

OSU -- Working Papers in Linguistics

NO. 4

GABRIEL DRACHMAN, MARY LOUISE EDWARDS,
CHARLES J. FILLMORE, GREGORY LEE,
PATRICIA LEE, ILSE LEHISTE,
AND ARNOLD M. ZWICKY

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by

Gabereil Drachman, Mary Louise Edwards,
Charles J. Fillmore, Gregory Lee, Patricia Lee,
Ilse Lehiste, and Arnold M. Zwicky

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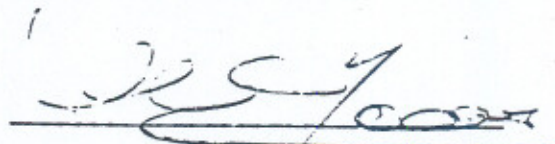
Foreword

The Computer and Information Science Research Center of The Ohio State University is an inter-disciplinary research organization which consists of the staff, graduate students, and faculty of many University departments and laboratories. This report presents research accomplished in cooperation with the Department of Linguistics.

The work of the Center is largely supported by government contracts and grants. The preparation of several of the papers contained in this report was partly supported by the Office of Science Information Service, National Science Foundation under Grant No. GN-534.



Ilse Lehiste
Chairman
Department of Linguistics



Marshall C. Yovits
Director
CIS Research Center

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List of WORKING PAPERS IN LINGUISTICS

No. 1

- "The Grammar of 'Hitting' and 'Breaking'," Charles J. Fillmore, pp. 9-29. (To appear in Studies in English Transformational Grammar, R. Jacobs and P. Rosenbaum, eds., Ginn-Blaisdell, 1970.)
- "The English Preposition WITH," P. Gregory Lee, pp. 30-79.
- "Relative Clauses and Conjunctions," Sandra Annear Thompson, pp. 80-99.
- "On Selection, Projection, Meaning, and Semantic Content," D. Terence Langendoen, pp. 100-109.
- "Some Problems of Derivational Morphology," Sandra Annear Thompson and Dale Elliott, pp. 110-115.
- "The Accessibility of Deep (Semantic) Structures," D. Terence Langendoen, pp. 118-127. (To appear in Studies in English Transformational Grammar, R. Jacobs and P. Rosenbaum, eds., Ginn-Blaisdell, 1970).
- "Review of Haim Gaifman, 'Dependency Systems and Phrase-Structure Systems,' Information and Control 8 (1965), pp. 304-337," James T. Heringer, pp. 128-136.
- "Diphthongs Versus Vowel Sequences in Estonian," Ilse Lehiste, pp. 138-148. (To appear in the Proceedings of the VI International Congress of Phonetic Sciences, Prague, 1967.)

No. 2

"Lexical Entries for Verbs," Charles J. Fillmore, pp. 1-29.

(Also in Foundations of Language 4 (1968), pp. 373-393.)

"Review of Componential Analysis of General Vocabulary: The Semantic Structure of a Set of Verbs in English, Hindi, and Japanese, Part II, by Edward Herman Bendix. I.J.A.L. Vol. 32, No. 2, Publication 41, 1966." Charles J. Fillmore, pp. 30-64. (Also in General Linguistics 9.41-65 (1969)).

"Types of Lexical Information," Charles J. Fillmore, pp. 65-103.

(To appear in Semantics: An Interdisciplinary Reader in Philosophy, Linguistics, Anthropology and Psychology, Jacobovits and Steinberg, eds., Cambridge University Press; and Proceedings of the Balatonszabadi Conference on Mathematical Linguistics, Kiefer, ed., D. Reidel.)

"'Being' and 'Having' in Estonian," Ilse Lehiste, pp. 104-128.

(Also in Foundations of Language 5 (1969), pp. 324-341.)

No. 3

"Do from Occur," P. Gregory Lee, pp. 1-21.

"The Syntax of the Verb 'Happen'," Dale E. Elliott, pp. 22-35.

"Subjects and Agents," P. Gregory Lee, pp. 36-113.

"Modal Auxiliaries in Infinitive Clauses in English," D. Terence Langendoen, pp. 114-121.

"Some Problems in the Description of English Accentuation," D. Terence Langendoen, pp. 122-142.

No. 3 (continued)

"Some Observations Concerning the Third Tone in Latvian," Ilse
Lehiste, pp. 143-158.

"On the Syntax and Semantics of English Modals," Shuan-fan
Huang, pp. 159-181.

Introduction

This report presents a somewhat wider cross-section of research carried on in the Department of Linguistics than our previous reports.* While a number of papers report directly on work performed under Grant No. GN-534, National Science Foundation, some of the papers have been prepared with support from other sources, and a few unsponsored papers have been included. The publication of these papers has been made possible by support from the Graduate School of The Ohio State University. Appropriate acknowledgement is given in connection with each paper.

The areas represented include semantic theory (paper by Fillmore), syntax (papers by G. Lee, P. Lee and G. Drachman), phonological theory (papers by A. Zwicky), experimental phonetics (paper by I. Lehiste), language acquisition (papers by A. Zwicky and M. Edwards) and bilingualism (paper by I. Lehiste). We expect that most of the papers will eventually be published through regular channels; however, as a part of the process of giving the papers their final form, we would like to present them to colleagues in the field for criticism and discussion.

*It should be noted here that Working Papers in Linguistics No. 4 was originally scheduled to contain papers presented at the First Columbus Semantics Festival, which took place on April 14-15, 1969. These papers, however, will be published in more permanent form by Holt, and they will be edited by D. Terence Langendoen. Inquiries concerning that projected volume should be directed to Dr. Langendoen.

Copying, and Order-changing Transformations in Modern Greek*

Gaberell Drachman

*This paper outlines part of the results of research in Greek syntax undertaken during a Research Quarter graciously granted me by the Ohio State University College of Humanities in Spring 1969. I am much indebted to Professor G. Kourmoulis, Chairman of the Department of Linguistics at the University of Athens, Greece. He not only made an office and a library available to me, but also invited me to conduct within his Department the Seminar in Syntax as a result of which the present paper took its first shape.

Copying, and Order-changing Transformations in Modern Greek

Gaberell Drachman

Abstract

The phenomenon of "redoublement de complement" in Modern Greek may straightforwardly be re-interpreted as copying: that is, in terms of a rule-series that copies the complement on to the front of the Verb-Phrase, pronominalizes one or other of the two occurrences, and then either treats the pronominalized occurrence as an enclitic or deletes it.

But evidence may be adduced that, at least for Greek, a similar copying process is also involved in the transformations for Relativisation, Subject-raising, and Conjunct-movement, as well as in the derivation of inputs for backward Gapping.

It is suggested that the difference between the English and Greek outputs results not from the fact that English employs "order-change" where Greek employs "copy" processes: rather, the processes of Copy are common, but English obligatorily deletes the relics of copy, while Greek sometimes retains them. Copying is thus to be considered an important (and universal?) mechanism of order-changing.

1. Redoublement de complement as Copying.

1.1. Copy of Direct Object.¹

The simplest sentences of the type

1.1. O kinigos skotose ton liko

The hunter killed the wolf

have free alternants showing redoublement de complement, i.e., containing an additional pronoun identical in shape with the article of the object NP. Thus,

1.2. O kinigos ton skotose ton liko.

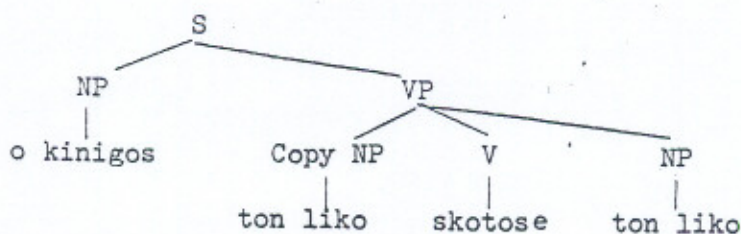
1.3. O kinigos ton liko ton skotose.

Now whereas 1.3. shows an ordering variant which may or may not depend on 'free word order' type rules,² the additional pronoun clearly has no connection with such re-ordering, as is clear from the grammaticality of 1.2. itself. What is more, the ungrammaticality of non-contrastively-stressed

1.4. *O kinigos ton liko skotose³

in which VP-internal permutation is employed, can hardly be explained in relation to 1.3., since it is absurdly ad hoc to suppose that the permutation somehow requires the additional pronoun.

On the other hand, the (apparent) copying of the article may be motivated, for both 1.2. and 1.3., if we assume that what is copied is the entire Direct Object NP. Such copying will produce a tree⁴ such as:



We shall assume that in the present case the choice of NP Object to be retained in full is (stylistically) free.⁵ However, instead of being deleted, the remaining NP Object is pronominalised. Thus, pronominalising the Copy NP results in 1.2: "O kinigos ton skotose ton liko"; on the other hand, pronominalising the original NP Object produces the ungrammatical⁶ 1.3: "*O kinigos ton liko skotose ton." The natural derivation-order for these processes is of course:

1. Copy Direct Object NP (optional)--by sister-adjunction (to left) under VP
2. Pronominalisation under Identity within VP⁷ (oblig)
3. Enclitic attraction (oblig)--for most dialects.⁸

1.2. Copy of Indirect Object.

Consider next sentences with Indirect Object NP. (The IO-NP and any copy pronoun are underlined):

- 1.5.a. O Petros edose to krasi ston Mixali.
Peter gave the wine to Michael.
- 1.5.b. O Petros pire to krasi apo ton Mixali.
Peter took the wine from Michael.

Sentences 1.6.a. and 1.6.b. below show the alternative construction with the inflected Article in a simple NP.

1.6.a. O Petros edose to krasi tu Mixali.⁹

1.6.b. O Petros pire to krasi tu Mixali.

But the IO-NP may also be copied, as may be seen in the following sentences:

1.7.a. *O Petros tu edose to krasi ston Mixali.

1.7.b. *O Petros tu pire to krasi apo ton Mixali.

1.8.a. *O Petros ston Mixali tu edose to krasi.¹⁰

1.8.b. *O Petros apo ton Mixali tu pire to krasi.

1.9.a. O Petros tu edose to krasi tu Mixali.¹¹

1.9.b. O Petros tu pire to krasi tu Mixali.

1.10.a. O Petros tu Mixali tu edose to krasi.

1.10.b. O Petros tu Mixali tu pire to krasi.

Note that those sentences in which the copy pronoun co-occurs with the preposition-phrase are ungrammatical (1.7., 1.8), while those containing the copy pronoun and the simple NP are grammatical (1.9., 1.10.) regardless of which NP, original or copy, is retained in full. For the dialects in which 1.7. and 1.8. are ungrammatical, copy may not involve a preposition phrase.

1.3. Copy of Direct and Indirect Object Personal Pronouns.

What is most characteristically Balkan in the copying of complements appears in the personal pronoun system.¹² Consider the Direct Object, in sentences 1.11.a-d:

1.11.a. O Petros filise emena.

Peter kissed me.

1.11.b. O Petros me filise emena.

1.11.c. O Petros emena me filise.

1.11.d. O Petros me filise.

and the Indirect Object in sentences 1.12.a-g:

1.12.a. O Petros dini to krasi semena.

Peter gives the wine to me.

1.12.b. O Petros dini to krasi emena.

1.12.c. *O Petros mu dini to krasi semena.

1.12.d. O Petros mu dini to krasi emena.

1.12.e. *O Petros semena mu dini to krasi.

1.12.f. O Petros emena mu dini to krasi.

1.12.g. O Petros mu dini to krasi.

It is clear, again, that the preposition phrase blocks the copy rule; that when copy applies one or other of the occurrences of the DO or IO becomes an enclitic, and that this enclitic is attracted to the verb.^{13, 14}

1.4. Copy of both Direct and Indirect Objects.

As was seen above, the enclitic attraction rule normally places the enclitic immediately in front of the verb--but for Imperative immediately after the verb.

The sentences below show both DO and IO enclitics.

1.12.d. O Petros mu dini to krasi emena.

Peter gives me the wine.

1.15.a. O Petros mu to dini to krasi emena.

1.15.b. O Petros to krasi mu to dini emena.

- 1.13.a. Dose mu to krasi emena!
Give me the wine!
- 1.16.a. Dose mu to to krasi emena!
1.16.b. Dose to mu to krasi emena!
1.16.c. *Dose to krasi mu to emena!
1.16.d. *Dose to krasi to mu emena!
1.16.e. *Mu to dose to krasi emena!

For the non-Imperative cases, the DO and IO enclitics clearly have the order IO + DO, and precede the verb. However, for the Imperative, the enclitics must both immediately follow the verb (*1.16.c-e), although the order seems to be optional (1.16.a. vs. 1.16.b.). If this option is to be expressed as an optional switching rule, assuming that DO + IO is somehow basic, it is important to disengage this switching rule from the Scrambling rule--since the latter otherwise only operates on major constituents.

1.5. A Constraint on Choice of "Survival" NP.

Even for the simple sentence types so far considered, the choice of NP to survive in full seems to correlate with some degree of topicalisation--and thus, with stress. This may be confirmed from a consideration of sentences with non-contrastive stress containing Q-words, Neg, and Prohibition.

- 1.17.a. Pu tin evales tin lampa?
Where did you put the lamp?
- 1.17.b. ?Pu tin lampa tin evales?
- 1.18.a. Pote to exvises to spiti?
When did you build the house?

1.18.b. ?Pote to spiti to extises?

1.19.a. Yati ton dernis ton yo su?

Why do you beat your son?

1.19.b. ?Yati ton yo su ton dernis?

1.20.a. Den tin evala tin lampa eki.

I didn't put the lamp there.

1.20.b. *Den tin lampa tin evala eki.

1.21.a. Min tin valis tin lampa eki!

Don't put the lamp there!

1.21.b. *Min tin lampa tin valis eki!

With non-contrastive stress,¹⁵ it seems that topicalisation of the DO is marginally allowed with (fronted) Q-words, but not allowed at all with Neg or Prohib. The constraint with Q-words is not well understood: on the other hand, that on Neg and Prohib probably follows simply from the requirement that these morphemes are attracted to the verb.¹⁶

2. Copy and Relative.

In this section, it will be suggested that (restrictive) relativisation involves the Copy rule, assuming that such Relatives derive from a Base rule of the type NP \longrightarrow NP S, where S contains an NP identical with the head NP.

2.1. Simple Relatives.

The simplest derived forms of the sentence "There's the well that the neighbour dug" are (the relatives are underlined):

2.1.a. Na to pigadi to opio anikse o yitonas.¹⁷

2.1.b. Na to pigadi pu anikse o yitonas.

2.1.c. *Na to pigadi anikse o yitonas.¹⁸

Labelling (2.1.a.) as the opi-relative and (2.1.b.) as the pu relative, consider now the parallel sentences with (underlined) copy.

2.2.a. *Na to pigadi to opio to anikse o yitonas.

2.2.b. Na to pigadi pu to anikse o yitonas.

where it is seen that pu-relative shows the usual enclitic trace of copying, while opi-relative shows none.

Now it is of course possible to maintain that we have here a stylistic dichotomy: opi-relative does not allow copying,¹⁹ where pu-relative does. On the other hand, one might hold that the very process of relative itself always consists of copying, but that the enclitic-deletion rule is obligatory for opi-relative but only optional for pu-relative.

Thus, suppose the sentence at the stage

Na to pigadi - o yitonas anikse to pigadi.

Copying of the "identical NP" onto the front of the embedded S gives

Na to pigadi - to pigadi - o yitonas anikse to pigadi.

At this stage, relative replacement in the embedded S must occur; but here opi and pu relatives differ: opi-relative replaces the Noun only, while pu-relative replaces the whole NP. Thus:

Na to pigadi - to opio - o yitonas anikse to pigadi

but Na to pigadi - pu - o yitonas anikse to pigadi.

The second, and more important difference between the two derivations is that for the opi-style there is no enclitic Identity-

replacement~ pronominal for the original NP-DO in the embedded S,²⁰ and thus the whole NP is deleted.

We are thus in effect claiming that the difference between opi and pu relatives is not that the one requires Fronting and the other Copying: both require copying, but the rules for relative replacement and the fate of the 'original' NP differ in detail.

