (24) *His realising that Oscar, was unpopular it is necessary for PRONOMINALIZATION to apply backward to (19) to produce the ungrammatical (20b), and, as I pointed out earlier, this conversion would violate Condition (ii) on rule (18).

It might be argued that (14b) could be blocked equally well if it were assumed that PRONOMINALIZATION were a postcyclic rule, and some condition were imposed upon forward pronominalization, so that (23) could not be transformed into (14b); for if backward pronominalization is applied to (23), (14c) will result. But what condition could be imposed? That forward pronominalization is impossible if the

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leftmost identical NP is contained in an object clause of such verbs as realize and the rightmost identical NP is not contained in it? But this condition is too strong, for it is not in general true that forward pronominalization is blocked "out of" (in the obvious sense) the object clause of verbs like realize. Thus a sentence like (23), (25) *Mary's realizing that Oscar, was unpopular didn't disturb Oscar,

which is derived from a structure exactly like (16), except that Mary is the subject of realize instead of Oscar, can undergo backward pronominalization (cf. (26a)) or forward pronominalization (cf. (26b)).

(26a) Mary's realizing that he, was unpopular didn't disturb Oscar,

(26b) Mary's realizing that Oscar, was unpopular didn't disturb him.

It can therefore be seen that the only cases where a postcyclic rule of forward pronominalization would have to be blocked "out of" the object clause of verbs like realize are cases where the deep structure subject of the verb in question was identical to the NP in question in the object clause, a fact which is explained if PRONOMINALIZATION and EQUI NP DELETION are cyclic rules, as I have assumed above. (Lakoff, op. cit., has demonstrated that the latter rule must be cyclic.)

Notice also that whether PRONOMINALIZATION is postcyclic or cyclic, Condition (iii) on backward pronominalization will have to be stated anyway, for sentences like the (a) version of (7)–(13) must still be prevented from being transformed into the corresponding (c) versions, and (19) must not be transformable into (20b).

But it is only if PRONOMINALIZATION is formulated as a postcyclic rule that some constraint on forward pronominalization becomes necessary in order for a distinction between (14b) and (14c) to be made. Considerations of simplicity therefore dictate clearly that PRONOMINALIZATION must be formulated as a cyclic rule, not as a postcyclic one.

There is a further point which is closely related to these considerations: compare (27) with the superficially very similar (5), which I repeat here for convenience.12

(27a) *The knowledge that Fred, will be unpopular doesn't bother Fred,

(b) *The knowledge that Fred, will be unpopular doesn't bother him,

(c) The knowledge that he, will be unpopular doesn't bother Fred.

(5a) *The possibility that Fred, will be unpopular doesn't bother Fred,

(b) The possibility that Fred, will be unpopular doesn't bother him.

(c) The possibility that he, will be unpopular doesn't bother Fred.

The deep structure of (5), to which either forward or backward pronominalization can apply, is roughly that shown in (28), on the next page.

On the first cycle of rules to apply to (28), when the sentence Fred, will be unpopular is being processed, no rules of relevance to the present discussion apply. On the second cycle, the complementizer that is adjoined to the node S which dominated the first-processed sentence. PRONOMINALIZATION cannot apply, for the structure up to the second highest occurrence of the node S does not contain two identical NP.

On the third cycle, when the entire sentence is being operated on by the cyclic rules, the verb bother selects some abstract complementizer which converts its...
sentential subject into an abstract NP which has a substantivizing adjective as its head noun: the possibility that Fred will be unpopular. Many details of this substantivization transformation are as yet unclear, but I am reasonably confident that they can be worked out in such a way that my main claim, that the deep structure of the abstract subject of (5) is approximately that shown under the highest NP of (28), will not have to be drastically revised. Following this substantivization, PRONOMINALIZATION can apply in either direction, for the that-clause in apposition to the noun possibility is a subordinate clause (cf. footnote 9 above).

Now let us return to (27), where, as was the case in (14), only backward pronominalization is possible. It is immediately clear that if the abstract subject of (27), the knowledge that Fred will be unpopular, is derived from some putatively intransitive adjective (say, known), on analogy to the derivation of possibility from possible, the fact that forward pronominalization is excluded for (27) will remain unexplained.

