Cycle and After

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0. Introduction

This paper centers around problems raised by the history of three syntactic rules in Finnish: S-to-O Raising, Tough Movement, and Personal Passive. We will show that the first two rules existed in old literary Finnish and have been lost and that the third, if it existed, has been replaced by an Impersonal Passive rule. By reviewing what rules are left in Finnish and how they interact, we draw two general consequences for linguistic theory out of these changes. One is that historical changes seem to leave discourse functions untouched; when Finnish lost one set of formal means for getting thematic NPs into initial position, it acquired different formal means - late thematic movement rules for doing the same thing. We feel this is a strong argument for the use of functional notions in syntax; the historical change we are looking at cannot be explained without them.

The second consequence is that the supply of cyclic-type rules in Finnish has been depleted to the point where there are in fact no arguments for the cycle. More precisely, we will show that modern Finnish needs a constraint against bleeding obligatory rules which not only protects lower rules from being bled by the application of higher rules as the cycle does, but also protects higher rules from being bled by the application of lower rules. Once we have this constraint, a model of rule interaction for Finnish needs no cycle and has no bottom-to-top orientation in any form. Structure rules (previously cyclic rules) apply first as anywhere rules subject to an anti-bleeding constraint. Other rules (previously the post-cyclic rules) apply afterwards; we don't go into the little-understood problem of late rule interaction. In the light of this conclusion, we would suggest that a universal theory of rule interaction will have no bottom-to-top orientation and that what looks like such an orientation in some languages is in fact an artefact of the form of their structure rules. On the issue of directionality in general see Eliasson (1975). His examples are taken from phonology.

§1 goes over the evidence for the previous existence of Tough Movement, S-to-O Raising and a Personal Passive rule, and the arguments that they no longer exist in modern Finnish. It concludes with a sketch of what cyclic-type rules remain in Finnish after these are gone. §2 discusses the nature of these syntactic changes in functionalist terms. §3 develops a principle which prevents bleeding of obligatory rules and shows that with this principle, none of the standard arguments for the cycle go through in Finnish. §4 discusses the status of the cycle given the conclusions of §3.

1. Three rules and how they got lost

1.1. S-to-O

There is unequivocal evidence for the existence of S-to-O

Raising in old Finnish. It must be pointed out, however, that there was considerable indeterminacy around this rule, as the change was gradual rather than sudden. The following examples illustrate the fact that the raised NP was in the accusative case (marked with -t in personal pronouns, with -n in singular nouns).

(1) ia hen neki heijet hädese soutauan (1642)
'and he saw them (acc.) in danger rowing.'
(2) ionga he Antiochian lwleuat oleua. (1642)
'which (gen.) they A. believe to be.'

Example (2) could be either an instance of the accusative or the genitive case, as these two have collapsed in the singular. Better evidence for the existence of this rule is found from examples where the accusative case is replaced by partitive, due to the negative form of the matrix verb - the peculiarity of the object in Finnish is its case alternation (cf. Dahl and Karlsson 1975). The raised object does not differ from any object in a simplex sentence in this respect:

(3) ihmedhen ... ioijta eijkengen kuullut tuleuata. (1642)
'wonders which (part.) no one heard coming.'
(4) Jos ei yxicän tiedhä hänen perillistänsä. (1609)
'if no one knows his heir (part. poss.)

The object is in the nominative when the verb is in passive:

(5) leuttin hen oleua raskas. (1609)
'Pro found her (nom.) to be pregnant.'
(6) Nytt palkatan sille lapselle catzoia. (1609)
'now is hired for the child a custodian.'

In contemporary Finnish, the corresponding constructions do not result from the application of a S-to-O Raising. What is happening instead is that the verb is made into a participle and the sentence boundary is weakened between the sentences so that any NP from the lower clause can be fronted. As a consequence of this, the subject of the lower clause is marked with a genitive so as not to get it confused with the subject of the matrix. Let us have the modern Finnish equivalents to the examples (3)-(5) here:

(7) Ja hän näki heidän hädässä soutavan.
'and he saw them (gen.) rowing in danger.'
(8) Ihmeiden, joiden kukaan ei kuullut tulevan.
'wonders which (gen.) no one heard coming.'
(9) Hänen huomattiin olevan raskaana.
'she (gen.) was found to be pregnant.'

In contemporary Finnish, then, the "demoted" subject is in the genitive no matter what happens to the matrix verb - there is no alternation in the case form. This change of affairs has a simple explanation. Ever since final *-m changed to -n, the two primary case endings, accusative and genitive have looked alike in the singular (the pl. has no accusative which would differ from the nominative). In the participial construction, the -n ending of the raised object was reanalysed as being genitive, possibly by analogy

to the genitive "subject" of modals like Minun (gen.) pitää/täytyy 'I must', and infinitive constructions like Anna miesten (gen. pl.) hakata puita 'Let the men chop the wood.' After the reanalysis, the -n ending was used for the subject of the participial construction also in pronouns (whose accusative ending is -t) and in all plurals (which lack accusatives altogether). What happened to other constituents in the participial construction, is still partly indeterminate (Itkonen 1976).[1]

Wiik (1972) has claimed that despite the reanalysis, we could still consider the constituent in the genitive as being raised. The raising rule would be unique: S-to-Indirect object. We do not agree with this analysis. The genitival constituent does not behave in any way differently from the other nominal constituents of the lower clause: any one of them can be fronted. It seems to us that the genitive marking of the subject is not due to its being raised (see fn. 1 again). This is just one instance of the general tendency to avoid having two major NPs in the same grammatical case within the same sentence (Siro 1964),[2] so as not to get them confused through changes in word order.