Assuming that Relative always requires copying, it might still appear that a rather special form of copying is involved; first, copying is obligatory, and second, there is no choice of survival NP-- in fact we may not choose the 'original' for survival in full.²¹ But this is hardly a constraint on copying: quite simply, these are the conditions on Relative replacement. That is, we may as well leave the copy rule to operate unconstrainedly.

Indirect Object relatives behave in a manner similar to Direct Object relatives. Thus:

2.3.a. Methise o anthropos ston opion edose ta xrimata.

The man to whom I gave the money got drunk.

2.3.b. *Methise o anthropos ston opion tu edosa ta xrimata.

2.4.a. Methise o anthropos pu edosa ta xrimata.

2.4.b. Methise o anthropos pu tu edosa ta xrimata.

As before, no reflex of the original IO-NP survives in ston opion relative, and the same explanation applies as above.

Relativisation is thus one of the configurations in which copy is employed--what is special about relative copying is perhaps only the fact that S-adjunction is required.

2.2. Relatives with Adverb Phrases.

Even clearer evidence for the copy nature of the relative rule is to be seen in relatives from adverbial phrases, e.g., of Place. In this section, it is suggested that the constraint on relative-replacement is a sufficient cause for the obligatory total deletion of the 'original' adverb phrase with opi-relative.

Assuming the copy rule has operated normally for these cases, consider the stage in the derivation giving sentences such as:

2.5. Vrika to kalivi-mesa sto kalivi-meni o yiftos-mesa
sto kalivi.

I found the hut-in the hut-stays the gypsy-in the hut. The relative-replacement rule here gives not two but three possible outputs, involving opi, opu, and pu:

2.6. Vrika to kalivi-mesa sto opio-meni o yiftos.

2.7. Vrika to kalivi-opu-meni o yiftos.

2.8. Vrika to kalivi-pu-meni o yiftos.

Note that, as before, opi replaces only the Noun in the copy, whereas opu and pu replace the whole Preposition Phrase. However, while opi has but one acceptable output (2.6.), opu and pu have two further alternatives:

2.9.a. Vrika to kalivi-opu-mesa tu-meni o yiftos.²²

2.9.b. Vrika to kalivi-pu-mesa tu-meni o yiftos.

2.10.a. Vrika to kalivi-opu-mesa-meni o yiftos.

2.10.b. Vrika to kalivi-pu-mesa-meni o yiftos.

In 2.9. and 2.10., we find the debris of the 'original' adverb phrase.²³ The possibility of making the enclitic tu, enables the

whole remnant-phrase to be treated as an enclitic and thus attracted to the pre-verb position. Notice that we cannot interpret these cases as cases of simple copying within the embedded S, as we might with the cases of Section 2.1. above.²⁴

Sentences 2.10. show that, as before, the pronominal in the 'original' may be deleted.²⁵ If the preposition is also deleted, the simplest sentences with opu and pu (2.7., 2.8.) are derived.

3. Copy and Complement Sentences.

3.1. Copy of Whole Complement.

Greek Complement sentences may be introduced by oti, 'that', or na, 'for to'. For both types, to (the IT particle) is seen to survive optionally, as in:

3.1. Ego to perimeno oti tha yirisi o Petros.

I expect that Peter will return.

3.2. Ego to perimeno na yirisi o Petros.

"I expect Peter to return.

But while to might here be held to be the IT particle shifted to pre-verb position by the enclitic rule, the following variant sentences cannot be thus explained.

3.3. Ego to perimeno to oti tha yirisi o Petros.

3.4. Ego to perimeno to na yirisi o Petros.

It is clear that the whole complement sentence may be copied, with the usual consequences--option on NP survival, pronominalisation, etc., as is confirmed by the alternatives with survival of the copy NP.

3.5. Ego to oti tha yirisi' o Petros to perimeno.

3.6. Ego to na yirisi o Petros to perimeno.

An embedded question may similarly be copied, as is seen in

3.7. Tha su po pios ine o dolofonos.²⁶

I'll tell you who the murderer is.

3.8. Tha su po to pios ine o dolofonos.

3.9. Tha su to po pios ine o dolofonos.

3.10. Tha su to po to pios ine o dolofonos.

Sentence 3.8. shows the (optional) survival of IT; 3.9. shows the copy pronominal, but with IT-deletion; while 3.10. shows both copy pronominal and IT.

3.2. Subject Raising as Copying.

Unlike Latin,²⁷ both 'that' and 'for to' complements allow Subject-raising to occur with certain verbs in Greek. Thus, "I expect Thanasis to win the lottery" may be rendered as:

3.11. Perimeno oti o Thanasis tha kerdisi to laxio.

3.12.a. Perimeno o Thanasis na kerdisi to laxio.

3.12.b. Perimeno ton Thanasi na kerdisi to laxio.

Here, subject-raising is seen only in 3.12.b., while 3.12.a. shows that it is optional. As we expect, the raised subject having become a (derived) object, copying may occur, as in:

3.12.c. Ton perimeno ton Thanasi na kerdisi to laxio.

3.12.d. Ton Thanasi ton perimeno na kerdisi to laxio.

However, a variant also occurs in which copying of the kind demonstrated may occur without the expected Accusative case in the

NP. Thus:

3.12.e. Ton perimeno o Thanasis na kerdisi to laxio.

Here, for the copy to have occurred we must assume the embedded subject to have been raised: but "o Thanasis" is Nominative, and clearly belongs to the lower Sentence still. It may be the case that another (and identical) NP acts as the basis for the copy, i.e., that the lower Subject has been copied into the upper sentence, re-copied in the usual way, then deleted. An alternative solution is to suppose that the initial ton in 3.12.e. is the enclitic replacement for the "raised" subject itself, which again must mean that that subject is raised by copying.

We may conclude that "subject raising" is always performed by copying, and that the difference between 3.12.b. and 3.12.e. lies mainly in the choice of NP to survive in full. That the 'raised' subject may itself be copied (3.12.c.) demonstrates in turn that copying is in fact iterative.

3.3. Flip Verbs and the Copy Rule.

I assume that Flip verbs (Lakoff, 1968) require a structure NP - V+Prep-IT-S where the initial NP is animate. The pairs of sentences

3.13. I am surprised at S
Ego ksafniazome me to S

3.14. S surprised me
To S me ksafniase

show only minor differences as between English and Greek, these appearing (e.g.) in the prepositions and the (Greek) non-deletion of IT initially.

However, while it is clear that the derived object after Flip is subject to copying,

3.15. To oti ilthe arga ton ksafniase ton Petro.

That he came late startled Peter.

it is not obvious why the whole complement sentence is not copyable, as was seen to be possible above (section 3.1.).

Thus

3.16. Ego to perimeno to oti tha yirisi noris o Petros.

I expect that Peter will come home early.

but 3.17. *Ego to ksafniastika me to oti yirise noris o Petros.

I was startled at Peter's coming home early.

At first sight, the exclusion here might appear to depend on the presence of Passivisation in the verb. But parallel structures are also possible for Flip verbs like tromazo (I'm frightened): tromazo has no passive forms, yet copying is still unacceptable for the non-Flip sentences of the type

3.18. *Ego to tromaxo me to oti S.

I'm frightened at IT S.

Recalling the structures discussed under Relatives, it is feasible to suggest that what blocks Copy is the presence of a Preposition Phrase instead of a NP--and that the structure here is of the former type.

3.4. A Constraint on Passive.

The following sentences show that the direct and indirect objects may be permuted in Greek.

3.19. O prothipurgos edose to parasimo $\left\{ \begin{array}{l} \text{ston} \\ \text{tu} \end{array} \right\}$ stratioti.

The Prime-Minister gave the medal to the soldier.

3.20. O prothipurgos edose $\left\{ \begin{array}{l} \text{ston} \\ \text{tu} \end{array} \right\}$ stratioti to parasimo.

Moreover, the direct and indirect objects may be copied, with the usual results, in either of the above versions. Thus; e.g.

3.21. O prothipurgos tu edose to parasimo tu stratioti.

However, while the passive corresponding to 3.19. is grammatical, that corresponding to 3.20. is not

3.19.a. To parasimo dothike $\left\{ \begin{array}{l} \text{ston} \\ \text{tu} \end{array} \right\}$ stratioti apo ton prothipurgo.

3.20.a. *O stratiotis dothike to parasimo apo ton prothipurgo.

It is thus clear that the permutation in 3.20., i.e., Direct-Indirect object switch, can only arise after Passive.

Now it must be the case that the copy rule follows Passive, since it is clear that the derived subject cannot be copied, but that the indirect object may always be copied. This accounts for the partial failure of copying in passives, as in

3.2.. *To parasimo to dothike ston stratioti apo ton prothipurgo.

but 3.23. To parasimo tu dothike tu stratioti apo ton prothipurgo.

3.5. Copy and the Sentential Subject Constraint.

In Ross (1967) we find the notion that a subject S from NP cannot have its constituents removed--e.g., for Relative formation.

Thus,

3.24.a. That I bought the hat seemed strange to the nurse.

3.24.b. The nurse who that I bought the hat seemed

strange to--is stupid.

- but 3.24.c. *The hat which that I bought seemed strange to
the nurse--is red.
- 3.24.d. ?The hat which that I bought it seemed strange
to the nurse--is red.

We note that the relative from the NP "(to) the nurse" is acceptable, while that out of the embedded S from a subject NP is not (3.24.c.)--although the non-deletion of the (pronominalised) original object seems to improve matters, at least for some speakers (3.24.d.).

Consider the parallel Greek sentences:

- 3.25.a. To oti agorasa to kapelo fanike parakseno sti
nosokoma.
- 3.25.b. I nosokoma stin opian to oti agorasa to kapelo
fanike parakseno, ine kuti.
- 3.25.c. *To kapelo pu to oti agorasa fanike parakseno
sti nosokoma ine kokino.
- 3.25.d. To kapelo pu to oti to agorasa fanike parakseno
sti nosokoma ine kokino.

Here 3.25.b. from a simple NP is again acceptable: 3.25.c., from the embedded S, is not acceptable; but 3.25.d., with survival of the pronominalized 'original' Object, is acceptable.

At least so far as Greek is concerned, Ross' principle can hardly stand. A better formulation of the problem requires us to modify the rule allowing deletion of the 'original' NP after copying: the deletion simply may not operate within a Sentential Subject.

4. Two Remarks on Conjunction.

4.1. Conjunct Movement and Copy.

The main rules given in Lakoff-Peters (1966, 1969) for phrasal conjunction are (in derivation-order) Preposition-adjunction, Conjunct-movement, and Agreement. With these rules in mind, consider the following alternative sentences:

4.1. O Petros ke i Maria sizitisane to thema.

Peter and Mary discussed the matter.

4.2. O Petros me ti Maria sizitisane to thema.

4.3. O Petros sizitise to thema me ti Maria.

Peter discussed the matter with Mary.

4.4. O Petros sizitisane to thema me ti Maria.

Sentence 4.1. corresponds to the English gloss. But 4.2. shows that Preposition-adjunction is independent of conjunct-movement, in that the former does not entail the latter. Now whereas 4.3. shows the expected (singular) agreement of the verb with the remaining subject after conjunct-movement, 4.4. shows an anomalous plural in the verb.

Within the present framework, it is feasible to suggest that conjunct-movement is in fact conjunct-copying: the agreement rule then operates either before or after deletion of the 'original' right-hand conjunct.²⁸

4.2. Conjunction and IT-Replacement.

Lakoff's (1968) "further argument" for IT-replacement is that verb-gapping is blocked if there are three constituents in the

superficial structure of the right-hand sentence. Thus,

4.5. I saw Bill, and John Harry.

but 4.6. *I gave John a nickel, and Bill Harry a dime.

as also 4.7. I believe that John is rich, and Bill that Arthur
is poor.

but 4.8. *I believe John to be rich, and Bill Arthur to be
poor.

Lakoff goes on to speculate that the Latin equivalent to 4.8. may well be acceptable, pointing out that this would prove simply that It-substitution had not applied here.

The case of Greek is equally pertinent. Thus:

4.9. O Petros perimeni ton Perikli na figi, ke i Maria
tin Keti na elthi.

Peter expects Pericles to go, and Mary Kathy to come.
is perfectly grammatical, a fact which, according to Lakoff, we might hold to prove the non-application of It-replacement.

However,

4.10. O Petros ton perimeni ton Perikli na figi, ke i
Maria tin Keti na elthi

is also acceptable, and shows a copy of the embedded subject--a fact that we have held to prove the occurrence of It-replacement.²⁹

What is more, the simple conjunction in

4.11. Ego edosa tu Pavlu mia lira, ke i Maria tis Ketis
mia Drachme.

I gave Paul a gold sovereign, and Mary Kathy a
Drachma.

is also acceptable.

It seems we must seek further for the cause of the English exclusion, for it is unlikely that the constituent structure for the Greek cases (especially 4.11.) differs from the English in any essential manner.

5. Copy and Definiteness.

The possibility of copying is, all other things being equal, closely correlated with Definiteness in the constituent to be copied.

5.1. Thus, both direct and indirect objects must be definite, as in

5.1.a. O kinigos ton skotose ton liko.

The hunter killed the wolf.

5.1.b. *O kinigos ton skotose kapion liko.

The hunter killed some wolf.

5.2.a. O Thanasis tu edose to sitari tu ftoxu.

Thanasis gave the corn to the poor man.

5.2.b. *O Thanasis tu edose to sitari kapiu ftoxu.

Thanasis gave the corn to some poor man.

5.2. The Relative presents an apparent contradiction: relativisation may occur whether or not the head noun is Definite.

5.3.a. Vrika to pigadi, pu mesa tu ipirxe xrisafi.

I found the well in which there was gold.

5.3.b. Vrika { ena } pigadi, pu mesa tu ipirxe xrisafi.

I found a/some well, in which there was gold.

But rather than cast doubt on the formulation of Relative as resulting from copying, this suggests that the relativised NP is in fact Definite in the underlying representation. This hypothesis is of course quite confirmed by the existence of the alternative relative in opi,³⁰ as in

5.4. Methise kapios naftis, o opios foruse ena pardalo panteloni.

A certain sailor who was wearing highly coloured trousers got drunk.

5.3. An Object complement sentence can be copied regardless of the Definite status of its constituents. Thus

5.5.a. Ksero oti o igumenos lipi apo to monastiri.

5.5.b. To ksero to oti o igumenos lipi apo to monastiri.

5.6.a. Ksero oti kapios monaxos lipi apo to monastiri.

5.6.b. To ksero to oti kapios monaxos lipi apo to monastiri.

But this apparent anomaly follows from the fact that the head noun in such cases is always IT, which is of course inherently [+Def].

5.4. The subject of a complement sentence may be raised if it is Definite. However, as was noted in Lakoff (1968), the mere occurrence of Accusative would not prove raising to have occurred, since Accusative is a possible exponent of "for" in "for-to" complements. For example,

5.7.a. Perimeno ton Kosta na elthi.

I'm expecting Kosta to come.

is paralleled by

5.7.b. Perimeno kapion na elthi.

I'm expecting someone to come.

But we wish to hold that 5.7.b. does not exhibit subject raising.

The diagnostic sentences ought to be those in which copy is operated, as in

5.8.a. Ton perimeno ton Kosta na elthi.

5.8.b. *Ton perimeno kapion na elthi.

Unfortunately, however, the matter is impossible to disambiguate in this way since, while the copy in 5.8.a. proves subject-raising to have occurred, an Indefinite like kapio- may not be copied even in a simple sentence such as

5.9. *Ton skotose kapion.

I killed someone.

5.5. In Conjunction, it may be shown that copy may occur before or after conjunction-reduction. Thus (where to is singular and ta is plural)

5.10. $\left. \begin{array}{l} \text{To} \\ \text{Ta} \end{array} \right\}$ kurdisa to buzuki ke tin kithara.

I tuned the buzuki and the guitar.

But notice that if either of the conjuncts is non-definite, no conjunction-reduction can occur; e.g., if the second is indefinite only the first conjunct may be copied, as in:

5.11.a. To kurdisa to buzuki ke mia kithara.

