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Lexical Extension and Grammatical Transformations
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0. In earlier work on the syntax of causative constructions (see, for example, the papers in Shibatani (1976)) it was found that it is necessary to distinguish between productive rules of causative formation, which establish regular morphological, syntactic, and semantic relations between verbs and their associated causatives, and "accidental" causative relations between lexical items such as kill and die in English. Given the general framework of theoretical assumptions dominant in the early seventies, it appeared that the appropriate way to capture the distinction was to regard productive causative constructions as derived from syntactically complex source by a transformation, while the relations between irregular pairs, if stated systematically at all, would involve "lexical" rules of a nature and function never very clearly specified or understood.

More recent work on the nature of lexical relations (see especially Jackendoff (1975), Wasow (1977), and Bresnan (1977)) has led to the development of more explicit devices for stating regular relations between lexical items. While those particular authors regard such lexical rules as "redundancy rules", i.e. rules which state generalizations about items independently entered in the lexicon, it is clear that a framework admitting such rules allows for a non-transformational account not only of irregular and non-productive lexical relations, but of those traditionally called "productive" as well.

In this paper we develop an analysis of the Turkish causative construction according to which causative verbs are related lexically to their uncausative counterparts, and no transformational rule is involved in the generation of causative sentences; in particular, causative sentences are not regarded as having complex deep structures as proposed, for example, in Aissen (1974). This analysis, together with certain natural assumptions regarding the organization of the grammar and the interaction of its rule components, will be shown to account for a class of rule interaction phenomena which appeared paradoxical under the transformational analysis of causative constructions.

1. The Transformational Theory

According to the transformational analysis, the causative sentence (1) would have a deep syntactic structure like (2), which contains a clause corresponding to the simple sentence (3) embedded as object complement to the predicate CAUSE; a transformation, called various

ly Verb Raising, Predicate Raising, or Clause Union, reduces the two-clause structure to a simplex and amalgamates the embedded verb with the matrix verb; in Turkish the latter appears as a suffix attached to the former.

- (1) Kadın kasab-a et-i kes-tir-di.
 woman butcher-DAT meat-ACC cut-CAUSE-PAST
 'The woman had the butcher cut the meat.'
- (2) Kadın [kasap et-i kes-] CAUSE
- (3) Kasap et-i kes-ti.
 'The butcher cut the meat.'

The nominal complements of the embedded clause become complements of the derived simplex clause and assume derived grammatical relations according to principles which are by now well known: the subject ("1") of an intransitive clause becomes the direct object ("2") of the associated causative; the subject of a transitive clause becomes an indirect object ("3"), and the direct object of a transitive clause remains a direct object.

Aissen (1975, 1974) observed that a transformational analysis of this kind must incorporate some principle of rule interaction to account for the fact that certain "cyclic" transformations cannot apply on the embedded clause before Clause Union. For example, the application of Passive in the complement in (2) would yield

- (4) Kadın [et kasap tarafından kes-il-] CAUSE
 woman meat butcher by cut-PASS CAUSE

and Clause Union should derive (5):

- (5) *Kadın et-i kasap tarafından kes-il-dir-di.
 woman meat-ACC butcher by cut-PASS-CAUSE-PAST
 'The woman had the meat be cut by the butcher.'

But (5) is ungrammatical.

Facts parallel to these were noted in Sonrai by Shopen and Konaré (1970). They argued that the nonexistence of causatives to passive stems would follow from the assumption that causative stems are listed in the lexicon, while passive stems are derived transformationally. If Passive is a transformation as ordinarily conceived, and operates on a clause in syntactic structure to rearrange grammatical relations and as a side effect leaves a morphological mark on the verb, and if causative sentences at no stage have an embedded syntactic clause for Passive to apply to, then causatives to passive stems can never arise. Thus the inapplicability of Passive in causative constructions, while problematic for a transformational theory of causative formation, would be an automatic consequence of a lexical analysis of causatives, as long as the Passive rule can be argued to be a transformation, and not a lexical rule itself.