1.2. Passive

Old Finnish Bible translations contain a certain number of sentences which look like personal passives. (Other texts have less of these, cf. examples (5)-(6) above.) In (10), the underlying object of the verb ylenannettaisi, mine 'I', has controlled agreement on the negative auxiliary; also it is in the nominative like a subject rather than in the partitive as it ought to be if it had remained an object of the negative sentence (cf. section 1.1.).

(10) etten mine juttaille ylenannettaisi.
'That not (1st pers.) I to the Judases would be given over.'

In contemporary Finnish the auxiliary in a passive sentence is normally in the third person singular and the object gets the partitive:

(11) ettei minua juuttaille luovutettaisi.
'That not (3rd pers.) me ...'

In examples (12) and (13), also taken from the 1642 Bible, a personal ending has been attached directly to the passive verb, which has no auxiliary in the present and past.

(12) me domitamme
'we are (1st pers. pl.) doomed.'
(13) te castetat
'you are (2nd pers. pl.) christened.'

Finally, in (14), the verb agrees in number with the underlying object:

(14) elot nijtetehet
'the harvests are being cut.'

On the basis of (admittedly sporadic) examples like this, it would be tempting to think that Finnish used to have a personal passive construction and that it has been supplanted with an impersonal one during the last few centuries. While this conclusion has been drawn by some scholars (Ikola 1959), we believe it is unwarranted. First of all, even in modern Finnish, there is a tendency for clause initial nominatives to control verb agreement at least for number even if they are not subjects. (15) is taken from a study of mistakes by students on the matriculation exam which their teachers overlooked (Kangasmaa-Minn 1975):

(15) Säännöt ovat tehty rikkomista varten.
'The rules are made to be broken.'

One doesn't conclude from (15) that contemporary Finnish has a Personal Passive rule, because the construction is impossible when we replace säännöt with an NP which would not be marked nominative according to the rules for object marking:

(16) a *Minut olen tehty rakastamista varten.
'Me (acc.) am made to be loved.'
b Minut on tehty rakastamista varten
'Me has (3rd pers. sg.) been made to be loved.'

Rather, we seem to be dealing with a case of the well-known notion of synchronic analogy or derivative generation as discussed in generative terms in Chomsky (1965, 1972): an initial plural nominative looks like many other NPs which cause verb agreement obligatorily. In old Finnish, the pronominal -t accusative was not yet in regular use, so that the nominative would have been in the expected case for the pronominal objects me and te in (12) and (13).

Secondly, as has been pointed out by Posti (1975), the examples can be explained by seeing them as instances of Latin influence on the Bible translator Agricola. It is to be noted in this connection that early grammars from the 18. and 19. centuries do not mention any personal passive in Finnish.

The passive rule which is productive in contemporary Finnish, and might have been so in old Finnish, too, has either a transitive or an intransitive verb and a plural Pro subject. The only surface form of this Pro is a suffix on the verb; once this suffix has been attached to the verb, the sentence becomes subjectless. Thus the impersonal passive equivalents to the examples (12-14) are:

(17) meidät tuomitaan. 'We (acc.) are doomed.'
(18) teidät kastetaan. 'You are christened.'
(19) elot (pl.) niitetään. 'The harvests are being cut.'

1.3. Tough Movement

Sentences like (20-21) can be found in Finnish through the 19th century:

(20) Ne ovat mahdolliset tehdä. (1705)
'They are possible to do.'
(21) Nämä maat ovat vaikeita tehdä pelloiksi. (1891 grammar)
'These lands are difficult to turn into fields.'

The lack of informant judgements prevents one from constructing a full array of arguments that (20) is derived by Tough Movement rather than Object deletion. However, we do have sentences such as (22) which show that mahdollinen 'possible' took an obligatorily extraposed sentential subject rather than the lexical subject and sentential complement which would underlie an object deletion construction.

(22) Nijn eij ole mahdollinen olla ja puhtasti elä, vlcona Awiosäädyltä. (1674)
'So is not possible to be and cleanly to live outside of marriage.'

Other adjectives which showed up in tough movement constructions are hyvä 'good', paha 'bad', kelvollinen 'suitable'. In contemporary Finnish, the object in a sentential subject is no longer raised to subject position, but thematized as any NP can be:

(23) Ne on mahdollista tehdä.
'It is possible to do them.'
(24) Yöllä on mahdollista siirtää portti.
'At night it is possible to move the gate.'