5.11.b. *Ta kurdisa to buzuki ke mia kithara.

5.6. Non-specific (attributive) indefinites may not be copied,

5.12.a. O Petros kani ton yatro.

Peter pretends to be a doctor.

5.12.b. *O Petros ton kani ton yatro.³¹

5.7. It remains a problem why generic indefinites may be copied.

Thus we find:

5.13.a. Den xonevo to mosxari.

I can't stomach veal.

and 5.13.b. Den to xonevo to mosxari.

6. Copy and Greek Scrambling.

6.1. Scrambling.

In addition to the major order-changing rules (such as Passive) applying within single clauses, a further and later rule applies in many languages which optionally scrambles the order of certain constituents. Languages employing such stylistic constituent-scrambling are traditionally called "free-word-order" languages, and Greek is said to be one of them.

Evidence for the free-word-order status of Greek may apparently be found in simple sentences of the type "The farmer killed the wolf": thus,

6.1. O agrotis skotose ton liko.

6.2. Skotose ton liko o agrotis.

6.3. Skotose o agrotis ton liko.

These alternants require no special stressing, and permute SVO

(assumed as a base) to VOS and VSO respectively. A further three variants are possible in theory, however. These are

6.4. O agrotis ton líko skotose.

6.5. Ton líko skotose o agrotis.

6.6. Ton líko o agrotis skotose.

However, these may be found only with contrastive stress on the object NP. If we define "free-word-order" as requiring no special stress conditions, then Greek is certainly not a free-word-order language. The scrambling illustrated in 6.1.-3. above is subsumed under the rule

Scramble: any two major nodes within the same S

Condition: Not under VP

and the case of contrastive stress is covered by the additional sub-condition "except under contrastive stress."

The parallel negative, question, and negative-question sentences may be shown to follow the same constraints.

6.2. Gapping, Scrambling, and Copying.

The relation said to hold for many free-word-order languages between Gapping and Scrambling may be shown for Greek to hold:

- a) With contrastive stress, for Gapping and Scrambling,
but
b) With non-contrastive stress, only for Gapping and Copying.

6.7.a. O Periklis ipye³² tin bira, O Sokratis tin
lemonada, ke o Manolis to nero.

Pericles drank the beer, Socrates the lemonade,
and Manolis the water.

6.7.b. *O Periklis tin bíra, o Sokratis tin lemonáda, ke
o Manolis ipyē to neró.

6.7.c. O Periklis tin bíra ipyē, o Sokratis tin lemonáda,
ke o Manolis to neró.

6.7.d. O Periklis tin bíra, o Sokratis tin lemonáda, ke o
Manolis to neró ipyē.

From a triple conjunction, sentence 6.7.a. arises by simple application of the Gapping rule: for an underlyingly SVO language like Greek, Gapping normally applies forward, i.e., the identical verbs after the first are lost. This is confirmed by the ungrammaticality of 6.7.b., where Gapping has been applied backwards.

Note now that 6.7.c. and d. are also acceptable. We suppose, with Ross, that Gapping may occur before or after Scrambling. Then if Gapping applies first (and forwards) 6.7.c. arises. However, Scrambling may apply first--since under contrastive stress VP-internal constituents may be switched--in which case backward Gapping produces 6.7.d.

The following sentences 6.8. show the power of the copy rule to supply the missing inputs for backwards Gapping, viz., strings in which, without contrastive stress, each S has a verb finally. Thus,

6.8.a. O Periklis tin ipyē tin bíra, o Sokratis tin
lemonáda, ke o Manolis to neró.

6.8.b. O Periklis tin bíra tin ipyē, o Sokratis tin
lemonáda, ke o Manolis to neró.

6.8.c. O Periklis tin bira, o Sokratis tin lemonada,
ke o Manolis to nero to ipye.

Here, 6.8.a. shows copying with copy-pronominalisation; this is naturally an input for forward Gapping. 6.8.b. and c. on the other hand (like 6.7.b. and c.) show retention of the copy NP, with the result--following pronominalisation and enclitic attraction-- that a verb-final string arises. Thus Gapping may apply forwards or backwards, under non-contrastive stress, depending on whether the copy or the 'original' NP is pronominalised.

Footnotes

¹Copy of NP with Nominative case is excessively rare, being confined to the exclamatory-deictic Na tos o Petros, "There's Peter!", and the question Puntos o Petros? "Where's Peter?".

²See Section 6.1. below, for the relation of Copy to Scrambling.

³Section 6.1. takes up the occurrence of such sentences, which arise under contrastive stress on the object.

⁴It is assumed that the copy NP is sister-adjoined under VP.

⁵Cf. Section 2 below (Relative), where this choice is not free.

⁶The enclitic undergoes attraction to the verb, and is preposed to it for most dialects. As may be seen from a consideration of the constraints on Scrambling and topicalisation, this particle is truly an enclitic--i.e., becomes part of the node Verb.

⁷Whether or not this is the correct condition, the rule must avoid pronominalisation of the subject NP in case that NP is identical with the Object NP.

⁸Cf. below (1.3., 1.4.) for order of enclitics and for the case of Imperative. It is to be supposed that certain idioms, such as fthina tin glitoses ("you came off lightly") probably owe their pronominal to the copy rule, with subsequent Object-deletion--here, from fthina glitoses ti zoi su. Cf. "you'll get it!", "Stop it!"

⁹Note that not only are ston and apo ton replaced by the same morpheme tu, but each of these sentences is ambiguous with the corresponding sentence containing the possessive tu Mixali (Michael's).

¹⁰Some of my (Athenian) informants would marginally accept sentences of the type "Ston Petro tu edose to krasi."

¹¹Again, the surface tu Mixali is ambiguous--so that 1.9. and 1.10 also mean "Peter gave him Michael's wine," "Peter took Michael's wine from him."

¹²Cf. Sandfeld (1930).

¹³1.1.b-c. and 1.2.c-f. show retention of both copy and original NPs, where the original is retained under contrastive stress. 1.1.d. and 1.2.g. show deletion of the original NP. Note that 1.2.g. is superficially equivalent to the corresponding English sentence with Dative shift, although this construction arises in Greek only through obligatory Copy for pronouns.

¹⁴While precisely these constraints apply to Negative, Question, and Prohibitive sentences with DO or IO, the case of the Imperative shows an ordering variant.

1.12.d. O Petros mu dini to krasi emena.

Peter gives me the wine.

1.13.a. Dose mu to krasi emena!

Give me the wine!

1.13.b. *Mu dose to krasi. emena!

1.12.f. O Petros emena mu dini to krasi.

1.14.a. Dose mu emena to krasi!

1.14.b. *Mu dose emena to krasi!

Assuming that the copy rule operates for Imperative just as it

does for the other sentence types so far considered, it is clear that enclitic attraction still obtains--but the enclitic is postposed rather than preposed to the verb. Other constructions showing this irregularity are:

- (1) the Exclamatory Bravo su! "well done!"
- (2) the Participial Legontas tu tu Petru "Saying (it) to P"
- (3) the Question Puntos o Petros? "Where's Peter?"

¹⁵Compare contrastively-stressed:

- 1.17.c. Tin lampa, pu tin evales?
- 1.18.c. To spiti, pote to extises?
- 1.19.c. Ton yo su, yati ton dernis?
- 1.20.c. Tin lampa, den tin evala eki.
- 1.21.c. Tin lampa, min tin valis eki.

¹⁶The enclitic-attraction rule is later, so that the surface sequence will be (as in the a-sentences)

den- +Pro
+Encl -V; min- +Pro
+Encl -V.

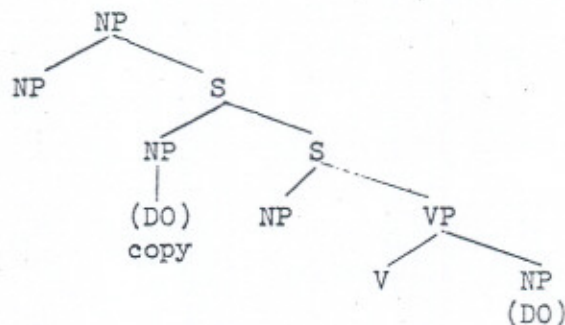
¹⁷I do not treat here the (optional) permutation rule which captures the preference for "subject last" in embedded Sentences.

¹⁸Clearly, Greek does not allow deletion of the relative, cf. English, "There's the well the neighbour dug!"

¹⁹Note that the Katharevousa (K) style of which opi-Relative is an example never shows the debris of complement copying, even for the simplest DO case such as O kinigos ton skotose ton liko.

²⁰This identity-based process occurs within the embedded S, which suggests that the NP-DO copy is Chomsky-adjoined to this S.

Thus:



²¹*Na to pigadi o yitonas enikse to pigadi.

²²Compare *Vrika to kalivi-mesa sto opio-mesa tu-meni o yiftos.

²³Cf. sub-standard English "There's the hut where I found the gypsy in it," "There's the hut which I found the gypsy in it," but never "There's the hut in which I found the gypsy in it."

²⁴ Na to pigadi-to pigadi-o yitonas-to pigadi-anikse to pigadi would still give

Na to pigadi-pu-to-anikse o yitonas

where the copy phrase is relativised, and the original is pronominalised. But an adverbial phrase cannot be copied in a simple S: thus, in Vrika ton yifto mesa sto kalivi, we may copy the DO complement, to give:

Ton vrika ton yifto mesa sto kalivi
Ton yifto ton vrika mesa sto kalivi

but not the adverb phrase, to give:

*Mesa tu vrika ton yifto mesa sto kalivi, or

*Mesa sto kalivi vrika ton yifto mesa tu.

²⁵The generalised Subject/Object NP relative and the relative of Place fall together in the pu-relative. Ambiguous sentences can arise when the 'original' pronominal-replacement survives. Thus:

2.11. Afto ine to kalivi pu to vrika-
can stand for either "This is the hut which I found" or "This is the hut where I found it", deriving respectively from

2.12. Afto ine to kalivi-(ego) vrika to kalivi.
I found the hut.

2.13. Afto ine to kalivi-(ego) vrika X sto kalivi.
I found X in the hut.

²⁶Note that Greek embedded questions show Aux-attraction to the question-word, just as simple questions do.

²⁷Cf. Lakoff. 1968.

²⁸The alternative interpretation, in Lakoff-Peters terms, is of course that agreement occurs before or after conjunct-movement.

²⁹Confirmed by the acceptability of the Personal Passive sentences:

O Petros theorite vlakas: O Petros theorite oti ine vlakas.
Peter is considered a fool.

³⁰Recall that opi-replaced the Noun only: thus the article remains.

³¹Cf. O Petros ton kani ton Perikli orea.

Peter plays (the part of) Pericles well.

³²The verb is underlined in the examples of this section.

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Subjects, Speakers and Roles*

Charles J. Fillmore

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Subjects, Speakers, and Roles

Charles J. Fillmore

1. This report is a record of issues in the semantics of natural languages that have concerned me in the past few years, some of the things I have had to say about them, and some of the things that others have had to say about them. There is nothing new in these pages, and there is much that is borrowed. I use numbered paragraphs mostly to create favorable associations--but also to make it obvious that I do not expect the reader to perceive here any structure beyond that of sheer sequence.

2. The traditional first task of sentence analysis has been that of understanding and recognizing the highest-level division in a sentence, that between its subject and its predicate. On the traditional account, the subject of a sentence is that portion of it which indicates 'the person or thing about whom or which a statement is made or a question asked,' and its predicate is that portion of the sentence which contains 'the statement or the question asked.'

3. In formal grammars of the type first discussed by Chomsky, the subject/predicate distinction is captured in terms of labeled co-constituents of sentences. The two major co-constituents of a sentence are a nounphrase (NP) and a verbphrase (VP). A NP that is an immediate constituent of a sentence is defined as its subject; a VP that is an immediate constituent of a sentence is its predicate.¹ We may refer

to this as the configurational definition of subjects and predicates.

4. In theories of grammar that derive from the work of Chomsky, a distinction is made between the deep structure of a sentence and its surface structure. Since both the deep structure and the surface structure are capable of having major co-constituents of the same types, and since the entities so identified may be different in the deep and surface representations of the same sentence, it is necessary to speak of both deep structure and surface structure subjects and predicates.

5. It is of concern, therefore, whether the traditional account of the subject/predicate distinction applies to the distinction as it is defined for the surface structure or the deep structure level. Something akin to the traditional distinction is apparent in the surface structure of some sentences. On the interpretation that the passive transformation in English is meaning-preserving, it can be said that sentences (5-a) and (5-b) differ only in the identification of one or another NP as subject.

(5-a) pianists play pianos

(5-b) pianos are played by pianists

There are arguments for saying, however, that while (5-a) is 'analytic,' (5-b) is 'synthetic.' Such claims might be made for the interpretation that (5-a) is a general statement about pianists and that (5-b) is a general statement about pianos.

6. It might be argued that either of the sentences in (5) can in fact be interpreted in either of the two mentioned ways. If that is so, then it follows that the traditional account of the semantic

relevance of the subject/predicate distinction cannot be captured by the configurational definition at all, on either the deep or the surface structure level, unless grammatical description is a good deal more subtle and abstract than grammarians have thought.

7. The transformations which link deep structures with surface structures are taken, in the standard theory, to have in themselves no semantic import. It has therefore been assumed that the semantic relevance of the subject/predicate distinction should be sought only in the deep structure.

8. However, the semantic role of deep-structure subjects appears not to be univocal, at least when we look for the role of this entity in the most straightforward way. The involvement of the entity named by the subject NP in the event or situation described by the sentences given below appears to be quite different in each case.

- (8-a) the boy slapped the girl
- (8-b) the boy fell down
- (8-c) the boy received a blow
- (8-d) the boy has a toothache
- (8-e) the boy has blue eyes
- (8-f) the boy [=his appearance] shocked me

In order for a semantic theory to relate THE BOY to the predicate expression found in each of these sentences, reference must of course be made to the 'subject' NP; but there appears to be no common notional property of 'subjectness' which semantic descriptions of these sentences can exploit.

9. A commitment to the view that 'subjects' defined in the

configurational way must be relevant to semantic descriptions has led to two varieties of re-analysis. The first is mentioned in sections (10)-(14), the second, briefly, in (15).

10. Though it may not be possible to find a single semantic contribution for the subject role with all types of predicate expressions, it may at least be possible to find a unique subject role for each predicate word, or, better, for each type of predicate word. There is a group of verbs in English which have both transitive and intransitive uses and which show the same NP role with respect to the subject in their intransitive uses as they do with respect to the direct object in their transitive uses. Typical examples can be constructed with movement-verbs like ROTATE or change-of-state verbs like BREAK.

(10-a) the cylinder rotated

(10-b) Fred rotated the cylinder

(10-c) the lens broke

(10-d) Fred broke the lens

11. According to one attractive and popular proposal for capturing facts of the sort exhibited by the sentences in (10), the transitive sentences contain, in their deep structures, the intransitive sentences embedded to the verb CAUSE.² In each case the subject of the underlying verb CAUSE is the subject of the transitive sentence; the analysis interprets the sentence as representing the proposition that the entity identified by the subject NP of CAUSE is causer of an event characterized by the intransitive sentence. The sentences (10-b) and (10-d) can be thought of as having in their deep structure something of the sort suggested by (11-a) and (11-b) below:

(11-a) Fred cause (the cylinder rotate)

(11-b) Fred cause (the lens break)

[I ignore here the problem of tenses.] On this analysis, the relation between the verb (ROTATE or BREAK) and its underlying subject is the same in both its (surface) transitive and intransitive uses. The appearance of these underlyingly intransitive verbs in transitive-verb positions is a matter of surface detail.

12. The cases presented in (11) show a reconstruction that gives a unique subject/verb relationship for different 'uses' of the same verb. By allowing the relation between deep and surface structures to be more abstract still, it is possible to show semantic relations between two different verbs in a way that will reveal their underlying semantic commonalities; and, in particular for our purposes, will show that, for the given verb pairs, the role of the deep-structure subject is the same in both cases. Thus the deep structures of (12-a) and (12-c) are something like what is suggested by (12-b) and (12-d) respectively.