There are some problems to be solved before such an account can be made to work for Turkish, however. There are some rules, classically regarded as cyclic transformations, which do appear to apply in causatives as if causative sentences had a complex structure. These are the rules of Reflexivization and Equi; briefly, these rules appear to apply in causative sentences in such a way as to indicate that the superficial 3 in a causative to a transitive and the superficial 2 in a causative to an intransitive are subjects at some level of representation. This phenomenon will be discussed in section 4, where we will suggest a way to reconcile these facts with a lexical analysis of causatives.

2. A Lexical Account of Causative Formation

We propose here that causative formation in Turkish does not involve a syntactic transformation uniting two clauses, but rather a generative rule of word formation which derives the lexical entries for causative verbs. We provide below an explicit statement of this rule.

Since this rule is to take lexical entries (specifically, lexical entries of verbs) as input and give derived lexical entries as output, we must first state our assumptions regarding the form of lexical entries. We assume that the lexical entry for a verb includes (a) a phonological representation (kes in (6)); (b) a semantic representation of some sort, which we will crudely abbreviate as a gloss; (c) the grammatical category symbol: V; and (d) an indication of the argument structure associated with the verb in deep structure, given in terms of grammatical relations (enclosed in angle brackets).

(6) [$\langle(1), 2\rangle$ V] kes
CUT

(7) [$\langle(1)\rangle$ V] koş
RUN

(8) [$\langle(1), \text{DAT}\rangle$ V] bin
MOUNT

In (6) we have indicated that the verb kes is transitive by including an obligatory 2 among its arguments. Example (7) illustrates an entry for an intransitive verb, and (8) an entry for an oblique transitive verb which requires a dative complement. Entries such as these comprise what we call the kernel lexicon: the set of basic, independent lexical entries of the language.²

We propose that this kernel lexicon is extended by a set of generative lexical rules which provide derived lexical entries; among these lexical extension rules is the causative formation rule, which we formalize as follows:

Notice that the only obligatory term in the argument structure of the input entry specification of the causative rule is the absolutive; and correspondingly, the only obligatory term in the argument structure of the derived entry is a 2.

3. The Missing Subject Causatives

Our analysis provides a rather straightforward account of a certain property of causative constructions which we will call the "missing subject" phenomenon. There are causatives like (13)-(14) above, where a NP corresponding to the subject of the kernel verb is omitted, though logically implied; omission of this NP is not always possible, however:

(15)*Antrenör koş-tur-du
 trainer run-CAUSE-PAST
 'The trainer caused to run.'

(16)*Memur otobüs-e bin-dir-di.
 official bus-DAT board-CAUSE-PAST
 'The official had board the bus.'

Zimmer (1976) discusses missing subject constructions, and assuming a transformational analysis as outlined in section 1, he proposes that the absence of a NP corresponding to the deep subject of the complement clause is due to the application of Passive in the complement; in this way he would relate the disappearance of the "missing subject" in the causative to the disappearance of the deep subject of a passive (which may optionally appear in a *tarafından*-phrase, but of course need not appear at all).

Zimmer notes three problems with this analysis. First, the passive suffix does not appear on the verb in the missing subject construction; second, it must be stipulated that only personal Passive (Passive promoting 2 to 1) applies in causatives, because there is in Turkish an impersonal Passive deriving passive forms of intransitive and oblique transitive clauses:

(17) Bu saha-da koş-ul-ur.
 this field-LOC run-PASS-AOR
 'One runs in this field.'

(18) Burada otobüs-e bin-il-ir.
 here bus-DAT board-PASS-AOR
 'One gets on the bus here.'

But as was shown above (exx (15)-(16)) the corresponding missing subject causatives are ungrammatical. Third, while it is precisely the personal passives that allow a *tarafından*-phrase, appearance of a *t*-phrase in a missing subject causative is ungrammatical:

- (19) Et kasap tarafından kes-il-di.
meat butcher by cut-PASS-PAST
'The meat was cut by the butcher.'
- (20) *Kadın et-i kasap tarafından kes-tir-di.
woman meat-ACC butcher by cut-CAUS-PAST
'The woman had the meat cut by the butcher.'

There seems to be a rather obvious generalization which is obscured by this analysis: namely, that all causative verbs in Turkish are transitive. Exx (13)-(14) are grammatical precisely because the verb has a deep direct object, and the omission of what would have been the indirect object is inconsequential. In (15)-(16), however, the omission of the NP corresponding to the kernel subject deprives the causative verb of its direct object. In the lexical treatment we are proposing, causative verbs are in essence strictly subcategorized for a deep direct object as a consequence of the formulation of the rule in (9).