For the deep structures of (27) and (5) differed only in that one word, PRONOMINALIZATION would affect them identically. Similarly, it is easy to see that the subject of (27) could not derive from a phrase-structure expansion of NP like NP → Det N S, i.e. from a NP like the one shown in (29).

In processing (31), no rules which are of concern to us here apply on the lowest cycle. On the second cycle, after the complementizer that has been adjoined to the most deeply embedded S, the structural description for PRONOMINALIZATION is met, so the rule must apply. Since backward pronominalization cannot apply (the subject NP of know is not dominated by a subordinate clause which does not dominate the subject NP of will be popular), the rule obligatorily converts the latter NP into a definite pronoun, producing the sentence Fred knows that he will be unpopular.

On the highest cycle of (31), the verb bother specifies that it is possible to adjoin to the second highest sentence the abstract complementizer which triggers the same substantivization transformation which applied in the derivation of (5). After this complementizer has been adjoined, but before the substantivization transformation has applied, then NP DELETION deletes the subject of know under identity with the object of bother. Then the substantivization rule applies, ending
the derivation; 

PRONOMINALIZATION cannot apply for the same reason it could not apply on the highest cycle of (16).

Thus it can be seen that the derivation of (27) is not parallel to the derivation of the superficially similar (5), but is rather parallel to the derivation of (14), and that the explanation for the impossibility of forward pronominalization in (5) is the same as it is in the case of (14). In both instances it was the assumption that PRONOMINALIZATION is cyclic that made possible an explanation of the facts of extremely similar constructions.

I have postponed until this point the discussion of the interaction between PRONOMINALIZATION and relative clauses because the facts are not so clear-cut as they are in the case of the other types of subordinate clauses listed in footnote 9, and because I suspect there may be dialectal variation in this area. For me, the (c) versions of (32) and (33), where backward pronominalization has applied, differ in acceptability.

(32b) *Girls who Sam, has dated like Sam,
(a) Girls who Sam, has dated like him,
(b) "Girls who he, has dated like Sam,
(c) "Girls who he, has dated say that he is charming.

(33a) *Girls who Sam, has dated say that Sam, is charming.
(b) Girls who Sam, has dated say that he, is charming.
(c) Girls who he, has dated say that he is charming.

That (32b) is worse, for me, than (33a) seems to be due to the fact that in the latter, the rightmost occurrence of the NP Sam, is contained in a clause which does not contain the leftmost occurrence of this NP. The same obtains in the case of non-restrictive relative clauses, as can be seen in (34) and (35).

(34a) *Agnes, who Sam, has dated, likes Sam,
(b) Agnes, who Sam, has dated, likes him,
(c) "Agnes, who he, has dated, likes Sam,

(35a) *Agnes, who Sam, has dated, says that Sam, is charming.
(b) Agnes, who Sam, has dated, says that he, is charming.
(c) "Agnes, who he, has dated, says that he is charming.

For some reason which I cannot explain, (35c) is less acceptable for me than (33a). Nonetheless, in order to capture the clearer differences between (32b) and (33a), and between (34c) and (35c), it seems that the following provision, which was worked out by Edward Kimna and me, must be appended to Condition (ii).

If term 2 of the structural description is contained in a restrictive or nonrestrictive relative clause, backward pronominalization is only possible if term 4 is contained in some clause which does not contain and is not contained in this relative clause.

Langacker (op. cit., footnote 9) does not impose condition (36) upon the pronominalization rule, and cites as grammatical several examples which seem to be exactly parallel to (32a) and (34c), which is one of the reasons for my belief that there may be distinct differences in this area.

It does seem to me, however, that some version of (36) must be included in the grammar of all speakers of English, for I know of no speakers who find (37a) and (37b) equally acceptable.

(37a) *His, employers like Sam,
(b) His, employers think that Sam, is charming.

If the NP Sam's employers is derived by means of some rule of AGENTIVE FORMATION from some NP containing a relative clause, such as the ones who employ Sam, which I believe to be essentially the correct analysis, then condition (36) will differentiate correctly between (37a) and (37b), if the rule of AGENTIVE FORMATION is ordered after PRONOMINALIZATION.