(12-a) Peter killed the cat

(12-b) Peter cause (the cat die)

(12-c) Peter put the beer in the icebox

(12-d) Peter cause (the beer to be in the icebox)

The replacement of CAUSE TO DIE by KILL and CAUSE TO BE by PUT is, again, a matter of surface detail.

13. One might object to the semantic equivalence of (12-a) and (12-b) on the grounds that (13-a) and (13-b) are not exact paraphrases.

(13-a) Peter killed the cat in the attic

(13-b) Peter caused the cat to die in the attic

This objection is not critical, because it is quite possible to constrain the replacement by KILL of CAUSE TO DIE to only those situations in which the interior sentence has no adverbial modification. The locative phrase IN THE ATTIC, in (13-a), can only refer to the place where the causing took place.

14. Apparent difficulties of the sort mentioned in (13) are counter-balanced by the advantages that this reanalysis offers in sentences like (14-a) below:

(14-a) Peter put the beer in the icebox for three hours

The complex sentence analysis makes intelligible the occurrence in this sentence of an adverbial of time duration (FOR THREE HOURS), an adverb which cannot be construed as qualifying the action which Peter performed, but only the situation of the beer's being in the icebox. Efforts which consider semantically complex verbs as inserted pretransformationally are required to say of verbs like PUT that they are used in referring to actions which have resulting states and that they tolerate adverbial modification of either the preceding action or the resulting state, but not (presumably) both. Observe (14-b)

(14-b) *Peter instantly put the beer in the icebox for three hours.

15. Certain researchers continue to seek a univocal interpretation to the deep structure NP for all cases in which it occurs. These workers are required to assign the agentive or causing role to the deep structure subject, and then to interpret all sentences which fail to contain a NP that has this semantic role as sentences which have no

deep structure subject whatever.³ I will not say more of this approach, since I do not consider it distinct--with respect to the 'agent' role--from an approach which assigns 'roles' to NPs explicitly.

16. The second grammatical function of NPs which is defined configurationally within the standard theory is that of the direct object. On the traditional account, the role of the direct object in a sentence is that of 'patient' of the action referred to by the verb of the sentence, though deviations from this have long been understood and classified. By its configurational definition, the object NP is identified as that NP which is an immediate constituent of the main VP of the sentence. That the direct object relation is not semantically univocal can be seen in the following sentences:

- (16-a) I smashed the pumpkin
- (16-b) I grew the pumpkin
- (16-c) I like the pumpkin
- (16-d) I imagined the pumpkin
- (16-e) I made the pumpkin into a mask
- (16-f) I made a mask out of the pumpkin

17. Defenses of the underlying univocality of the semantic role of the direct object can be pursued in the same style as those dealing with sentence subjects.

18. It would seem, however, that linguistic theory ought to provide some way of distinguishing (i) the semantic roles which NPs have with respect to their predicate words, from (ii) facts about their positions in syntactic configurations, on either deep or surface structure levels. In some of my work I have tried to show how this

could be done.

19. Certain verbs and adjectives seem to require inherently a given number of NPs in the sentences in which they take part. Another way of saying this is that certain verbs and adjectives seem quite naturally to be reconstructible as n-place predicates in formulations within the predicate calculus. In descriptions of logical n-place predicates, there is no special status by which one or another of the arguments can be isolated from the rest, a status that would correspond to the role of subject or object. The relation between unstructured (but, of course, ordered) n-place predicate expressions and syntactic configurations appears to require the positing of certain mechanical correspondence rules which will make use of the left-to-right position of the arguments in the predicate expression.

20. For example, the verb REMIND--as seen in that sense of (20-a)

(20-a) Harriet reminded Fred of Charlotte

according to which Fred, on encountering Harriet, thought of Charlotte-- can be viewed at the semantic level as a three-place predicate, representable [ignoring tenses again] as (20-b)

(20-b) remind [Harriet, Fred, Charlotte],

a representation which is subject to the following syntactic configuration rules: the NP which identifies the first argument assumes the subject position; the NP which identifies the second argument assumes the direct object position; and (a special rule) the NP which identifies the third argument becomes part of a preposition-phrase which begins with OF.

21. Assuming that the underlying semantic predicates have their

argument slots arranged in a fixed order, one can define converse relations between predicates in terms of their underlying expressions. Thus, the pair LIKE/PLEASE will be defined as 1-2 converses; the pair SELL/BUY will be defined as 1-3 converses; the pair ROB/STEAL will be defined as 2-3 converses.

- (21-a) John likes roses
- (21-b) roses please John
- (21-c) like [a,b] =_{df} please [b,a]
- (21-d) John sells roses to schoolgirls
- (21-e) schoolgirls buy roses from John
- (21-f) sell [a,b,c] =_{df} buy [c,b,a]
- (21-g) Harvey robs John of roses
- (21-h) Harvey steals roses from John
- (21-i) rob [a,b,c] =_{df} steal [a,c,b]

22. Unfortunately, the method just proposed requires that each converse pair be separately identified, for each language, by some defining expression like (21-c), (21-f), or (21-i). It is assuredly reasonable to demand of a semantic theory that observed converse relations among predicate words in natural languages be explainable from their meanings and their syntactic properties, not that they need to be stated by a set of definitions. For two expressions to be converses of each other is a surface syntactic fact; the description of this situation should not depend on prior definitions made on underlying semantic representations.

23. One type of theory that would allow such explanations would require that all surface converse pairs have the same ordering of

arguments in their underlying representation, and that special rules for subjectivalization and objectivalization be defined for one member of each such pair. The 'explanation' of the relation is that one member of the pair represents an irregularity in the grammar with respect to the subjectivalization and objectivalization rules.

24. A second approach is one which presents, with each underlying predicate expression, an unordered set of argument slots, each of which is labeled according to its semantic role (or 'case' relationship) with the predicate word. It is this last position that I have taken.⁴

25. One finds that a decision to speak of predicates, arguments and role types, rather than predicates, arguments and positions, make it possible to provide a sharp separation between what I take to be purely syntactic phenomena--the left-to-right positioning of elements in the flow of speech--and facts about semantic interpretation. Two phonologically distinct predicate words may be interpreted as being semantically identical, having the same number of arguments in the same roles, but differing solely in the processes which arrange their elements into syntactic configurations. Each member of such pairs as BUY/SELL, TEACH/LEARN, SEND/RECEIVE, etc. 'take' essentially the same argument types, in the same roles, but they differ as to the role identification of the argument whose name or description becomes its subject.

26. Such an explanation is not in itself fully satisfactory, however. It is quite frequently the case that differences in subject selection properties (independently of the formation of passive

sentences) are correlated with other kinds of facts about predicate words. Two semantically similar predicate words may differ, for example, in the optionality of the surface manifestations of certain of their arguments. In expressions containing SELL, for example, it is not necessary to include a NP that mentions the 'customer'; thus (26-a) is a syntactically complete sentence.

(26-a) Harvey sells shoes

In expressions containing BUY, it is not necessary to include a NP that mentions the 'merchant'; thus (26-b) is a syntactically complete sentence.

(26-b) the girl bought some shoes

Similarly, expressions containing ROB may lack overt mention of the 'loot,' just as expressions containing STEAL may lack overt mention of the 'victim,' as is seen in the syntactically complete sentences (26-c) and (36-d)

(26-c) the boy robbed a bank

(26-d) the girl stole some shoes.

27. The view which recognizes labeled roles for the arguments of a predicate expression makes it possible, furthermore, to speak of the relatedness of predicates having different numbers of terms. Two verbs can differ in that one manifests an n-place predicate and the other manifests an m-place predicate, the roles of the arguments that are present in the one and absent in the other accounting for the differences in the semantic interpretation of the sentences which contain them. This way of speaking provides a fairly natural way of speaking of the relationship between KILL and DIE, or that between

PERSUADE and BELIEVE. The role by which KILL differs from DIE, and that by which PERSUADE differs from BELIEVE is that of the individual that is 'agentively' involved in the events named by these verbs. Apart from this difference, we are dealing here with pairs of synonyms.

28. (It has been maintained that the relation between words like these is more revealingly captured by the paraphrases with CAUSE like those mentioned in (10)-(14) above. The question is whether this reformulation is indeed significantly closer to the underlying conceptual reality to justify claims that have been made about the non-distinctness of semantic representations and deep structures of sentences. The word CAUSE itself seems to have a substructure: to say that John caused the cat to die is to say that John engaged in some activity and that activity directly resulted in the death of the cat.)

29. Anyway, the view which separates semantic roles from grammatical functions as sharply as this proposed role-structure analysis does, makes it possible to explore, as a separate type of inquiry, the function of the subject/predicate division. There might be some difference between reasons for choosing the verb BUY as opposed to the verb SELL, independently of the optional omissions mentioned in (26).

30. The verbs BUY and SELL refer to institutionalized interpersonal activities involving two participating parties, a sum of money, and goods or services that are to be provided for one of the participants by the other. There are no situations that can in themselves be distinguished as buying situations or selling situations; but the choice of one or another of these verbs seems to make it possible to speak of a buying/selling transaction from one of the

participants' point of view. One of the reasons for providing this distinction is to make it possible to determine the scope of modification of certain kinds of adverbs added to the sentence. I refer to the difference we sense, with regard to the scope of SKILLFULLY, in (30-a) and (30-b).

(30-a) he sells apples skillfully

(30-b) she buys apples skillfully

31. It even appears that there is a difference between the processes for determining the scope of adverbial modification and the processes which determine the deep-structure subject as distinct from the surface-structure subject. This can be seen by comparing sentences (31-a) and (31-b), where VICIOUSLY in both cases related to Harvey's participation in the act, with sentences (31-c) and (31-d), where WILLINGLY in both cases relates to the participation in the act of the individual indicated by the surface subject NP.

(31-a) Harvey viciously took advantage of Melissa

(31-b) Melissa was viciously taken advantage of by Harvey

(31-c) Harvey willingly took advantage of Melissa

(31-d) Melissa was willingly taken advantage of by Harvey

32. The proposal hinted at in (31) suggests that there is some validity to the notion deep-structure subject; but the facts are not really that decisive. It may appear instead that certain adverbs may be introduced into a sentence as ways of qualifying one participant's role in the activity, the identity of that individual being recognized by the associated role type (Experiencer, Agent, etc.). Thus, Manner adverbs of the type VICIOUSLY may appear only in sentences having

underlying Agents, the scope of the adverb being unaffected by the ultimate choice of surface subject. Postal has noticed that the adverb PERSONALLY occurs only in sentences with subjective experience verbs and in connection with the NP identified as the Experiencer--again independently of whether this NP is or is not the sentence subject.⁵

Examples like his are given below:

(32-a) personally, I don't like roses

(32-b) your proposal doesn't interest me, personally

(32-c) *personally, you hit me

(32-d) *personally, ontogeny recapitulates phylogeny

33. A theory which separates information about grammatical configurations from information about the nature of the underlying semantic relations must find some way of dealing with the so-called symmetric predicates. It should be possible, at some level, one might think, to say of verbs like MEET, COINCIDE, AGREE, etc., that they require expressions referring to two or more entities, but such expressions may appear in any of the several ways provided by English grammar: as plural subjects, as in (33-a); as conjoined subjects, as in (33-b); or as paired NPs arranged in different (depending on the verb) syntactic configurations, as in (33-c), and (33-d).

(33-a) the boys met/agreed

(33-b) John and Fred met/agreed

(33-c) John met Fred

(33-d) John agreed with Fred

It must be agreed that no theory of grammar should be constrained in such a way that it has to recognize two different verbs MEET, two

different verbs AGREE, etc., in order to distinguish the intransitive from the non-intransitive use of these forms.

34. This means recognizing, for some n-place predicates, that they 'take' two or more NPs in identical roles; but the main insights that have come from 'case grammar' or the theory of semantic role structure have depended on the assumption that no simple sentence requires the occurrence of more than one NP in a given role.

35. There do seem to be some differences in the conjoined subject as opposed to the distributed NP versions of symmetric predicate sentences, but for many of these the difference does not need to be seen as basic. We may consider again the effect of adverbial modification, once again taking the adverb WILLINGLY.

(35-a) John and Fred willingly agree

(35-b) John willingly agrees with Fred [not a paraphrase
of (35-a)]

(35-c) John and Fred fought with heated mud

(35-d) John fought Fred with heated mud [not a paraphrase
of (35-c)]

36. For the examples in (35), the answer seems to bear on the procedure by which adverbs of various kinds are to be introduced into sentences. It may be the case that in the symmetric-predicate sentence itself, there is no necessary semantic difference that accompanies one subject choice or the other. Once a choice has been made, however, the sentence is limited as to the embedding context which will welcome it. Thus, sentence (36-a) requires the 'transitive' form of MEET in its embedded sentence, but only because the verb ENJOY requires an

identity between its subject and the subject of its object sentence; and the subject of ENJOY is JOHN and not JOHN and MARY.

(36-a) John enjoyed meeting Mary

(36-b) John enjoyed (John meet Mary)

The point is that analogous interpretations are possible for sentences with the adverb WILLINGLY, and with Instrumental WITH-phrases. It is required merely that the adverb WILLINGLY be analyzed as a disguised embedding verb, as suggested by (36-d).

(36-c) John willingly met Mary

(36-d) John was willing (John met Mary),

and that WITH-phrases be associated with paraphrases containing the verb USE, as suggested already by Lakoff.^{6,7}

37. It is frequently the case, however, that apparent symmetric predicates are not properly symmetric after all. Sentences of the form (37-a)

(37-a) NP resembles NP

are extensionally symmetric if both NPs are definite referring expressions, but otherwise (as in (37-b)) not.

(37-b) your brother resembles a horse.

My interpretation of the Similarity Predicates is that one of the terms has the role Stimulus (or what I would call Instrument, but with the notion of 'implement' abstracted away), the other has the role Theme (or what I have called Object in my earlier writings), and the sentence is an expression of a 3-place predicate in which the third and phonetically absent argument is the Experiencer, which is understood, when unexpressed, to be identified with the speaker of the

sentence. The Stimulus must be expressed as a referring expression, but the Theme need not. The sentence means roughly that your brother as stimulus evokes in me memories of horses. [Incidentally, the verb REMIND, mentioned earlier, has a very similar structure, except that with it an NP representing the Experiencer must be present in the surface sentence.]

38. For many other so-called symmetric predicates there are arguments that the associated NPs do not serve in absolutely identical roles. It is difficult to capture such information in the face of the wide range of facts accounted for in the conjoined-subject source analysis of Lakoff and Peters,⁸ but such a reanalysis may prove to be necessary after all. And this is to say nothing of the problem of dealing with the Asymmetric Joint Action Predicates of the type discussed by a prominent generative semanticist (writing under an alias).

(38-a) Fred and Sheila were blanking

(38-b) Fred was blanking Sheila

(38-c) *Sheila was blanking Fred⁹

39. The occurrence of quantifying expressions of various types seems to be constrained in fairly mysterious ways according to the surface arrangements of the NPs in a sentence. Lakoff's 'derivational constraints'¹⁰ fail, as far as I can tell, to account for the particular set of mysteries I have in mind. In general, DEVELOP INTO and DEVELOP OUT OF are 1-2 converses (although they also have a use as 2-3 converses of 3-place predicates); but there is a skewness in the pattern of quantification compatible with these expressions, as

can be seen by comparing the paraphrasability facts shown below:

- (39-a) every acorn developed into an oak
- (39-b) an oak developed out of every acorn [a paraphrase of (39-a)]
- (39-c) every oak developed out of an acorn
- (39-d) *an acorn developed into every oak [not a paraphrase of (39-c)]

[Jeffrey Gruber first drew my attention to sentences (39-a, b, c, d).] Similarly, MAKE INTO and MAKE OUT OF are 2-3 converses of 3-term predicates, and the patterns seen above are repeated, only this time between the direct object and the object of a preposition.