As noted above, we are assuming that the subject is optional in the deep argument structure of every verb. In those cases where a verb is inserted into a deep structure without a subject, we assume that the absence of a subject triggers Passive; so that personal passives without tarafından-phrases, and all impersonal passives, are assumed to have no initial subjects. 3

4. Control Rules in Causative Constructions

As noted in section 1, there are rules (Reflexive and Equi) which in some cases operate in causative sentences as if there were a complex structure involved.

Aissen (1974) observed that Reflexivization with 1st or 2nd person controller is clause-bounded in Turkish; furthermore, for most speakers the antecedent of reflexivization must be a subject:

- (21) Ben Hasan-a ayna-da kendi-m-i göster-di-m.
I Hasan-DAT mirror-LOC self-lsg-ACC show-PST-1
'I showed Hasan myself in the mirror.'
- (22) *Hasan ban-a ayna-da kendi-m-i göster-di.
Hasan me-DAT mirror-LOC self-lsg-ACC show-PST
'Hasan showed me myself in the mirror.'

In causative sentences, however, the dative NP corresponding to a subject in the related un-causative can control reflexivization:

- (23) Hasan ban-a kendi-m-i yıka-t-ti.
Hasan me-DAT self-lsg-ACC wash-CAUSE-PAST
'Hasan made me wash myself.'

Aissen (1974) cited this phenomenon as evidence for a syntactically complex analysis of causative sentences; for if sentences like (23) have deep structures in which

the surface dative is a subject of a clause embedded under the predicate CAUSE, then Reflexive can be presumed to have applied in the embedded clause before Clause Union, when the controller was the subject of the clause containing the reflexive. Under an analysis in which the nominal bana is not a subject at any stage, the grammaticality of sentences like (23) would be an unexplained anomaly.

A similar argument can be based on the behavior of a subject-subject Equi rule in causative sentences. The verbs unut 'forget' and başla 'begin' allow Equi-deletion of the subject of a complement clause, and this rule requires a subject controller:

- (24) Hasan [∅ ekmek almağ-ı] unut-tu.
 Hasan bread buy-ACC forget-PAST
 'Hasan forgot to buy bread.'
- (25) Çocuk [∅ yürümeg-e] başla-dı.
 child walk-DAT begin-PAST
 'The child began to walk.'

This Equi is controllable by a non-subject only in causative constructions, where the dative or accusative NP corresponding to a kernel subject can act as controller:

- (26) Ben Hasan-a [∅ ekmek almağ-ı] unut-tur-du-m.
 I Hasan-DAT bread buy-ACC forget-CAUS-PST-1sg
 'I made Hasan forget to buy bread.'
- (27) Ben çocuğ-u [∅ yürümeg-e] başla-t-ti-m.
 I child-ACC walk-DAT begin-CAUS-PST-1sg
 'I made the child start walking.'

Again the facts could be taken to indicate that causative sentences have a syntactically complex deep structure; with Equi taking place before Clause Union, at a point when the controller is a subject of the Equi verb.

The question which goes unanswered under a Clause Union analysis is why these two rules should behave differently from a rule like Passive, which cannot apply in the embedded clause before Clause Union. Looked at the other way, the behavior of Passive indicates that there is no syntactically complex structure underlying causative sentences; while Equi and Reflexive seem to indicate that there is.

Our account of the difference depends on recognizing a typological difference dividing the two types of rules. Passive is a rule affecting grammatical relations; while Reflexive and Equi, though sensitive to grammatical relations, do not affect them. They are rules of marking or interpretation which require the location of a controller satisfying certain grammatical conditions.

Rules of this class (let us call them "control" rule) appear in general to involve "global" conditions on the

controller (cf. Andrews (1971), Napoli (1975), and Timberlake (1979)). We propose here that such rules not only have global access to the strictly "syntactic" derivation, but in principle may be sensitive to "prelexical" structure as well.