In (23), ne 'they' is nominative because it is the object of an impersonal construction; while it has been moved to the initial position, it has not triggered agreement on the verb or predicate adjective.

There remains, however, one obstacle to the conclusion that Finnish had a rule of Tough Movement and lost it. While (25) is not very frequent, many informants say that it is not too bad; occasionally one even finds such a sentence in the newspaper.

(25) Kirjat ovat kivoja/kauheita/helppoja lukea.
'The books are fun/terrible/easy (part.pl.) to read.'

Does this show that the spoken language has a rule of Tough Movement? Or can sentences like (25) be attributed to the tendency for clause-initial nominatives to control agreement which was discussed in 1.2.? The second conclusion is more likely. If the fronted NP is one which would not remain in the nominative after the object casemarking rule, it is impossible to get a sentence which looks like a Tough Movement construction:

(26) a Minut on helppo suututtaa. 'I (pron.acc.) am easy
me is to make angry.'
b *Minut olen helppo suututtaa.
me am
c *Minä olen helppo suututtaa.
I am

In (26a), the object minut is in the special accusative form for personal pronouns; it can neither control verb agreement as in (b) nor be turned into a nominative which could control agreement, as in (c).

Furthermore, the fronted NP cannot undergo Equi as a Tough-moved NP can in English:

(27) Max is trying to be hard to get hold of.
(28) a Max on vaikea tavoittaa.
b *Max yrittää olla vaikea tavoittaa.

If Max in (28a) reached its position via Tough Movement, we would expect it to undergo Equi. On the other hand, if it gets there by thematization and is subsequently allowed to control agreement, our model of Finnish rule interaction predicts that it will not undergo Equi; Equi is a structure rule and is applied before thematic word order rules and feature changing rules.

A third argument against the existence of a rule of Tough Movement in Finnish is that it is impossible to find idiom chunk arguments for it. There are many Finnish idioms which have a plural object; this object can acceptably be fronted, but it never controls the agreement as ne or Nämä maat do in (20) resp. (21)

(29) Maksaa ikkunaruudut.
'To pay for the windowpanes.' = consequence
(30) *Ikkunaruudut olivat raskaita maksaa.
'The windowpanes were burdensome to pay.'
(31) Ikkunaruudut oli (3rd pers. sg.) raskaita maksaa.

This strongly suggests that (25) is a derivative generation in the sense of Chomsky (1972): while ne can be mistaken for a subject in (20), it is obviously much harder to mistake the object from an idiom chunk for a subject in order to generate a sentence like (30). Thus contemporary Finnish has no rule of Tough Movement, but it does have an analogical process whereby initial objects which look like subjects can control verb agreement. Unlike the case of the Personal Passive, however, Tough Movement seems to have been a productive, standard device in old Finnish as can be attested from e.g. early grammars all through the 19th century.

1.4. Summary

We have suggested that Finnish used to have rules of Tough Movement and S-O Raising which it lost. The inventory of the remaining structure rules in Finnish at the present looks rather meager. (32) to (37) are the rules of contemporary Finnish which look like paradigm cyclic rules:

(32) S-to-S Raising: Hän näkyy olevan vihainen.
'He seems to be angry.'
(33) Participialization (see above)
(34) Equi NP Deletion: Matti aikoo oppia englantia.
'Matti intends to learn English.'
(35) Object Deletion: Hän on kaunis katsoa.
'He is beautiful to look at.'
(36) Ergative Deletion: Juna jäi lähtemättä/lähettämättä.
'The train remained ungone/unsent.'
(37) Impersonal Passive: Talo rakennettiin kalliolle.
'The house was built on the rock.'

None of these rules change the grammatical relation of the constituent involved, and only S-to-S Raising changes the clause membership of a node. Participialization, as was noted before, con-

sists of a de-finitization of the verb + a weakening of the sentence boundary; a late, independent rule makes the subject of this construction genitival.

Feature changing rules are not good candidates for cyclicity in Finnish: while Reflexivization interacts crucially with structure rules in English, it can be shown to be a late rule in Finnish applying after rules like (32) to (37) (Hakulinen 1974a). Case-marking as well is a superficial rule which follows late thematic movement rules.

2. A functional view

The three rules we have been discussing all served certain discourse functions. In this section we will look at what these functions would have been and how the modern language lacking these rules fills the same function with rules which apply late.

This will lead us to two reflections. First, the changes we are considering cannot be described in a purely formal framework. In a purely formal grammar, loss of a single rule would be a very simple change, which might be expected to recur often. Loss of one rule with simultaneous addition or extension of rules which generate the same word order possibilities would, on the other hand, be quite complex; the model would therefore predict that this kind of change is unlikely. It is only in functional terms that the complex changes we are looking at are simple and natural. We feel this is a strong argument for functionalism in syntax. The second reflection is that Finnish syntax is becoming "flatter". We will rely on this flatness in §3 in our demonstration that Finnish does not need a cycle.