- (39-e) I made every log into a canoe
- (39-f) I made a canoe out of every log [a paraphrase of (39-e)]
- (39-g) I made every canoe out of a log
- (39-h) *I made a log into every canoe [not a paraphrase of (39-g)]

40. Lest the data of (39) be thought of as involving exceptional properties of 'verbs of physical transformation', we can show here that verbs which are themselves converses of each other (FOLLOW and PRECEDE) exhibit similar patterns with their own passive counterparts.

- (40-a) a Sunday follows every Saturday
- (40-b) every Saturday is followed by a Sunday [a paraphrase of (40-a)]
- (40-c) every Sunday follows a Saturday
- (40-d) *a Saturday is followed by every Sunday [not a paraphrase of (40-c)]

(40-c) a Saturday precedes every Sunday

(40-f) every Sunday is preceded by a Saturday [a
paraphrase of (40-e)]

(40-g) every Saturday precedes a Sunday

(40-h) *a Sunday is preceded by every Saturday [not a
paraphrase of (40-g)]

I suspect that the data offered in sections (39) and (40) are ultimately explainable in terms of 'derivational constraints' of the kind discussed by Lakoff. A reason for bringing them up in this report is that they show restrictions of a fairly interesting sort that relate both to the formation of deep-structure subjects (put differently, to the choice of particular members of a converse pair) and to the formation of surface-structure subjects.

41. In my proposals on 'case grammar' I have assumed that the role types which one can refer to in describing the semantic structure of predicates make up a universally valid and reasonably well-specified set of concepts. I have assumed, too, that the role types are themselves unanalyzables, corresponding to elementary perceptions on the part of human beings concerning such matters as who did it, who experienced it, where it happened, what the result was, where a thing that moved ended up, where it started out, what moved, and a few others. I have convinced myself that certain role notions recur across widely variant languages, namely those for which one finds useful the terms Agent, Instrument, Location, Object, Patient, etc. I have found that many valid assertions about languages can be made by describing the structure of their sentences in these terms. The

most serious difficulties have had to do with specifying exactly what this small set of role types consisted of, and determining whether or not it would turn out to be necessary, at least for some verbs, to interpret certain arguments as serving two role functions simultaneously.

42. This last difficulty is that of seeing the relationship between the case functions that seem to be involved in almost every sentence--such as, for example, those I named in the last section--and the sort of role structure that is involved in the description of particular kinds of institutionalized transactions for which a 'field' of vocabulary may exist in a language. I have in mind the roles of customer, merchant, goods, and instrument of exchange in the vocabulary field that includes BUY, SELL, PAY, DICKER, etc.; and those of defendant, judge, deed, victim, etc., in the field that includes verbs like ACCUSE, CRITICIZE, FORGIVE, APOLOGIZE, CONFESS, CONCEDE, JUSTIFY, EXCUSE, etc. I am at the moment ready to assume that it may be necessary to treat the semantic roles of arguments on two 'levels'. I mean that I may want to be able to say that in expressions with BUY there is one argument which has Customer function on one 'level', Agent function on another, whereas in expressions with SELL, the argument which has Agent function is the Merchant, not the Customer. In what follows I leave open the possibility that the roles associated with a predicate word may not bear a one-to-one correspondence with the arguments associated with it.

43. A great deal of attention has been given in the last year or two, in linguistic circles, to the fact that the semantic description

of expressions containing particular predicate words needs to distinguish what the speaker of the sentence might be saying (or 'doing in saying') explicitly from what he is said to presuppose about the situations concerning which he is speaking. The apparatus for formulating the presuppositions will need to refer to the entities which serve particular role functions with respect to the event or situation identified by the predicate.

44. In my description of verbs of judging,¹¹ for example, I have pointed out that for sentence (44-a)

(44-a) Harvey accused Fred of writing the letter.

the utterer of the sentence presupposes (that Harvey presupposes?) that someone's having written the letter in question was bad, and what he is declaring, in uttering (44-a), is that Harvey claimed that Fred is the one who did it. On the other hand, for sentence (44-b)

(44-b) Harvey criticized Fred for writing the letter

the speaker of the sentence presupposes (that Harvey presupposes?) that Fred was the one who wrote the letter, and is declaring, in uttering (44-b), that Harvey claimed that for Fred to have written the letter was bad. The force of Harvey's utterance in (44-a) is what is presupposed in (44-b), and vice versa.

45. Paralleling the pair of words offered in (44) is the pair CREDIT and COMMEND. These differ in that where ACCUSE and CRITICIZE carry the idea of blameworthiness, CREDIT and COMMEND carry the idea of goodness. That is, in (45-a) someone's having written the letter is judged in advance as being good, and what is communicated is that Harvey claimed Fred did it; in (45-b) Fred's responsibility is pre-

supposed, and what is communicated is that Harvey claimed that what Fred did was good.

(45-a) Harvey credited Fred with writing the letter

(45-b) Harvey commended Fred for writing the letter

46. The distinctions seen here are analogous to those which J. L. Austin recognized in an ambiguity of BLAME and in the pair of words EXCUSE and JUSTIFY.

47. Some of the verbs of judging are illocutionary verbs, as are, for those I have mentioned, ACCUSE and COMMEND. What this means is that, for those verbs of judging which are capable of serving as 'explicit performatives' or 'illocutionary force indicating devices,' a presuppositional analysis of them comes to show certain resemblances to, say, Searle's analysis of promising and other illocutionary verbs. The analysis of illocutionary acts along the line developed by Searle¹² is a special case of the analysis of the type I have in mind (especially as it concerns presuppositions), being special only in that what is presupposed of the subject of the verb must be true of the speaker of the utterance, and that a performance of the utterance under the first-person-present-tense conditions appropriate to performatives 'counts as' the performance of an act which has extralinguistic validity.

48. Searle's type of analysis can easily be extended, working, in the other direction, to the description of non-linguistic-act verbs. Thus the 'preparatory condition' for a valid utterance of (48-a)

(48-a) Sheila borrowed five dollars from Fred

is that Fred had five dollars; the 'sincerity condition' is that

Sheila intends to give Fred five dollars at some time in the future; the 'essential condition'--which here, however, cannot be matched with a rule which governs the use of an operative linguistic expression-- is that Sheila has undertaken an obligation to return Fred his five dollars some day.

49. (This is not to say that one can accept all of what Searle has to say about promising. His account fails, as far as I can tell, in one or two respects. For example, he claims that in performing a valid promising act one has taken on an obligation to perform in a particular way in the future. If this is so, then the utterances, on a mother's part, of the reassuring words (49-a) or (49-b) must be defective as acts of promising.

(49-a) I promise you that your father will come back

(49-b) I promise you that the sun will come up again
tomorrow.

If it were seen, however, that in making a promise one provides a personal guarantee of the (future) truth of a statement, such promising acts would not need to be described as defective. Promising of the type Searle has in mind must be understood in terms of guarantees of the (future) truth of statements whose propositional content contains descriptions of acts to be performed by the maker of the promise. (That is, in which an expression referring to the maker of the promise is in the Agent role.))

50. (A second quibble might be raised in connection with Searle's hint that THREATEN is the unfavorable consequence counterpart of PROMISE. This is wrong because (i) threatening acts do not need to

be (accompanied by) linguistic acts', and because (ii) in threatening somebody, one does not take on an obligation to do anything. You can succeed thoroughly in threatening me by merely saying that you might consider beating my brains out. It may be, however, that I am confused by an ambiguity in THREATEN between an illocutionary and a perlocutionary sense. I know, for example, that one can declare that threatening words are ineffective either by saying (50-a) or (50-b).

(50-a) you can't threaten me [perlocutionary]

(50-b) your threats don't bother me [illocutionary].)

51. We have thus seen that the semantic analysis of ordinary language sentences, in order to incorporate observations and rules about illocutionary force, must include in its scope ways of dealing with the participants in the speech act itself. The traditional term for dealing with matters of this sort is deixis. One speaks of person deixis (references to the speaker and the addressee), place deixis (references to the locations of the speaker and the addressee), time deixis (references to the time of the speech act), as well as references to portions of the utterance itself (discourse deixis), and references to the relative social statuses of the speech act participants (honorific systems, etc.).

52. In the description of certain predicate words, there is a necessary reference to deictic features, especially in the description of the presuppositions or 'preparatory conditions'. The prime example of this for English is the verb COME.¹³ In sentences of the form given in (52-a)

(52-a) O (object) comes to P (place) at T (time)

it is presupposed of P that it is either

(i) where the speaker of the sentence is at the time
of utterance; or

(ii) where the addressee of the sentence is at the time
of utterance; or

(iii) where the speaker of the sentence is/was/will be at T; or

(iv) where the addressee of the sentence is/was/will be at T.

53. Sentences containing no other deictic references permit all four presuppositional possibilities, as in (53-a)

(53-a) Fred will come to the office tomorrow

But others are limited because of presuppositions associated with other deictic parts of the sentence. Thus, (53-b) presupposes either that you are there now or that you will be there tomorrow, but not that I am there now nor that I will be there tomorrow at the time I arrive; and (53-c) presupposes that I will be there tomorrow at the time of your arrival, or that you are there now while I am speaking.

(53-b) I will come there tomorrow

(53-c) you will come there tomorrow

54. (A full semantic theory of a language must additionally take into account the fact that there is an extended or displaced use of deictic features corresponding to the ways in which the speaker of a third-person narrative 'identifies' with one or another of the characters in his narrative. If one of the basic functions of deictic categories is to express directly the speaker's role or viewpoint with respect to his subject matter, in the 'displaced' use the speaker

performs some kind of psychological 'identification' with one of the parties in his narrative. It seems that instances of 'displaced ego' can be seen in sentences like (54-a), where the author is interpreted as viewing the situation from Harry's point of view, rather than from Fred's or Bill's.

(54-a) Fred came to where Harry was, and then Harry went
to where Fred was

In (54-b) the author is aloof; sentence (54-c) is unacceptable.

(54-b) Fred went to where Harry was, and then Harry went
to where Bill was

(54-c) *Fred came to where Harry was, and then Harry came
to where Bill was

The phenomenon is quite analogous to the distinction provided by some (e.g., Algonquian) languages between 'proximative' and 'obviative' third persons. It has been noted that the proximative forms are only associated with one individual in a third person narrative at a time, and that the switch in the application of the form from one individual to another corresponds to a shift of point of view in the development of the narrative.)

55. As stated earlier, it is the inclusion of reference to speech act participants in semantic descriptions which makes possible the incorporation of matters of 'illocutionary act potential' in the description of sentences. An attractive view is that the illocutionary force of a sentence is represented in the deep structure of that sentence, or at least that what one might call the 'straightforward illocutionary act potential' of a sentence should be so represented.

Evidence that maybe all conversational sentences should be provided with this sort of superstructure at their 'deepest' representation has been offered by Ross. For sentences whose utterances have the illocutionary force of asserting or informing ('declaring'), there are reasons for believing that there is, in the deep structure, a silent illocutionary verb of declaring having a first-person Agent NP, a second-person Dative PP, and having the non-silent part of the sentence as its direct object.¹⁴

56. The occurrence of adverbs like PERSONALLY is now permitted a consistent accounting. The adverb occurs in sentences with 'psychological' verbs and in which the Experiencer NP is coreferential with the Agent NP of the immediately commanding linguistic-act verb. Where the upper linguistic-act verb is apparent in the surface structure, this observation accounts for the acceptability of (56-a) as opposed to (56-b).

(56-a) Fred said that he personally dislikes roses

(56-b) *Fred said that Martha personally dislikes roses

By assuming a first person declarative supersentence above all declarative sentences, one can account, in Ross's fashion, for the acceptability of (56-c) as opposed to (56-d).

(56-c) personally, I dislike roses

(56-d) *personally, Fred dislikes roses

57. Analogously, the pleading-word PLEASE occurs only in sentences immediately commanded by verbs of ordering or requesting. The requirement is that the Agent NP of the interior sentence be coreferential to the Dative NP of the ordering or requesting verb. Where the ordering or requesting verb is present,

sentence, this accounts for the acceptability of (57-a) as opposed to (57-b).

(57-a) I told Fred to please leave the room

(57-b) *I predict that you will please leave the room

Assuming that imperative sentences are contained in silent performative structures of ordering allows one to explain, by the same principle, the acceptability of (57-c) as opposed to (57-d).

(57-c) please leave the room

(57-d) *Fred please left the room

58. One question about the presuppositional structure of sentences that I have not discussed is that of who does the presupposing. Presupposing may be thought of as an act performed by the speaker in his production of the utterance, or as an act imputed by the speaker to one or more of the individuals whose properties or actions are described by the utterance in question. I assume that there will be much more to say about such matters after one has seen the results of Lakoff's explorations into the logic of 'world-creating verbs'.

59. The view of semantic interpretation that I have been assuming is roughly this: I believe that, given a full grammatical description of a sentence, with complete semantic descriptions of the lexical items it contains, it should be possible to 'compute' the full semantic description of the sentence, including, of course, information about what its utterers must presuppose to be true, including its utterers' imputations of presuppositions to individuals described or referred to in the sentence. This 'computation' will involve many types of grammatical facts and a great many subtle properties of lexical items.

The view is representative of what is called interpretive semantics, but it is one which involves operations which are quite distinct from those proposed in the earliest presentations of interpretive semantics. Operations involving selection restrictions are here replaced by an understanding of presuppositions; this has the effect of dissolving the problem of discovering the boundary between the semantic properties of words (e.g., nouns) and the physical properties of the things to which the words could be correctly applied. Interpretive semantics is one which welcomes lexical items that contain in their definitions variables not found in the expressions that contain them. These variables are relevant to the semantic interpretation of sentences, because there are situations in which predications involving these variables are more essential parts of the communication than anything else. To use a familiar example: to say of Fred, literally, that he is a bastard, is to say of his mother that she was not married on the day he was born. And that is to 'refer' to someone not mentioned in the original assertion.

60. The alternative view, within what has come to be called 'generative semantics',¹⁵ has it, if I understand correctly what is going on, that all of the information relevant to the semantic interpretation of a sentence must be present in a representation of the deep structure of that sentence, and that, in fact, there is no level of 'deep structure' that is distinct from the level of semantic representation. If in the end the 'generative semantics' view turns out to be more valid--and I don't know what I am revealing about myself to admit that I find the arguments favoring generative semantics over-

whelming but somehow not coercive--then descriptions of the type I am capable of coming up with through my work will fall in place, within the correct theory, on the level of lexicology. I believe, that is, that the observations about the meanings of lexical items, the relations which must be described in characterizing the semantic structure of expressions containing specific lexical items, and the format for expressing these facts, can be exactly the same under either view.

61. It is the apparatus for dealing with presuppositions that makes me retain faith in the interpretive-semantics position. It is frequently possible to state the presuppositions of a sentence in the form of a schema which operates on the grammatical description (in fact, often enough, the surface grammatical description). If we take, for example, the presuppositional effect of 'contrastive stress,' it generally seems to be the case that a sentence of the form suggested by (61-a)

(61-a) X Y Z [where underlining represents emphasis]

is associated with the presupposition suggested by (61-b)

(61-b) it has been suggested that X Y' Z [where Y' ≠ Y]

Given this formula, we can figure out in what contexts one might say (61-c)

(61-c) It's an essay in descriptive metaphysics.

by imagining what different type of metaphysics somebody might have alluded to in the utterances that preceded (61-c). If it is impossible for us to do this--because, say, we know nothing whatever about how the word METAPHYSICS is used--we cannot understand the presuppositional

content of (61-c), but we know something about how to acquire this understanding.

62. Perhaps the main reason I cling to views of interpretive semantics is that I am unconsciously guilty of the much-discussed sin of confusing the linguistic technical term 'generate' with the psychologically more immediately understandable notion 'produce' (as in 'produce utterances'). I so frequently find myself speaking without any understanding-of what I am saying that I quite naturally think of the ability to produce a sentence as involving essentially different principles from those that are employed in figuring out what if anything its utterer intended.

Footnotes

¹See Noam Chomsky. 1965. Aspects of the Theory of Syntax, M.I.T. Press, chapter 2.

²See, e.g., James D. McCawley. 1969. Lexical insertion in a transformational grammar without deep structure, in Bailey, C-J., B. J. Darden and A. Davison, Papers from the fourth regional meeting of the Chicago Linguistics Society, University of Chicago, pp. 71-80.