For example, the condition on non-third person reflexivization is that the controller must be in the same clause as the reflexive pronoun, and be a subject of the verb of which the reflexive is a dependent. In the causative construction (ex (23)) the controlling nominal, though dative (presumably a 3) at deep structure and thereafter, is associated through the rule of lexical derivation for causative verbs with the grammatical relation 1 in the argument structure of the kernel verb. Thus, though that nominal is not a 1 at any stage in the strictly syntactic derivation, it "is" a 1 prelexically. We assume that this correspondence of the nominal in question to a 1-argument in the prelexical derivation of the causative verb satisfies the subject condition on the controller of non-third person reflexivization.

We propose a similar treatment of subject-subject Equi for the verbs unut and başla: the condition on the controller is that it be a subject of the embedding verb; an NP counts as a subject of that verb if it is the correspondent of the 1 of the kernel verb from which the causative is formed.⁴

On the view proposed here, the difference in the interactions between the two types of "cyclic" rules and the causative rule is due to the difference in how the rules involve grammatical relations. As a consequence of our fundamental assumption regarding the organization of the grammar, a transformational rule cannot feed a lexical rule. Consequently a rule like Passive which produces syntactically derived grammatical relations cannot affect the input to the Causative rule, and there are no causatives formed to passive stems. The organization of the grammar does not, however, guarantee that the Causative rule will bleed relation-sensitive transformational operations, unless it is assumed that such rules are strictly local; and we believe it has been amply demonstrated (cf. the works cited above) that in general they are not. Control rules quite typically involve conditions on the controller which require global access to the syntactic derivation; our proposal is that where there is an extended lexical derivation involving a regular rule such as Causative Formation, control rules can look back through the lexical part of the derivation as well. The prelexical structure cannot be affected by transformations, but it is in effect part of the derivation and can be "seen" by transformations with global sensitivity.⁵

5. The Causative Rule and other Lexical Processes

The causative rule can feed itself, as the following multiple causatives are grammatical:

- (28) Memur turistler-e bavullar-ı aç-tır-t-ti.
 official tourists-DAT cases-ACC open-CAUS-
 CAUS-PAST
 'The official had the tourists open the cases.'
- (29) Kadın-a kasap tarafından et-i kes-tir-t-ti-k
 woman-DAT butcher by meat-ACC cut-CAUS-CAUS-
 PAST-1PL
 'We made the woman have the meat cut by the
 butcher.'

We must consequently assume that lexical extension rules may apply to derived lexical entries as well as to kernel ones.

Aissen (1974, 1975) discussed the interaction of causative formation with two other processes: (-İş) Reciprocal Formation and (-In) "Reflexive" Formation. (The latter is more properly a "middle", as will be obvious from the examples.)

- (30) İkizler öp-üş-tü.
 twins kiss-RECIP-PAST
 'The twins kissed (each other).'
- (31) Hasan yıka-n-dı.
 Hasan wash-MID-PAST
 'Hasan washed (himself).'

She reported that neither of these processes could apply to feed causative formation, so that causatives to reciprocals (with the appropriate interpretation) and causatives to middles were nonexistent. This turns out to be incorrect with respect to reciprocals, for the following is grammatical:

- (32) Memur ikizler-i öp-üş-tür-dü.
 official twins-ACC kiss-RECIP-CAUS-PAST
 'The official had the twins kiss (each other).'

But the observation appears to be correct for middles:

- (33) *Mehmet Hasan-ı yıka-n-dır-dı.
 Mehmet Hasan-ACC wash-MID-CAUS-PAST
 'Mehmet made Hasan wash.'

In our present framework, this might be taken to indicate that reciprocal formation is a lexical rule (if it is a rule at all) and middle formation a transformation. This does not seem right, however, because both of these processes look like lexical rules under our assumptions. Neither can be fed by any known transformational operation, for example. In particular, neither can be fed by Raising:

- (34) *Ikizler git-ti san-ış-tı.
 twins go-PAST think-RECIP-PAST
 'The twins thought each other to have left.'
- (35) *Hasan kazan-dı san-ın-ıyor.
 Hasan win-PAST think-MID-PRES
 'Hasan thinks (himself) to have won.'