Both Personal Passive and Tough Movement can be called thematic. They yield an unmarked topic (unlike Topicalization) which is, at the same time different from the deep subject of the sentence. In thematic terms, these rules are called forth when an object is thematic, given.

The function of S-to-O Raising is not thematic in an equally straight-forward manner. It changes the clause-membership and grammatical status of one constituent of the embedded sentence only; the derived object is, however, free to participate in other thematic rules like Paasive on the higher cycle. Thus, this rule serves a discourse function indirectly, by allowing the object of the lower clause to be promoted all the way to the primacy position.

When these rules ceased to exist, their discourse functions were taken over by other types of rules. In sections 1.1. - 1.3. we have given examples of the rules that have taken over the discourse functions of the allegedly cyclic rules which were lost. The remaining rules were Participialization (7-9), Impersonal Passive (17-19) and NP-Topicalization (17-19) and (26a, 31). These rules leave the clause membership of the constituents involved untouched. The movement rule is not limited to any single constituent (an object or a subject) but applies under certain circumstances to any NP. This rule is triggered e.g. when the sentence has no subject: the target structure of a declarative sentence in con-

temporary Finnish is verb second, and in order to accommodate subjectless sentences (e.g. impersonal passives) to this target, one of the NPs following the verb will be automatically fronted.

No one has claimed that thematic movement rules are cyclic. In section 1.1. we mentioned that Participialization is followed by a late case marking rule which turns the NPs of the participial construction into accusatives or genitives. Thus the changes we have described here mean that post-cyclic rules have taken over the functions of cyclic rules. Moreover, both the Topicalization rule and the Case Marking rule seem to be paying less attention to whether the constituent it applies to is an object or a subject than to the position of this constituent in relation to the verb (see fn. 2). In other words, we could say that Finnish syntax is becoming "flatter"; rules need less information about deep features like grammatical relations and are happy with surface features like category label (NP), or thematic position (preceding or following the verb).

3.0. Lack of evidence for the cycle

Passive, Subject-to-Object Raising and Tough Movement are all paradigm cases of cyclic rules; Passive and S-to-O Raising especially both play crucial roles in the classic arguments for the cycle. In this section we will show that the absence of these rules in contemporary Finnish makes it impossible to set up standard arguments for the cycle over anywhere application of structure rules. Instead, Finnish seems to have two batches of rules: structure rules apply first as anywhere rules, and other rules (feature changing and thematic movement rules) apply afterwards.

There are two kinds of arguments which have been widely accepted as supporting the cycle: sandwich arguments and bleeding arguments. Bleeding arguments are based on the fact that rules must not be applied to the top of a complex sentence so as to bleed obligatory rules which would have applied to the bottom. In section 4.1. we will show that Finnish does need some kind of an anti-bleeding constraint, and that this constraint protects obligatory rules in general from being bled rather than having the bottom to top asymmetry of the anti-bleeding mechanism incorporated in the cycle. Sandwich arguments are based on sentences in which a chain of deletions or movements are of the form Rule A - Rule B - Rule A, with the second application of Rule A being in a higher clause from the first. In section 4.2. we will show that the current inventory of Finnish rules makes it impossible to construct such chains.

Our negative conclusions rely on two facts about Finnish, which ought to be pointed out once more. First, that Finnish has no rules which change grammatical relations within a clause, and it has only one rule (S-to-S Raising) which creates a derived grammatical relation. This makes it impossible to construct chains of movements of a given NP; we will see that the embedding properties of S-to-S Raising verbs make it impossible to construct chains using S-to-S Raising plus deletions. This is a consequence of what was discussed in 1.3.: thematic rules have taken over the

discourse functions of the very rules which could be used as a basis for arguments for the cycle.

The second crucial fact is that Finnish feature-changing rules are all late rules; case marking rules must be stated over whole trees and even reflexivization applies after the structure rules. This means that arguments cannot be constructed on the basis of feature-changing rules being bled by or sandwiched with structure rules.

We have restricted our attention to the interaction of the structure rules remaining in Finnish. We recognize that other types of rules have also been claimed to be cyclic (such as Wh-Movement). However, to our knowledge rules like Wh-Movement have never served as the basis for arguments that the cycle exists. If the paradigm cases of cyclic rules cannot be shown to interact cyclically, the less certain instances will have nothing to hang on to.

3.1. Bleeding arguments

The cycle has been posited in order to explain the ungrammaticality of sentences like (38) and (39).

(38) *We believe Suzanne$_i$ to have disguised her$_i$ as a nun.
(39) *Max$_i$ is bound to want for him$_i$ to go carrousing.

In (38), applying S-O Raising first to the matrix sentence removes the subject of the lower clause, Suzanne, before the clause-bounded rule of Reflexivization has a chance to apply. The cycle excludes this by giving Reflexivization a chance to apply to the lower clause before S-O Raising can destroy its environment by applying to the higher clause. Since Reflexivization is obligatory and its SD is met on the first cycle, there is no way of generating sentence (38) which lacks the reflexive. Given an anywhere theory of rule application, S-O Raising, finding its SD met, would indeed be able to apply first. Similarly, in (39), S-to-S Raising with be bound removes the subject of want before this could serve as a controller to delete the subject of to go carrousing by Equi NP Deletion. The cycle gives Equi a chance to apply to the embedded sentence before S-to-S Raising can apply to the matrix sentence, and Equi applies obligatorily. (39) could be derived by an anywhere application of rules because the deep structure of the sentence meets the SD for S-to-S Raising, so that this rule could apply first.