³For examples of this approach see Barbara Hall. 1965. Subject and object in English, M.I.T. Ph. D. dissertation, and P. Gregory Lee. 1969. Subjects and agents, OSU Working papers in linguistics No. 3, Columbus, pp. 36-113.

⁴See, e.g., my The case for case. 1968. in F. Bach and R. Hamrs, eds., Universals in linguistic theory, Holt, Pinehart & Winston, pp. 1-88, and Lexical entries for verbs. 1968. Foundations of Language 4.4.373-393.

⁵Paul M. Postal, Cross-over phenomena, in Specification and utilization of a transformational grammar (Scientific report No. 3), Yorktown Heights, New York: IBM Research Center.

⁶See George Lakoff. 1968. Instrumental adverbs and the concept of deep structure, Foundations of Language 4.1.4-29.

⁷For further discussion of the matters taken up in sections 19-36, see my Types of lexical information. 1968. OSU Working papers in linguistics No. 2, pp. 65-103 (to appear in Semantics: An interdisciplinary reader in philosophy, linguistics, anthropology and psychology, Jakobovits and Steinberg, eds., Cambridge University Press.)

⁸George Lakoff and Stanley Peters. 1969. Phrasal conjunction and symmetric predicates, in Modern studies in English, David Reibel and Sanford Schane, eds., Prentice-Hall, pp. 113-142.

⁹Quang Phuc Dong. 1968. A note on conjoined noun phrases, PEGS (unpublished).

¹⁰George Lakoff. 1969. On derivational constraints, in Papers from the fifth regional meeting of the Chicago Linguistics Society, Chicago, pp. 117-139.

¹¹For a somewhat more detailed discussion, see my Verbs of judging: An exercise in semantic description. 1969). Papers in Linguistics 1.1, Florida State University, pp. 91-117.

¹²John R. Searle. 1969. Speech Acts: An essay in the philosophy of language, Cambridge University Press.

¹³See my Deictic categories in the semantics of 'come'. 1966. Foundations of Language 2.219-226.

¹⁴For a persuasive statement of this analysis, see John R. Ross. 1968. On declarative sentences, to appear in Jacobs and Rosenbaum, Readings in English Transformational Grammar, Blaisdell.

¹⁵See, for a survey of the literature on and the arguments for generative semantics, George Lakoff's Generative semantics. To appear in Danny Steinberg and Leon Jakobovits, eds., Semantics: An interdisciplinary reader in philosophy, linguistics, anthropology and psychology, Cambridge University Press.

The Deep Structure of Indirect Discourse*

Gregory Lee

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The Deep Structure of Indirect Discourse¹

Gregory Lee

1. Otto Jespersen and other traditional grammarians have described indirect discourse as being a transform of direct discourse. Jespersen² says that in converting direct discourse into indirect discourse person, tense, and mood are shifted and the form of questions, commands, and requests is changed. So for example the sentence (1-a) becomes in indirect discourse (1-b) by shifting the person (I changes to he) and shifting the tense or mood (will changes to would).

(1-a) John said, "I will go."

(1-b) John said that he would go.

2. In the framework of generative-transformational grammar, the obvious way to take over this traditional account is to say that there are optional transformations which shift person, tense, etc. We start off with sentences in direct discourse, and, if these transformations apply, we get a sentence in indirect discourse. In this treatment a sentence with direct discourse and the corresponding sentence with indirect discourse would come from the same deep structure. Now two sentences that are derived from the same deep structure should be paraphrases; but corresponding sentences with direct and indirect discourse are not in general paraphrases. For example, (1-b) could be true in circumstances in which (1-a) was not true. John's actual

words could have been "I shall depart," and (1-b) would still be a fair report of what John said. The direct discourse sentence purports to give John's actual words, but the indirect discourse sentence is true just so long as what John said "boils down" to saying that he would go.

3. So already a major problem arises in trying to relate direct and indirect discourse in the terms of generative grammar. Let me set the major problem aside for a moment to examine some more narrow evidence for and against the proposition that indirect discourse is derived from direct discourse.

4. Sentences (4-a), (4-b), and (4-c) illustrate an argument for getting indirect discourse from direct discourse. Not everyone will find (4-a) unacceptable, but I predict that at least some people will.

(4-a) *Mary is pregnant, but John said, "No she isn't."
The reason I think (4-a) is bad is as follows. For the conjunction but to be appropriate, John's words No she isn't must be interpreted as meaning 'No, Mary isn't pregnant,' where pregnant has been deleted, and Mary has been pronominalized. But for this deletion and pronominalization to take place, Mary and pregnant must have been mentioned in the conversation being reported on--before John spoke. In (4-a) there is no indication that Mary and pregnant were mentioned before John spoke; rather they are mentioned at the time John's speech is being reported. Contrast this with the acceptable (4-b) where Mary and pregnant are mentioned in the conversation being reported.

(4-b) Harry said, "Mary is pregnant," but John said,
"No she isn't."

In (4-b) the pronominalization and deletion can take place. (4-a) and (4-b) show that there is a contrast between direct discourse and what is not in direct discourse with regard to anaphoric relationships. I will call the constraint, which rules out (4-a), the 'pregnant-constraint.'

(4-c) shows that indirect discourse acts like direct discourse in this regard. I.e., the pregnant-constraint doesn't make (4-c) unacceptable.

(4-c) Harry said that Mary was pregnant, but John said,
"No she isn't."

The acceptability of (4-c) can be accounted for if indirect discourse is derived from direct discourse; i.e., if (4-c) is derived from (4-b). The pregnant-constraint will be stated at the level of deep structure, before (4-b) is changed to (4-c).

5. Sentences (5-a), (5-b), and (5-c), on the other hand, illustrate an argument that indirect discourse is not derived from direct discourse. The i subscripts in (5-a), (5-b), and (5-c) indicate that someone and he are to refer to the same person. (5-a) shows that ordinarily the indefinite someone can be the coreferential antecedent of he.

(5-a) John thought that someone_i would leave, but he_i
didn't.

But an indefinite in direct discourse cannot be the coreferential antecedent of a pronoun outside the direct discourse. I will call

(6-c) After Mary said that someone_i was in the room,
he_i said, "No one is in the room."

We can predict that the first in the room cannot be the antecedent of the in the room in the direct quote, because of the pregnant-constraint. The unacceptability of (6-d) confirms this prediction.

(6-d) *After Mary said that someone_i was in the room,
he_i said, "No one is."

In (6-d) in the room has been deleted from the direct quote, the antecedent being the preceding in the room. But this anaphoric relationship is ruled out unless the antecedent is also in a direct quote in deep structure. In (6-d) in the room is not in a deep structure direct quote, hence (6-d) is unacceptable.

7. Notice that this solution does not make the false prediction that corresponding sentences in direct and indirect discourse are always paraphrases. A sentence with indirect discourse has in general two interpretations, one of which is the same as that of the corresponding direct discourse sentence.

8. The sentences in (8-b) through (8-d) below are other cases like (6-d), where two constraints conflict. A sentence with indirect discourse has simultaneously forced on it two incompatible interpretations--an interpretation as being from deep structure indirect discourse and an interpretation as being from deep structure direct discourse.

As Joseph Emonds points out in his dissertation Constraints on Transformations (Indiana University Linguistics Circle, mimeo, Summer, 1969), parenthetical expressions like it seems to me do not

(8-e) John said that the woman who is sitting there
would (*he thought) agree to leave.

9. Now I know from some unsystematic checking-around that a lot of you will not agree with my placement of asterisks in these examples. Not only do the sentences take some thinking about, but they also permit well-considered disagreement. But suppose for a moment that the proposal in (6-a) is correct. Then the acceptability of sentence (9-a) is interesting.

--(9-a) Mary was pregnant, and John said that she was--but
Harry said, "No she isn't."

There are three occurrences of Mary and three occurrences of pregnant in (9-a); two of each are implicit. If the sentence were filled out more, it would read:

(9-b) Mary was pregnant, and John said that Mary was
pregnant--but Harry said: "No, Mary isn't
pregnant."

Let me refer to the three occurrences of pregnant as pregnant₁, pregnant₂, and pregnant₃. Pregnant₃ is deleted from the direct quote, the antecedent for the deletion being pregnant₂. The antecedent cannot be pregnant₁ (the pregnant that actually occurs), because of the pregnant-constraint. The indirect discourse in the second clause of (9-a) must be from direct discourse--again because of the pregnant-constraint. But now the pregnant-constraint prevents deleting pregnant₂ with pregnant₁ as antecedent. But the fact is that the second pregnant can be deleted.

The only way around this problem that I can see is to allow deletion

to occur both before and after the conversion of direct discourse into indirect discourse. This implies first, that pregnant₂ is really present in the deep structure of (9-a) (otherwise it could not act as an antecedent); and second, it implies that the anaphoric relationship between pregnant₁ and pregnant₂ cannot be stated in the deep structure of (9-a), but is established at a lower level by the process of deletion.

Likewise the anaphoric relation between Mary and the first she in (9-a) must be established after underlying direct discourse is changed into indirect discourse.

Footnotes

¹This paper was read at the December 1969 meeting of the Linguistic Society of America. Another paper on indirect discourse was read at that meeting by Mary Gallagher. Professor Gallagher's paper, "Accounting for indirect discourse," has now appeared in *Papers in Linguistics* 2.1.83-89. Her arguments and my conclusion may seem to be in conflict, but a careful reading will show that in fact they are not.

²Otto Jespersen, *The Philosophy of Grammar*, p. 292 ff.

A Note on Manner Adverbs

Patricia Lee

A Note on Manner Adverbs

Patricia Lee

Assuming as basic George Lakoff's proposal that manner adverbs are derived from adjectival constructions, I would like to further examine the selectional restrictions on manner adverbs and the paraphrasal relationships among the more basic adjectival constructions.

I. It is obvious that manner adverbs take human subjects and cannot take inanimate subjects.

(1) Mary carefully typed the letter.

(2) *The rock carefully rolled down the hill.

However, it is not quite so obvious that manner adverbs can also take animate, non-human subjects.

(3) The cat meticulously buried its feces.

It has been suggested that this restriction may be related to a volitional feature of the adverb. The following sentences would then have to have animate subjects and a feature of volition in the adverb.

(4) The dog deliberately chewed up my shoe.

(5) The horse intentionally stepped on my foot.

But consider sentences such as

(6) The cat obnoxiously kneaded the blanket.

(7) The dog heroically saved the child.

- (8) The mule reluctantly moved.
- (9) The anteater eagerly ate the ants.
- (10) The horse wisely chose the right road.

(The adverbs in 6-10 will be further discussed in section II.)

In each of the above sentences the acceptability depends on the volitional nature of the adverb. Thus, sentences (11) through (15) are strange:

- (11) The beetle obnoxiously climbed up my leg.
- (12) The cat heroically hissed.
- (13) The dog reluctantly ate the fish.
- (14) The moth eagerly flew toward the light.
- (15) The cat wisely retracted its claws.

Although these sentences are grammatical, they are odd either because the acts involved are not completely and consciously acts of will, or because non-human animals do not do things reluctantly or wisely.

One solution to this problem would be to subcategorize adverbs into volitional or non-volitional categories, and allow animacy to be the only subject selectional restriction. In this way +human subjects would correspond to +animate subject and +volitional adverb. However, with non-human subjects the problem still exists of determining what can be volitional for a cat, a dog or a beetle. The fact that sentences (11) through (15) are not completely unacceptable, but only odd, indicates another solution. There are situations in which the sentences of (11)-(15) would be perfectly suitable; for example, my intense dislike for beetles could lead me to say The beetle obnoxiously climbed up my leg, or even,

(16) The beetle { maliciously
deliberately } climbed up my leg.

(i.e., I attribute a volitional act--that of trying to frighten me--to the beetle, although I know in fact that the beetle had no such purpose in mind.) This would be similar to saying:

(17) Cats { cruelly
ruthlessly } kill rodents.

although most people would acknowledge the cruelty with which cats kill mice is a human, not feline, attitude.

What I propose then, is that the adverb ascribed to an action can either be the speaker's description of how the act is being committed, or the subject's attitude toward the act. This would be the source of many ambiguities with human subjects as well as non-human subjects. The sentences

(18) John wisely decided to study linguistics.

may be Professor Glump's opinion of John's decision and John may think it was a dumb thing to do.

II. This brings us to the problem of what adverbs have this ambiguity; I think that in fact all adverbs can be ambiguous in this way, but that some have a much more likely reading as the subject's opinion of how the act was performed. There are manner adverbs derived from both stative and active adjectives; those derived from active verbs and having human subjects are much less likely to be read as the speaker's opinion. Sentence (20) is less likely to be denied than (21):

(20) John deliberately tore up the notice.

(21) The cat deliberately ruined my couch.

It seems to me that there are actually three types of manner adverbs: (a) those derived from active adjectives which are also volitional, (b) those derived from active adjectives which can be volitional or non-volitional, and (c) those derived from stative adjectives which are non-volitional. Examples follow.

ACTIVE		STATIVE
+volitional	±volitional	-volitional
masterfully industriously meticulously carefully deliberately ruthlessly cleverly	heroically obnoxiously	reluctantly eagerly wisely

Whether or not heroic and obnoxious are active can also be challenged. They both meet the test for stativity:

(22) He seems to be { obnoxious.
heroic. }

And there is a definite strangeness in some of the active interpretations:

(23) ?What he did was be { obnoxious.
heroic. }

(24) Bill was deliberately { obnoxious.
heroic. }

(25) ?*John was careful in being { obnoxious.
heroic. }

but

(26) Max acted { obnoxiously
heroically } and Sam did so too.

- (27) Herkimer was { obnoxious
heroic } in order to win Larry's
respect.
- (28) Paul eats bugs because he wants to be { obnoxious.
heroic. }
- (29) Be { obnoxious!
heroic! }
- (30) ?Dick is stupid instead of { obnoxious.
heroic. }
- (31) You are { heroic
obnoxious } for my sake.
- (32) Portia is being { obnoxious.
heroic. }
- (33) *I saw him being { obnoxious.
heroic. }
- (34) Giulia persuaded Hilda to be { obnoxious.
heroic. }
- (35) ?Cassius will be { obnoxious.
heroic. }
- (36) ?*We used masks to be { obnoxious.
heroic. }
- (37) He was { obnoxious
heroic } with a gun.
- (38) ?She was { obnoxious
heroic } by (means of) taking LSD.
- (39) They are { obnoxious
heroic } together.
- (40) Henry is { obnoxious
heroic } with Zelda.
- (41) *Sue was { obnoxious
heroic } and was { obnoxious.
heroic. }
- but
- (42) Sue kept on being { obnoxious.
heroic. }
- (43) ?Laura happened to be { obnoxious
heroic. }

(44) ?Amy is { obnoxious
heroic } in the park.

This lack of agreement indicates that perhaps there is a further subcategorization of verbs needed. Although I have no definite proposal at the present, I suggest it be in terms of volitional acts, since both heroic and obnoxious have the property of being either intentional or unintentional.

III. There is yet another problem with adverbs; if we assume they are paraphrases of adjectival constructions as Lakoff (1965) proposed, we get

(45) Mort cleverly reads tea leaves.

coming from

(46) Mort is clever in reading tea leaves.

For me, this sentence is ambiguous; it can mean either (47) or (48):

(47) Mort reads tea leaves in a clever manner.

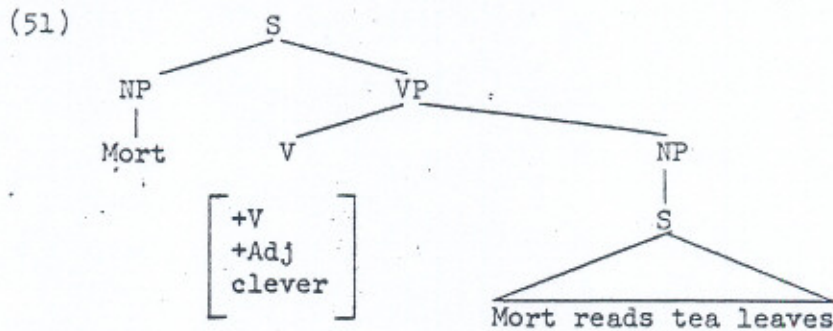
(48) Mort is clever in that he reads tea leaves (i.e.,
he makes a lot of money doing it.)