An interesting point arises in connection with the pronominalization of possessive noun phrases. Thus (38b) may be converted into (38a) by the application of forward pronominalization, but backward pronominalization cannot convert it into (38a).

(38a) *That Oscar, was unpopular didn't disturb Oscar's, mother.
(b) That Oscar, was unpopular didn't disturb his, mother.
(c) *That he, was unpopular didn't disturb Oscar's, mother.

Comparing (38) with (2), where backward pronominalization is possible (cf. (26)), we see that the only difference lies in the fact that in (38b) the rightmost occurrence of the NP Oscar, is embedded as a possessive modifier of the noun mother. It is not the case that possessive noun phrases can never pronominalize other identical noun phrases, as (39b) shows.

(39a) *That Oscar's, mother was unpopular didn't disturb Oscar's,
(b) That Oscar's, mother was unpopular didn't disturb his,
(c) That his, mother was unpopular didn't disturb Oscar.

But (39b) is produced by forward pronominalization, and the grammatical (38c) by backward pronominalization. Thus it is evident that in yet another respect, the latter kind of pronominalization is more restricted than the former. A third condition, which I am at present unable to formulate, must be imposed on it which will exclude such sentences as (38c).

In the preceding discussion, I have argued that PRONOMINALIZATION cannot be a prescriptive rule, applying before all other transformations; for such a rule would have to be able to operate in both directions, so that both the (b) and (c) versions of examples (1)-(6) would be generated. But if it were allowed to apply backwards, such a rule would generate sentences such as (1c), which could not be saved from ungrammaticality by the operation of later rules, and it would entail imposing many complicated and repetitive conditions, otherwise unnecessary, on such rules as ADVERB PREPOSITION, PARTICLE, etc.

I have further argued, on the basis of such examples as (14), that if PRONOMINALIZATION were formulated as a postcyclic rule, complex conditions would have to be imposed on forward pronominalization so that ungrammatical sentences like (14b) would not be produced. Furthermore, even if such conditions were formulated and added to the grammar, Condition (iii) on rule (10) would still have to be stated, so that sentences like (38b) and the (c) versions of (7)-(13) would not be generated.

Only if PRONOMINALIZATION is formulated as a cyclic rule, obligatory in most environments (but cf. footnote 10), can the unnecessary conditions be avoided which would be required if it were considered to be either a precyclic or a post-
cyclic rule. Furthermore, if it is a cyclic rule, a natural explanation can be found for the otherwise extremely puzzling differential behavior exhibited by superficially identical structures, such as (5) and (27). The naturalness of this explanation therefore provides evidence of the strongest kind for the only theory of language which contains a formal apparatus which allows such rules as (18) to be stated—Chomsky's theory of generative grammar.

14

On So-Called "Pronouns" in English

PAUL M. POSTAL

The following is an informal discussion of certain regularities in the syntactic behavior of forms traditionally called "pronouns" in discussions of English syntax. By informal I mean that, although the analysis suggested involves a number of highly complex grammatical rules and a very special conception of the theory of grammar, no attempt has been made here to formulate or present any of the rules in their correct form. Nor is very much said about the theoretical assumptions these require. My aim is the much weaker one of trying to suggest that a class of facts requires that English grammar be formulated in such a way that it can contain such rules.

Our traditional lore about English grammar recognizes a class of forms often called "pronouns" or "personal pronouns" which include I, we, you, he, she, it, they. At the start we may ignore for simplicity the various case forms as, your, him, etc., as well as reflexives, although these will become crucial later. Very often it was said that such forms "stand for" or "replace" or "are substitutes for" previously mentioned or understood noun forms. Certain modern students of English such as Robert Allen have noted, essentially correctly, that in many ways such forms actually "replace" whole noun phrases (henceforth NP's) rather than nouns, since they cannot occur with articles, relative phrases, and other elements which can occur in the same NP with ordinary nouns. Compare


To a paper read to the Linguistic Society of America several years ago.