However, the derivation of sentences like (38) and (39) could also be prevented by positing an anti-bleeding principle such as (40):

(40) No rule can apply so as to destroy the environment for an obligatory rule which would otherwise have been able to apply.

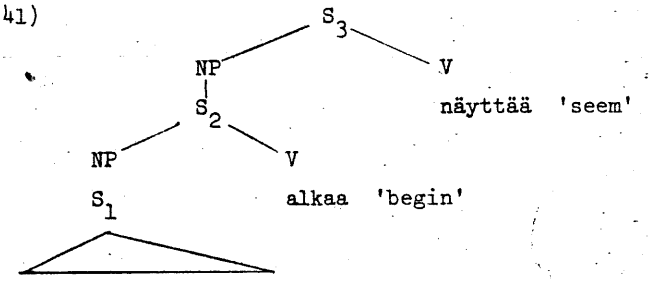
This works because Reflexivization and Equi are obligatory in (38) and (39); bleeding arguments cannot center on the applicability of optional rules (see section 3.2.).

The major difference between the cycle and a constraint like (40) on anywhere application of structure rules is that the cycle has a bottom-to-top orientation whereas (40) does not; that is, the cycle blocks bleeding of rules in lower clauses by the application of rules in higher clauses, but not vice versa, whereas principle (40) is symmetric and prevents bleeding of obligatory rules in general. In this section we show that bleeding of obligatory rules is impossible in Finnish, and that the asymmetric anti-bleeding principle captured by the cycle is insufficient.

Because of the restricted inventory of Finnish structure rules and because feature-changing rules apply late, one finds only one class of instances where the application of a higher-clause rule bleeds the application of a lower-clause rule. This happens when a prior application of S-to-S Raising or Equi would bleed S-to-S Raising or one of the subject-controlled deletion rules in a lower clause. Here, we consider two examples.

First, an optional higher S-to-S Raising must not bleed a lower obligatory application of S-to-S Raising. In structure (41), the NP of the verb alkaa 'begin' obligatorily undergoes S-to-S Raising, and the NP of the verb näyttää 'seem' undergoes the rule optionally. This is illustrated by examples (42-44).

(41)



Matti oppii englantia
'Matti learns English'

(42) Matti alkaa oppia englantia.
'Matti is beginning to learn English.'

(43) Näyttää (siltä) että Matti oppii englantia.
'It seems that Matti is learning English.'

(44) Matti näyttää oppivan englantia.
'Matti seems to be learning English.'

Since the underlying tree meets the SD for S-to-S Raising with näyttää as well as with alkaa, one could under a pure anywhere theory of rule interaction apply S-to-S Raising with näyttää first. This would destroy the SD for S-to-S Raising with alkaa, whose sentential subject would have been removed and made into the subject of näyttää. After this extraposition could apply as in (45), or S-to-S Raising could apply a second time as in (46).

(45) *Näyttää alkavan, että Matti oppii englantia.

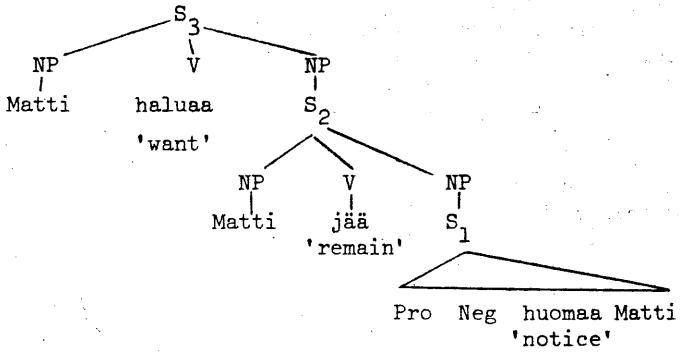
(46) *Matti näyttää alkavan oppivan englantia.

Both results are bad. The only good outputs from (41) are those in which obligatory Raising with alkaa has not been bled. Raising with näyttää may have applied, or not:

(47) Näyttää, että Matti alkaa oppia englantia.
'It seems that Matti is beginning to learn English.'
(48) Matti näyttää alkavan oppia englantia.
'Matti seems to begin to learn English.'

The second example is an instance where an (obligatory) Equi[5] must not be allowed to bleed Ergative Deletion[4]. (49) is a tree which meets the SD for Equi (top two clauses) and at the same time the SD for Ergative Deletion (bottom two clauses).

(49)



Let us apply Equi first. The output is (50), to which Ergative Deletion can no longer apply since the lower instance of Matti is separated by two clauses from the nearest coreferent which could be used as a controller.