Since this ambiguity exists, the deep structures of (47) and (48) must be different. Specifically, the deep structure of (48) must be sensitive to for-to and Poss-ing complementation (as described by Rosenbaum, 1967)-since sentence (49) and (50) are paraphrases of (48):

(49) For Mort to read tea leaves is clever.

(50) Mort's reading of tea leaves is clever.

A deep structure such as (51) would allow the transformational derivation of (49) and (50).



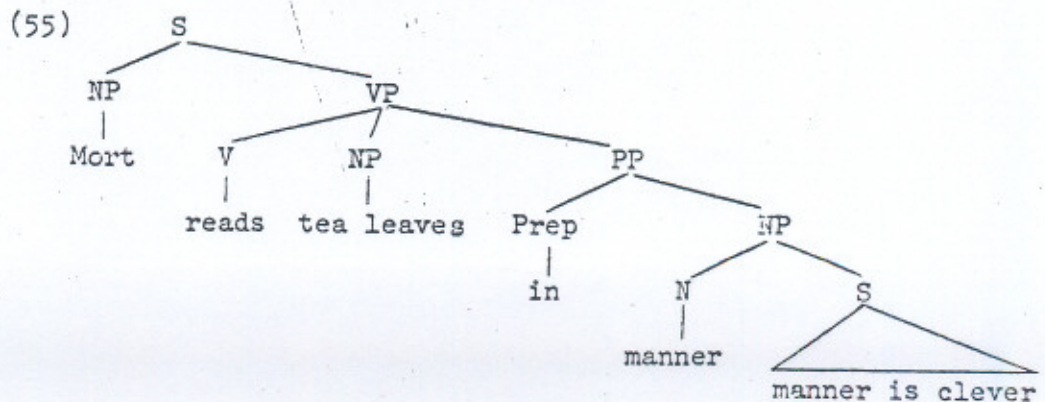
Such a deep structure would also permit the derivation of the related sentences:

(52) It is clever of Mort to read tea leaves.

(53) That Mort reads tea leaves is clever.

(54) Mort is clever to read tea leaves.

The fact that transformational rules of complementation and extraposition apply to the deep structure (51) indicates that it is not exceptional, and the main problem was to differentiate that structure from the one underlying sentence (47) (Mort reads tea leaves in a clever manner.). Since sentence (47) obviously cannot be sensitive to the rules mentioned above, and, since these rules appear to have a wide range of application in English, the deep structure of sentence (47) is actually the exceptional (and problematic) case. For sentence (47), I propose a deep structure on the order of (55):



Whether or not the phrase containing the adverbial element is in fact a prepositional phrase is debatable.

However, a structure like (55) eliminates the need for a special adverb node (if the prepositional phrase can be accepted) and in addition provides a means of distinguishing the two uses of cleverly-type adverbs. Unfortunately I can find no overwhelming syntactic arguments in favor of (55); however, the semantic function of cleverly in Mort reads tea leaves cleverly is definitely related to the verb phrase of the sentence rather than the sentence as a whole or the main noun phrase. So, although the specifics of (55) may be in doubt, the general structure is probably correct.

Finally, there are two adjectival paraphrases of manner adverbials:

(56) John was careful in playing roulette.

(57) John was careful at playing roulette.

As far as I know, the difference between in and at in these cases has not been discussed. The first fact to be noticed is that at cannot occur with the non-volitional or \pm volitional adjectives:

(58) *Marvin was heroic at saving the child.

(59) *Lilly was obnoxious at making faces.

(60) *Winnie was reluctant at leaving.

(61) *Winnie was eager at leaving.

(62) *Phil was wise at deciding to stay.

However, the sentences (58) through (62) are all okay with in (with the possible exception of (65) and (66)):

(63) Marvin was heroic in saving the child.

- (64) Lilly was obnoxious in making faces.
- (65) ?Winnie was reluctant in leaving.
- (66) ?Winnie was eager in leaving.
- (67) Phil was wise in deciding to stay.

The active, volitional adjectives can take either in or at:

(68) Jim was {
masterful
industrious
meticulous
careful
clever
deliberate
ruthless
} {
in
at
} playing chess.

There does, however, seem to be a difference in meaning between sentences with at and sentences with in, and the difference seems to be related to the habitual or regular manner in which the subject performed the action. So, although

(69) Jim is careful at playing chess.

is all right,

(70) *Jim was careful at playing that game of chess.

is strange.

Admittedly there are many unsolved problems in manner adverbs, but I think further research centered around the notions of volition, reference or attribution, and habitual or regular action will provide some answers.

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Grammatical Variability and the Difference between Native
and Non-native Speakers*

Ilse Lehiste

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Grammatical Variability and the Difference between Native
and Non-native Speakers

Ilse Lehiste

A currently popular method of teaching syntactic theory involves contrastive presentation of 'grammatical' and 'non-grammatical' sentences. There is, however, an increasing amount of evidence that native speakers do not agree among themselves with regard to grammaticality judgments (Elliott, Legum, and Thompson, 1969; Quirk and Svartvik, 1966). The use of the grammaticality criterion may therefore be questioned on theoretical grounds. A concrete problem arises in teaching a syntax course to a group of students including both native and non-native speakers of the language from which the examples are drawn: non-native speakers frequently fail to see the rationale for a particular decision as to whether a sentence is or is not grammatical, if this rationale consists of an appeal to the native speaker's intuition.

The notion of grammaticality is admittedly difficult to define, and even more difficult to explain to linguistically naive users of a language (Bolinger, 1968). One way to explore the reliability of native speakers' grammaticality judgments would be to compare the actual use of a grammatical feature by a group of monolingual native speakers of English with the use of the same feature by a group of bilinguals for whom English is the second language. In this manner,

direct reference to grammaticality could be avoided.

I conducted a small experiment, the purpose of which was to compare the ranges of grammatical variability within two such groups, with the view of finding out whether the difference between the two groups, if any, was in any way significantly different from the variation within the native group.

I selected a set of 91 English sentences which had already been used to test the range of variability within a group of native speakers of English (D. Terence Langendoen, Elements of English Grammar, in press). The subjects of this study were a group of junior high and high school teachers of English, who participated in a summer institute at Ohio State University in 1968. The structural feature which the sentences were designed to test was the formation of 'tag questions'. This term is used to refer to questions asking for confirmation of the content of a declarative sentence. For example, the statement "The sky looks threatening" might be followed by "doesn't it", which would constitute an appropriate tag question. The responses given by the 46 native speakers are analyzed in detail in Langendoen's forthcoming book. A gross indication of the amount of grammatical variability found within this group is provided by the fact that the test subjects showed complete agreement in only 33 instances out of 91. In other cases, the number of different responses to a single statement varied between two and eight.

I presented the same set of sentences to a comparable group of 46 Estonian-English bilinguals ranging in age from 17 to 51. The bilinguals, who are long-term residents of the United States and

I conducted a small experiment, the purpose of which was to compare the ranges of grammatical variability within two such groups,

Canada, took the same test under similar conditions. The particular structural feature, formation of tag questions, is very suitable for testing with this group, since Estonian does not know tag questions of the English kind; a statement might be turned into a question by the use of a phrase similar to the German nicht wahr or the French n'est ce pas, but even that would not be very common. The older bilinguals have Estonian as first language and English as second language both in order of acquisition and in order of fluency. The younger members of the group have learned Estonian from their parents and English from the surrounding community, and consider themselves to be more fluent in English than in Estonian. Almost all bilinguals use English in more situations than Estonian, although most of them continue to speak Estonian within their immediate family. The educational level of the bilingual group is at least comparable to that of the monolingual group, and all bilinguals have had some formal instruction in English grammar; they cannot, however, be expected to be as familiar with formalized "school grammar" as the monolingual group consisting of teachers of the English language.

I started out with the expectation that there would be considerable variation within the bilingual group, and that the younger bilinguals would be progressively more similar to the native speakers of English than the older bilinguals in their formation of tag questions. I hoped to find a way to express the degree of similarity in some concrete terms which might be used as a measure of 'degree of bilingualism' or, perhaps, 'degree of nativeness'. I should say from the outset that the results of the experiment turned out largely negative.

In order to establish some measure of the degree of similarity between the two groups, I arbitrarily defined the notion of 'deviant response' as a variant of a tag question not included among the set of variants offered by the members of the monolingual group in response to a specific sentence calling for confirmation. For example, if the statement was "The boy looks sleepy" and all 46 native speakers formed the tag question "doesn't he", then a bilingual's "does he not" was classified as a deviant response. (Later I shall present a more detailed analysis of deviant responses.)

A gross comparison of the two sets of 4186 tag questions yielded 701 deviant responses on the part of the bilinguals, amounting to 16.7% of the total. A separate analysis of 23 younger members of the group, below the median age of 27 years, showed 297 deviant responses; the 23 older members had 404 deviant responses. Thus the younger bilinguals contributed about 42% of the deviant responses, while the older half of the group was responsible for 58% of the deviations. This difference does not seem to be particularly striking.

A separate analysis of the deviant responses of each bilingual subject showed that the number of deviant responses ranged from one to 68 (out of 91). A large proportion of deviant responses was furnished by six individuals, whose scores were 68, 62, 54, 54, 41, and 35. The curve became fairly smooth after that. It is perhaps significant that the subgroup of six contained the two oldest members of the group; but these were balanced out by an 18 year-old and a 19 year-old at the other extreme of the age range. Together, the six subjects with the highest number of deviations accounted for almost

half of the difference between the monolinguals and the bilinguals. If these six individuals were discounted, there would remain less than ten deviant responses for each remaining bilingual.

It is of course questionable whether the notion 'deviant response' has any validity at all. It should be kept in mind that there was extensive variability within the monolingual group, even though it consisted of English teachers. This variability was reflected in the number of possible responses to a given statement, which ranged from one to eight. There is no evidence as to how a less uniform monolingual group would have performed under similar circumstances, and what the number of their deviant responses might be relative to the responses given by the reference group. It is likewise unknown whether the same two groups would have produced identical responses when re-tested on a different occasion. As I emphasized before, the counting of deviant responses constitutes only a very gross measure of the differences between the younger and the older half of the bilingual group on the one hand and between the monolingual and the bilingual groups, on the other. With these reservations in mind, I cannot consider the differences in any way conclusive, and the starting hypothesis does not appear to be confirmed.

Let us look now a little more closely at the deviant responses. In fact many of the apparent deviations have no linguistic significance. The monolingual group, being English teachers, had a clear notion of what a tag question is; the bilingual group seemed to have considerable difficulty in grasping what was required of them, and many of their responses suggest that the subjects must have thought they were

participating in a free association test. For example, all monolinguals responded to the sentence "I have five cents in my pocket" with either "Haven't I?" or "Don't I?"; but two of the bilinguals asked "How much do you have?". There were altogether 95 deviant responses of this type.

Another set of discountable deviant responses consisted of elsewhere acceptable variants that did not occur among the monolinguals' responses at a given time. On numerous occasions, the variants of tag questions given by monolinguals might include "don't they" and "do they not" in response to one sentence, but only "don't they" in response to an analogous sentence. The bilinguals may have used "do they not" as a variant in both instances; it would have been accepted in one case, and treated as a deviant response in the other. This applies in particular to lack of inversion with regard to negation or affirmation. The general rule of the formation of tag questions requires that the statement and the tag question oppose each other with respect to negation, but there were many exceptions to this rule within both the monolingual and the bilingual group. Again, an exception to the rule within the bilingual group was counted as a deviant response if there were no exceptions within the monolingual group with regard to a given sentence. It seems to me that all such cases should be considered together, and if exceptions to a general rule occur within the monolingual group, analogous exceptions within the bilingual group should be excluded from the list of deviant responses.

The majority of the bilinguals' deviant responses fell into the

two categories just described--"free association" deviations and elsewhere acceptable variants. If these two categories are excluded, as I believe they should, there is very little left to indicate a possible difference between the monolingual native speakers and the bilingual non-native speakers of English.

The residual difference consists of two types of deviant responses. There were, first of all, five responses that seem to translate the Estonian equivalent of nicht wahr or n'est ce pas. These included two occurrences of isn't it so?, two instances of right?, and one occurrence of no?. The ages of the subjects who provided these responses ranged from 19 to 35; the 35 year old individual provided both isn't it so? responses.

And there were 27 pronoun references in which he was used for she and vice versa. This is a deviation which could be attributed to an Estonian substratum, since there is no grammatical gender in Estonian, and there is only one form for the pronoun of the third person. Sixteen of these 27 instances occurred in the bilinguals' responses to the sentence "My uncle's spouse won't eat caviar". Evidently "My uncle's spouse" did not equal "My uncle's wife" for the individuals who referred to "My uncle's spouse" as "he", and the deviance may be a matter of lexical limitation rather than a matter of being unsure in the selection of the proper masculine or feminine pronoun.

If the mistakes with regard to "My uncle's spouse" are discounted, the concrete, quantizable differences between the monolingual and the bilingual group consist of five translated nicht wahr responses and

eleven wrongly chosen pronouns, which would contribute about .4% of the 4186 responses. To these might be added a greater grammatical variability: within the bilingual group, the number of possible responses varied between 2 and 13, whereas among the monolinguals, the number of variant responses ranged between 1 and 8. One should, however, at least consider the possibility that this greater variability might be due to the lesser degree of homogeneity within the bilingual group.

And then there are the six individuals who seem to have selected the statistically less frequent responses in a relatively great number of times. While each individual deviant response used by these six may be explained and accounted for, their very accumulation leaves a definite non-native impression. I cannot find any more precise way to define this lack of nativeness, much less express its degree in a quantizable way.

I would like to return now to the question of the grammaticality of the tag questions used by the monolingual and bilingual speakers. Langendoen's study of the responses used by the monolingual group revealed extensive variability within that group. My study of the responses used by the bilingual group has shown similar variability within the bilingual group, and a rather small difference between the two groups. Yet we speak confidently of the native speaker's unerring ability to determine what is grammatical in his language. If there is so much variation among the native speakers and so much similarity between native and non-native speakers, the appeal to the native speaker's intuitive knowledge of grammaticality seems to lose much of its force.

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Temporal Organization of Spoken Language*

Ilse Lehiste

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Temporal Organization of Spoken Language

Ilse Lehiste

This paper reports the results of a pilot study dealing with the temporal organization of spoken language. In particular, it deals with the temporal structure of monosyllabic and disyllabic words in English.

It is assumed in this study that the production and perception of spoken language takes place in terms of phonological units. These units may be of various sizes, ranging hierarchically from a single speech sound through syllables and phonological words to phonological phrases. Evidence for the existence of such units comes from various sources, for example from studies of coarticulation (Öhman, 1967; MacNeilage and DeClerk, 1969). Another source of evidence is the study of suprasegmental patterns (Lehiste, 1970). All suprasegmental patterns are patterns in time; any contrastive arrangement of fundamental frequency or intensity is crucially dependent on the time dimension. The arrangement of articulatory events along the time dimension may likewise have suprasegmental function, and may serve to establish higher-level phonological units.

One way in which a phonological unit may be specified is with reference to its temporal organization. Several recent studies (Kozhevnikov and Chistovich, 1965; Slis, 1968) have shown that when a

speaker repeats the same utterance many times, at the same rate of articulation, the durations of adjacent phonemes are quite strongly negatively correlated. Thus, if an error is made in the duration of one phoneme, the error is largely compensated for in the following phoneme, which finishes at the originally planned time, despite the fact that it started late. This negative correlation suggests that articulatory events are programmed, at some (here unspecified) higher level, not in terms of single phonemes, but in terms of higher-level articulatory units. One way to determine the extent of these higher-level units would be to establish the domain over which such temporal compensation takes place, since it seems reasonable to assume that the sequences of sounds which are subject to temporal compensation constitute a single articulatory program.