There is thus no problem with reciprocals, since if reciprocal formation is lexical we must expect reciprocal causatives (in the absence of some independent constraint) to be grammatical, and they are; but by the same token, in the absence of some independent constraint, we must expect causatives to middles to be grammatical as well.

We have no motivated explanation for the ungrammaticality of causatives to middles. It may be that there is simply a condition on middles that the initial syntactic subject must be both agent and undergoer of the action; which would be incompatible with causativization

Conclusion

We have presented an explicit lexical account of causative formation in Turkish, and worked out some of its consequences. In particular we have shown that this lexical theory can be reconciled with the behavior of control rules if those rules are regarded as having access to information in the lexical part of a derivation. The rules of lexical extension interact with each other, so that they must be regarded as comprising a separate rule component, with its own principles of internal organization. Our theory further distinguishes productive lexical rules from nonproductive "relations" among the members of the kernel lexicon. The rules which see pre-lexical structure see it only when there is a lexical extension rule leading back to it. Where the relation between two words is not a reflection of a productive rule, as is the case with certain "frozen" and irregular causatives, control rules applying to a sentence containing one are not sensitive to the argument relations of the other. The rules of lexical extension may be regarded as reconstructing the traditional notion of productive word formation.

FOOTNOTES

1. We omit the argument here, but Passive in Turkish can be argued to be a transformation on the basis of the fact that, unlike the causative formation rule, it participates in cyclic-type interaction with other transformational rules. Passive feeds and is fed by a rule of subject-to-object raising, for example (see Kornfilt (1977) and references cited there). We are assuming the

existence of both lexical and transformational rules, and the principal criterion for assigning a particular rule to one class or another is its interaction properties. Wasow (1977) suggests several other criteria, none all of which we accept.

2. We assume also that the thematic relations of the arguments are indicated in lexical entries; but as we make no reference to thematic relations in this paper, we omit them from our representations.

3. This may well be an oversimplification; there is the fact, which remains unaccounted for under these assumptions, that impersonal passives must be interpreted as if the missing subject were +human, while personal passives without t-phrases do not have this restriction. Possibly the personal passives have deep subjects, and unspecified ones (+human or otherwise) vanish in the passive transformation; while impersonal passives have no subjects at any stage.

Another possibility (suggested to us by L. Knecht) is that impersonal passives are lexically derived. So far as we know, this would be compatible with our analysis. The impersonal passive rule in any case could not interact with the causative rule, because (a) Imp-passive creates subjectless intransitives, which cannot undergo the causative rule; and (b) the causative rule creates transitives, which cannot undergo Imp-passive.

4. The new 1 of the causative verb itself (ben in (26) and (27)) cannot control Equi (this would yield a reading that those sentences do not have). The appropriate condition appears to be that the controller must correspond to the kernel 1 of the Equi verb; its relation to the derived verb is irrelevant.

We cannot just say that Equi itself is prelexical, nor that Equi verbs simply subcategorize a VP which is carried over into the argument structure of the associated causative verb, because the Equi target may be a derived subject; i.e. Equi is fed by rules such as Raising and Passive, which we must assume to be transformations. The same holds for Reflexivization.

5. It should be noted that the control rules can see the argument structure only of lexical items that are related to those actually present by a regular rule of lexical extension. Ex (22) shows, for example, that Reflexivization cannot apply according to the argument structure of gör 'see', even though the semantic relation of that verb to the occurring verb göster is similar to that between a verb and its associated causative. These two verbs are not regularly related, and presumably must both be entered in the kernel lexicon.

6. There are various restrictions, which we have not

the space to discuss, on multiple causatives and the nominal arguments which they may take. While double causatives such as those cited are quite common, triple ones are extremely rare and quadruple and higher causatives are unheard of. Further, most speakers reject double causatives with more than one dative phrase corresponding to a pre-causative 1, so that in double causatives to transitives (like (29)) one of the agents must be expressed in a t-phrase or omitted.

It is possible that these restrictions are of a perceptual nature, and reflect the processing difficulties involved in recovering the argument relations underlying multiple causatives. In particular, the constraint on multiple 3's may be due to the difficulty of recovering the kernel grammatical relations through the interpretation process associated with the causative rule, and the t-phrase might present less difficulty because t-phrases are base-generated agent-phrases, and interpreted by an independent rule.

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