(50) *Matti haluaa jäädä ottamatta huomioon Matti.
'Matti wants to remain with Matti unnoticed.'

This, however, is an ungrammatical sentence. The only good output from (49) is obtained by applying Ergative Deletion first, and then Equi, whose SD remains satisfied by the output of Ergative Deletion:

(51) Matti haluaa jäädä ottamatta huomioon.
'Matti wants to remain unnoticed.'

Since Ergative Deletion is obligatory, our anti-bleeding principle succeeds in constraining the grammar so that this derivation is the only one possible.

We now turn to the possibilities for bleeding an obligatory rule in a higher clause by applying some rule in a lower clause. We argue that the interaction of Passive with S-to-S Raising and Equi is the only instance where this possibility arises, and that in this case, Passive in a lower clause must not be allowed to bleed Equi or S-to-S Raising in a higher clause. This is a situation which the cycle cannot handle. If a cyclic theory of rule interaction were adopted for Finnish, it would have to be supplemented with a partially redundant anti-bleeding principle or some other ad hoc -device.

In order to find out whether applying a rule in a lower clause can bleed a rule in a higher clause, we must first look for an obligatory two-store rule which is sensitive to the structure of the embedded clause. In Finnish, the possibilities are either S-to-S Raising, which can apply only when the embedded clause has a subject, or the rules which delete a subject or an object of a lower clause under coreference with an NP in the next higher clause. To bleed one of these rules we could try changing the grammatical status of a subject or object in the lower clause so that its coreference with a higher NP no longer leaves it open to deletion. Alternatively, we could change a construction with a subject into an impersonal construction so that the lower clause had no subject NP to undergo an obligatory application of Raising or Equi. The first possibility does not occur in Finnish, due to lack of rules changing grammatical relations. The second possibility reduces the bleeding S-to-S Raising or Equi by applying an Impersonal Passive in the lower clause. Other subjectless constructions can be assumed to be base-generated in Finnish.

As was pointed out in section 1.1., the Impersonal Passive rule suffixes the Pro subject to the verb and thereby prunes the subject node. While the Pro must come out at the surface attached to a verb, Passive is not obligatory in the sense that it must always apply immediately. The Pro can, under verbs which take optional S-to-S Raising, be S-to-S Raised before being attached. (52) and (53) are instances involving an optional S-to-S Raising verb. In (52), the Impersonal Passive rule has applied in the lower clause and the sentential subject, which no longer has a subject that could be raised, has been extraposed. One of the NPs of the sentential subject, Siellä, has been fronted due to the V-second constraint. In (53), the Pro has been raised and the Passive rule has applied to the matrix verb.

(52) Siellä näkyy tanssittavan.
'There seems Pro to be dancing.'
(53) Siellä näytään tanssivan.
'There Pro seems to be dancing.'

The crucial instance is the interaction of Passive with verbs taking obligatory S-to-S Raising, such as alkaa 'begin', taitaa 'might', sattuu 'happen'. Example (54) shows that S-to-S Raising is obligatory with taitaa; examples (55) and (56) show that the verb is not marked as super-obligatory for Raising, since the sentence which has no subject may simply be extraposed.

(54) Siellä taidetaan tanssia.
'There might be dancing going on there.'
(55) Siellä taitaa sataa.
'It might be raining there.'
(56) Metsässä taitaa olla sieniä.
'There might be mushrooms in the forest.'

Sentence (57) is the important one. If we passivize in the bottom sentence, it has no more a subject which could undergo Raising.

The higher verb, however, is marked obligatory for Raising, and so we get an ungrammatical structure.

(57) *Siellä taitaa, että tanssitaan.

What one finds instead (cf. 54) is a sentence in which the Pro subject has been raised and the Passive has applied in the matrix clause. Consequently, it is impossible to use passive to bleed an application of S-to-S Raising which would otherwise have been possible and obligatory.[6]

The same argument goes through for obligatory Equi verbs. (58) -(59) show that Equi is obligatory but not super-obligatory with haluta 'want':

(58) Pekka haluaa ostaa jäätelön.
'Pekka wants to buy an ice-cream.'
(59) Pekka haluaa, että tanssitaan.
'Pekka wants that there be dancing.'

Sentence (60) is good and you get it by first deleting the lower of two Pros and then applying Passive to the matrix sentence. Sentence (61) is bad; you get it if you first apply Passive to the bottom, thereby preventing Equi from applying on the top cycle to create an infinitive.

(60) Halutaan tanssia. 'One wants to dance.'
(61) *Halutaan, että tanssitaan.

3.2. Sandwich arguments

Sandwich arguments base the existence of the cycle on sentences in which two rules A and B have applied in the order A - B - A, so that the second application of A is in a higher clause than the first, and B interacts with both applications of A. The classic sandwich argument is the Passive-Raising-Passive case, exemplified by (62).

(62) Martha was thought by Maxine to have been destroyed by Jack.

In this section, we try to show that it is impossible to construct Finnish sentences where rules would interact in this way.

The only possibility in Finnish for advancing an NP along a chain as in (62) would be by an iterated application of S-to-S Raising, since this is the only Finnish rule which creates derived grammatical relations. This possibility, then, reduces the problem to the interaction of obligatory and optional S-to-S Raising which we have already handled by our anti-bleeding principle (40).

One might envision a sandwich involving S-to-S Raising and one of the deletion rules, such as Equi or Ergative Deletion. To construct such an example, one application of S-to-S Raising would have to occur under a predicate which takes one of the deletion rules, regardless of whether S-to-S Raising took the role of rule A or rule B. In fact it turns out that the co-occurrence restrictions on predicates prevent S-to-S Raising verbs from embedding under anything but each other.

At this point, one might think of constructing a sandwich using just the deletion rules: the sort of sentence envisioned would have a chain of deletions A - B - A which would delete all but the topmost of a series of coreferential NPs. We have been unable to find a series of predicates which co-occur with each other so as to provide a deep structure for such a derivation. Note that even if such a deep structure could be contrived, all the rules involved would be obligatory so that our anti-bleeding principle would dictate a bottom to top derivation even without positing a cycle.

In conclusion it must be pointed out that, while sandwich arguments are nice for arguing against a linear grammar, and nice for showing a given rule to be cyclic under a theory which has a cycle, they are not so nice for showing that rules apply cyclically rather than anywhere. Sentences like (62) involve only optional rules, so that applying them as anywhere rules always results in a good output (see Grinder 1972); as soon as an obligatory rule is brought in, the crux of the matter is the bleeding problem.

4. Import of arguments concerning the cycle

We have shown that Finnish does not support standard arguments for the cycle: due to the particular array of rules in the language, it is impossible to construct sandwich arguments for the cycle, and while it is necessary to prevent rules from applying to the top so as to bleed the application of obligatory rules to the bottom, it is equally necessary to prevent rules from applying to the bottom so as to bleed the application of obligatory rules to the top. Thus a generative grammar of Finnish could get along with anywhere application of structure rules plus an anti-bleeding restriction which is perfectly symmetric rather than oriented bottom-to-top as the anti-bleeding effect of the cycle is. If one posited a cycle instead, it would have to be supplemented with some constraint to prevent Passive from applying under obligatory S-S Raising and Equi predicates. While we find this an inelegant alternative to a symmetric anti-bleeding constraint, we admit that the "cost" of positing a cycle in Finnish is not overwhelming. Our result is therefore primarily a negative one: Finnish is a language whose sentences exhibit no trace of a bottom-to-top oriented system of rule interaction. This makes the status of the cycle as a universal quite problematic.

The cycle has been postulated a descriptive device for languages like English to handle their specific inventory of rules and, furthermore, some facts about rule form and rule interaction which really are universal. Some of the apparently universal characteristics of the cycle are:

(A) Rules apply recursively. Underlying structures are generated which in the course of reaching surface structure meet the SD for some rules more than once; and in this case the rules are allowed more than once.

(B) There are at least two kinds of rules: structure-type rules, which in the standard theory can typically be shown to be cyclic and which in any generative theory apply first, and rules which can be stated over whole trees and apply after the first batch. These rules tend to differ in form as well as in when they apply.[8]

Looking at the rules which apply to complex structures, we see that deletion rules apply to the right and/or down. NP movement rules apply up and, if unbounded, to the left. Single-clause NP movements can apply rightward but not up. Loosely speaking one tries to put important things near to the front of the sentence and tend to wipe out redundant material which crops up near the end and/or in subordinate clauses.

Two major factors distinguish a cycle + post-cycle theory of rule interaction from our loose collection of universals. One is that the cycle prevents obligatory rules in lower clauses from being bled. The other is that the cycle assigns a bottom-to-top direction to the grammar, and claims that this is not a derivative effect of the forms of rules, but rather a constraint which must be imposed on rule interactions in order to generate just the right sentences. We do not question that obligatory rules have a special status and that something must prevent their being bled. We encode this in our anti-bleeding principle. What we do question is that grammars need a bottom-to-top asymmetry apart from that provided by the form of raising and deletion rules. There is no evidence for such an asymmetry in Finnish; we think it may also be possible to eliminate this asymmetry in the grammars of languages like English. If it turns out, on the other hand, that English needs the bottom-to-top constraint on rule interaction, an earlier stage of Finnish which had Tough Movement and S-O Raising probably needs it, too; this would entail claiming that loss of this asymmetry is a possible historical change.

The alternative to breaking down the cycle into a scheme like A-B and the anti-bleeding principle plus eliminating the bottom-to-top orientation in Finnish would be to retain the cycle as a universal and to say that Finnish has one, but that you just can't see the asymmetry in the sentences of the language. What would this mean? The only sense we can make out of such a proposal is a claim that the cycle is psychologically real. Might Finns in some sense use a cycle in either producing or understanding sentences? While such a claim about a left-branching language might be plausible, it seems quite dubious for a right-branching language like Finnish. To either produce or understand a multiply embedded sentence cyclically, a Finn, or any speaker of a right-branching language, would have to store in his short-term memory a fully spelled out form of all clauses in the sentence either before saying the first word or before coming to an interpretation of the top clause. In fact the most straightforward interpretation of some psycholinguistic experiments on multiple center-embeddings is that you can keep in mind at most two clauses at once. The aggregation of experimental work to date has suggested that "the process of con-

structing surface trees is roughly left to right, top to bottom and clause by clause" (Fodor, Bever and Garrett 1974, p.434) and that "the perceptual system contains a buffer storage which cannot be cleared until it reaches the end of a sentoid and must be cleared thereafter. --- the completion of a clause is the condition under which lexical material is transferred from the most accessible memory system to one that is less accessible" (pp. 343,344).

While one can imagine other "psychologically real" statuses for the cycle than the use in production or perception (e.g. use in learning a grammar of the language from which a recognition and production device can be constructed), it becomes less and less clear why the cycle should be considered a necessary or even a likely hypothesis.

Footnotes

* We are indebted to Riitta Suhonen for providing us with useful examples from the archives of the Dictionary of Old Literary Finnish, and to Fred Karlsson for useful comments and criticism.

1. Case-marking of the primary constituents in the embedded participial construction is a complicated issue. This rule seems to be indeterminate and unsettled in contemporary Finnish. The basic principle is as follows: mark the subject of the participial construction with the genitive, the object of an impersonal passive and the "subject" of an existential with the accusative if the NP precedes the predicate verb; leave the latter two and the complement of the copula verb in the nominative when they follow the predicate verb. There is a trend to mark any pre-verbal NP with genitive, and post-verbal NP with accusative by the side of this "mainstream".
2. It has been argued (Hakulinen 1973) that the structure Toivon sinua tovérikseni 'I hope you to be my friend.', where the copula is always missing is a remnant of S-O Raising in contemporary Finnish. On the other hand, it is also possible to argue that these verbs take both a sentential complement with a finite verb and a construction Accusative + Translative. This claim is based on the fact that there is a meaning difference: the latter construction implies that the action expressed by the matrix verb is resultative whereas the construction with the finite complement doesn't. This dichotomy is parallel to the well-known difference between an implicative and a non-implicative interpretation of certain of these verbs: Muistin tulla 'I remembered to come' vs. Muistin, että tulin 'I remembered that I came.' (cf. Karttunen 1970 and fn. 4 below).
3. Extraposition does not leave a dummy pronoun behind in Finnish.
4. Ergative deletion is a minor rule, governed by olla 'be' and jäädä 'remain'. It deletes either an intransitive subject or an object of the embedded clause under identity with the matrix subject: Laiva jää [laiva ei lähde]$_S$ → Laiva jää lähtemättä 'The ship remains ungone.'; Laiva jää^S[Pro ei lähetä laivaa]$_S$ → Laiva jää lähettämättä 'The ship remains unsent.'

5. We have assumed that Equi NP Deletion is a rule in Finnish. This assumption is in fact open to question. Since Finnish has no rules which could create a derived subject under an Equi verb (cf. section 3.1. that S-S Raising predicates do not embed under Equi verbs), Equi, if it is a rule, deletes only underlying subjects. Thus the arguments for Equi are based on the fact that sentences like (i)-(ii) in English do not go through.

   (i) Max wanted to be arrested.
   (ii) Max tried to seem to have swallowed a goldfish.

   Furthermore, Equi if it is a rule is always obligatory. The only verbs in Finnish which can take Equi or not are the implicative verbs, which have to take Equi on an implicative reading and cannot on a nonimplicative reading. This means in the end that the only arguments for Equi in Finnish are selectional restriction arguments. If a suitable means for stating selectional restrictions over a complex structure can be motivated, the rule of Equi can be dispensed with. In this event the number of possibilities we would have to deal with to show that Finnish does not need a cycle would be even smaller.
6. In this argument we are assuming that Passive is a structure rule and would, by applying in the first batch of rules, be eligible to interact with Equi and S-S Raising. We have based this assumption on the fact that Passive clearly applies before many late rules. It bleeds reflexivization:

   (i) *Nähtiin itsensä peilistä. 'Pro saw oneself in the mirror!

   It bleeds object case marking:

   (ii) Eilen tapettiin sika. 'Yesterday Pro killed a pig.'

   and it feeds obligatory NP topicalization, unlike the (late) subject pronoun deletion (see Hakulinen 1974b):

   (iii) Metsässä tanssitaan. 'Pro dances in the forest.', cf.
   (iv) Tanssin metsässä. 'I dance in the forest.'

   While one could explain (i)-(iii) by adding a statement to the grammar saying that Passive is the very first late rule, we feel that this would be an unmotivated adhocity.
7. Sentence (61) is better if the two Pros are not co-referential.
8. As Kimball (1972) has observed, post-cyclic rules tend to differ in character from cyclic rules. This distinction is not entirely strict; for instance Breckenridge (1975) has shown that dummy insertion rules can apply late in the grammar as well as early. It seems, however, to be valid on the whole.

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