The question might now be asked whether such articulatory units (defined as the domain of a single articulatory program) are universal or language-specific. Different researchers, working with CVC-sequences in different languages, have found a closer correlation between either the initial CV sequence (Russian, Kozhevnikov and Chistovich, 1965), or between the VC sequence (Dutch, Slis, 1968). The observations regarding English which are reported in this paper support the view that in English, there is a closer connection between a vowel and a following consonant than between an initial consonant and a following vowel.

While this question is of intrinsic importance, it would be still more interesting to know whether two phonemically identical, but morphologically different linguistic items have identical time programs.

An example might be provided by the word pair weighed and wade, the first being the past tense of the verb to weigh, the second the infinitive of the verb wade. The past tense form contains two morphemes: the verbal stem weigh and the past tense marker -d. The word wade is monomorphemic. If the two words weighed and wade are produced with identical timing patterns, one may assume that the morphological process of assigning the past tense marker to weigh has taken place at a level which precedes the programming of motor commands for the realization of the phonemic sequence, which, according to traditional descriptions, is common for both weighed and wade. On the other hand, a difference in the temporal organization of the two sequences might indicate a difference in the level at which the utterance, about to be generated, is converted into a sequence of motor commands.

The specific aim of this pilot study was to test the temporal compensation hypothesis for English, and to establish the domain over which temporal compensation takes place.

I selected a set of ten words: steed, staid, stayed, stead, skid, skit, stay, steady, skiddy, and skitty. The words were chosen to provide an opportunity to study several different aspects of the problem, and also for the sake of relative ease of processing. I intended to analyze the tapes by means of a pitch meter and an intensity meter, and display the curves on a Mingograph. The initial clusters /st/ and /sk/ were selected because it is relatively easy to measure the duration of an initial /s/ from intensity curves with high-frequency pre-emphasis. The plosive following an initial /s/ is unaspirated in

English, which makes it possible to establish the duration of the plosive and the onset of the vowel with considerable precision. The set of words contains the pair staid ('stodgy') and stayed (past tense of the verb stay, which was likewise included), providing a chance to compare two words with identical phonological structure, but different morphological structure. The three disyllabic words steady, skiddy, and skitty are derived from the monosyllabic words stead, skid and skit through another morphological process--the suffixation of -y. I was interested in this particular word type, because in the Midwestern dialect of American English these words would normally be pronounced with a so-called 'voiced /t/'--a flapped allophone of the sounds that are realized initially as /t/ and /d/. The flapped /t/ occurs only intervocally; its occurrence signals that another vowel has to follow, and I interpret this to mean that the articulatory program must obligatorily encompass the whole CVC sequence.

Each of these ten words was recorded by two subjects, who repeated the word approximately 110 times at what was deemed a subjectively constant rate. The speakers were selected solely on the basis of their dialect: the Midwestern variety of General American, in which flapped allophones of /t/ and /d/ are the rule rather than exception. In other respects the two speakers differed a great deal. Speaker DS has a lowpitched (male) voice; he speaks slowly and steadily, with a clearly developed rhythm and fairly equal spacings between the productions of individual tokens of the test words. Subject JK, a high-pitched female speaker, speaks very fast and irregularly; she speeds up and slows down within a list of words, and is apparently unable to control

her rate of articulation very well, although it turned out that changes in tempo were mostly reflected in the spacings between the words rather than in the duration of the words themselves. Considering the great difference between the speakers with regard to the spacings between words, it was quite surprising that the results of the temporal compensation study turned out as similar for the two speakers as they did; however, I intend to control the rate of articulation much more rigorously in recording further subjects.

The recordings were processed through a pitch meter and intensity meter (designed by Børge Frøkjær-Jensen, Copenhagen) and displayed on a Mingograph (Elema-Schönander, Stockholm). The output of a Mingograph is a set of time-correlated curves and an oscillogram, from which quite reliable time determinations can be made for each segment. Some decisions had to be arbitrary--for example, in the word stay I considered the peak of the last non-laryngealized vocal fold flap to constitute the end of the utterance. With a paper speed of 10 centimeters per second, one millimeter corresponds to 10 milliseconds. The precision of measurement depended ultimately on the width of a pencil line drawn to indicate segment boundaries; the final results are given in milliseconds, but the measurements are probably accurate within two or three milliseconds rather than half a millisecond which the numbers might imply. Tokens which for some reason were not easily measurable were not included in the calculations.

After making the measurements, I calculated the following for each set of test words: the average duration of each segment; the variance for each segment; the relative variance; and the standard

deviation. Relative variance, a concept recently introduced by George Allen (Allen, 1969), is simply variance divided by average duration. By taking into account differences in the average duration of segments, relative variance provides a good measure of articulatory variability.

The goal of the study was to test whether there was any temporal compensation within sequences of segments. By assumption, a negative correlation between the durations of two successive segments was taken to imply that the two are programmed as a unit at some higher level at which articulatory sequences are programmed. There is a negative correlation between the durations of two segments, if the variance of the duration of the sequence of two segments is less than the sum of the variances of the segments considered separately.

On the other hand, a positive correlation reflects the influence of changing tempo: if the rate of articulation increases, all segments are shortened, although not necessarily at the same rate, and conversely, if the rate of articulation decreases, all segments are lengthened. It is possible to eliminate or reduce tempo effects by a normalization procedure which I did not employ in this pilot study, but intend to use during later stages of the project of which this article constitutes the first report.

I calculated the variances of all individual segments and of all successive pairs of sounds. In addition, I treated the initial cluster as a unit and calculated the variance of the sequence consisting of the initial cluster and the following vowel. I also calculated the variance for the whole word, and compared it with the sum of variances for the individual segments. To compensate for the differences

between average durations, I calculated the relative variances by dividing variances by average durations. Table I summarizes the results for the seven monosyllabic words for speaker DS.

Table I

Difference between the relative variances of successive segments taken individually and considered as a co-articulated sequence, calculated on the basis of monosyllabic words produced by DS.

Word	C_1C_2	C_2V	C_1C_2V	VC_3	$C_1C_2VC_3$
steed	-0.73	-0.38	-0.58	-0.66	-0.79
staid	+0.07	+0.26	+0.13	-0.48	-0.05
stayed	+0.48	+0.14	+0.26	-1.07	-0.79
stead	-0.40	-1.29	-0.36	-4.17	-2.80
skid	-0.06	-0.33	-0.32	-0.27	-1.14
skit	+0.01	-0.20	-0.20	-1.26	-0.53
stay	-0.55	-0.12	-0.08		

The entries in the table represent the difference between the relative variances of successive segments taken individually (for example, the first consonant and the second consonant) and considered as a coarticulated sequence (for example, the initial cluster). A consideration of some entries in the first row will illustrate the procedure. The first number, -0.73, is the difference between the relative variances of the two consonants /s/ and /t/ taken separately and /st/ considered as a coarticulated cluster. The sum of variances

for /s/ and /t/ was 1,136.58; the variance of the /st/ cluster was 954.10. The average duration, of course, was the same in both cases, and amounted to 251 milliseconds. The relative variance for the sum was 1,136.58 divided by 251, which is 4.53; the relative variance for the cluster was 954.10 divided by 251, which is 3.80. The difference between 4.53 and 3.80 is 0.73; the minus sign indicates that the relative variance for the cluster was smaller than the relative variance for the sum of segments, which means that temporal compensation was present and there was a negative correlation between the durations of /s/ and /t/. In the 106 measurable productions of this word, there was obviously a certain amount of temporal compensation between each successive pair of segments, as well as within the whole word, as shown by the negative entries in all columns.

Now the results obtained for this first word would not solve the question whether there is a closer correlation between an initial consonant and a following vowel, or between a vowel and a following consonant. Temporal compensation was present between all successive pairs of sounds; unless we had a way of evaluating the significance of degrees of correlation, it would be impossible to conclude which of the sequences constitutes a more closely coarticulated unit. I have in fact calculated Pearson correlations for many of the pairs, some of which will be presented below; but I am not sure they are very meaningful, and for the following reason. It so happens that there may be a statistically significant negative correlation between /s/ and /t/ in the word stead; but there is a positive correlation, likewise significant, between /s/ and /t/ in the word stayed, recorded

during the same session. Steed and stayed have exactly the same amount of temporal compensation within the whole word (-0.79 in the last column of Table I for both steed and stayed). It seems to me that one should compare not only the correlations within each word, but also the patterns produced within one recording session; in other words, not only the entries within a row, but also the analogous entries within each column. What seems significant to me is the fact that we find both positive and negative correlations in all columns except the two last ones. Within this recording session, there was always a negative correlation present between the vowel and the following consonant, and within the whole monosyllabic word.

Table II presents the same data for the second speaker.

Table II

Difference between the relative variances of successive segments taken individually and considered as a co-articulated sequence, calculated on the basis of monosyllabic words produced by JK.

Word	C_1C_2	C_2V	C_1C_2V	VC_3	$C_1C_2VC_3$
steed	+0.20	-0.08	+0.35	-0.19	+0.22
staid	-1.49	+0.29	-0.28	-0.36	-0.50
stayed	+0.09	+0.31	+0.49	-0.09	+0.36
stead	-0.13	+0.45	+0.35	-0.58	-0.25
skid	+0.17	-0.17	-0.09	-0.22	-0.01
skit	-0.19	-0.33	-0.13	-1.22	-0.94
stay	+0.23	+0.45	+0.47		

As was mentioned above, the second subject was a highly irregular speaker, who varied her speaking tempo to a much greater extent than the first. One might thus expect a greater amount of positive correlation, or perhaps a lesser degree of negative correlation, reflecting the influence of changing tempo. And indeed, the number of instances of positive correlation was doubled for this speaker. These were not simply additional cases; a comparison of the matrices for the two speakers shows that the pluses and minuses do not necessarily occur in the same slots. The one thing that is regular is the negative correlations in the next but last column, showing temporal compensation between a vowel and the following consonant. The tendency for negative correlation here was evidently strong enough to resist the influence of changes in tempo.

Table III presents similar data for the disyllabic words of speaker DS.

Table III

Difference between the relative variances of successive segments taken individually and considered as a co-articulated sequence, calculated on the basis of disyllabic words produced by DS.

Word	C_1C_2	C_2V_1	$C_1C_2V_1$	V_1C_3	C_3V_2	V_1V_2	$C_1C_2V_1C_3V_2$
steady	-0.55	+0.03	-0.31	-0.13	+0.18	-0.53	-0.70
skiddy	-0.04	-0.09	-0.22	-0.32	-0.61	-0.38	-0.92
skitty	+0.33	-0.03	+0.35	+0.01	-0.37	-0.73	-0.86

As may be seen from the table, the intervocalic flapped /t/ does not

seem to have any closer correlation with either the preceding or the following vowel; the values in the fourth and fifth column show both positive and negative correlation, and no obvious pattern emerges. The last column shows a considerable degree of interaction within the whole disyllabic word, as had been the case for this speaker also with monosyllabic words. The next but last column shows that there was also a temporal compensation (i.e. negative correlation) between the durations of the two vowels. If this can be substantiated by further research, it seems that in such disyllabic words, the duration of the second vowel is adjusted to the duration of the first, and the sequence of two vowels constitutes a unit of programming at some higher level. Unfortunately the second speaker's results are very confusing, and the conclusion is therefore even more tentative than the other conclusions drawn on the basis of this exploratory study.

Table IV presents Pearson correlations between the syllable nucleus and the final consonant in the monosyllabic test words produced by the two speakers.

Table IV

Pearson correlations* between the syllable nucleus and the final consonant in monosyllabic words produced by speakers DS and JK.

Word	Speaker DS	Speaker JK
steed	-0.35	-0.18
staid	-0.37	-0.33
stayed	-0.27	-0.25
stead	-0.76	-0.47
skid	-0.10	-0.57
skit	-0.38	-0.61

$$* r = \frac{\sum_{i=1}^n \frac{x_i y_i}{n} - M_x M_y}{s_x s_y}$$

As may be remembered, both speakers had negative correlations in all test words between this pair of sounds. These data are presented for the sake of possible comparison with the relative variances; I hesitate to draw any conclusions from the difference in degree of negative correlation on the basis of this material alone, without consideration of the relationships between other segments within the word. Other factors have to be included in the consideration; for example, speaker DS always had a much larger standard deviation for the duration of the final consonant than for the duration of the syllable nucleus, while speaker JK's standard deviations showed no

such pattern. Clearly for speaker DS final position influenced the variability of the duration of a segment in such a way as to make the two standard deviations non-comparable.

The results of the study thus indicate rather strongly that in English, there is a close interaction between the durations of vowels and following consonants in monosyllabic words, and between the durations of all the sounds within a monosyllabic or disyllabic utterance. This seems to provide some independent phonetic evidence for the existence of phonological words, which I would like to define as the domain over which such temporal compensation takes place. There is further evidence for the existence of such phonological units in the average durations of segments within a word during one recording session. A comparison of these average durations shows very interesting compensatory effects.

Table V shows the average duration of segments and words in the four monosyllabic words steed, staid, stayed, and stay, produced by speaker DS.

Table V

Average durations of segments (in milliseconds) in four monosyllabic words produced by speaker DS. N = number of tokens.

Word	N	C ₁	C ₂	V	C ₃	Total
steed	106	130	121	301	168	720
staid	110	119	96	330	167	712
stayed	111	125	96	330	151	702
stead	110	133	123	307	149	712

It is obvious that for this speaker, the word constituted a unit of timing. Compare, for example, the relative arrangement of the durations of the segments in steed and staid. There is a difference in the intrinsic durations of /i/ and /e[±]/; all other factors being kept constant, /e[±]/ is longer than /i/. However, the greater length of /e[±]/ was clearly compensated for in the shorter duration of the initial cluster; the difference in the durations of the words is very much smaller than the difference in the durations of the vocalic syllable nuclei. On the other hand, the absence of a final /d/ in stay was accompanied by lengthening of both members of the initial cluster.

Coming back to the question of whether there is any difference between bimorphemic and monomorphemic words of the same phonemic structure, I must say that very little, if anything, can be concluded from a comparison of the words stayed and staid. Speaker DS had a

difference of relative variances of -0.48 between the syllable nucleus and the final consonant in staid and -1.07 in stayed, the Pearson correlations being -0.37 and -0.27 respectively. The two ways of expressing negative correlation provide contradictory evidence in this case. For speaker JK, the difference in relative variances was -0.36 for staid and -0.09 for stayed; the Pearson correlations were -0.33 and -0.25. This might be interpreted to mean that there was a higher degree of cohesiveness between the syllable nucleus and the final consonant in the monomorphemic word. However, these results should be compared with the difference in relative variances in the whole $C_1C_2VC_3$ sequence. For speaker DS, the word stayed considered as a whole had a much greater degree of temporal compensation than staid. For speaker JK, the situation was exactly opposite: stayed showed positive correlation, while staid showed negative correlation. Unless some further evidence is provided by later stages of the study, it must be concluded that the morphemic structure of a word does not have any influence on its temporal organization in English.

Table VI compares stead with steady, skid with skiddy, and skit with skitty, again for speaker DS.

Table VI

Comparison of average durations (in milliseconds) of segments in three monomorphemic and three bimorphemic words, produced by speaker DS.

Word	C ₁	C ₂	V ₁	C ₃	V ₂	Total
stead	133	123	307	149		712
steady	94	98	133	20	173	518
skid	148	104	217	151		620
skiddy	128	97	90	28	166	509
skit	156	104	185	115		560
skitty	110	87	83	23	151	454

It is interesting to observe that in each case, the disyllabic word was shorter than the corresponding monosyllabic one, and that the shortening regularly involved the initial cluster. As was mentioned above, the two vowels of disyllabic words of this type are quite strongly negatively correlated. The observation might be added now that although skid and skiddy are longer than skit and skitty, the ratio between the durations of the two vowels in skiddy and skitty is practically identical: 0.54 for skiddy and 0.55 for skitty. The corresponding ratios for the other speaker were 0.89 and 0.84 respectively. Both speakers had a considerably different ratio between the two vowels in steady (although there was temporal compensation present between them); steady evidently constituted a different

disyllabic word type, although it too contained a flapped /t/.

Let us now return to the question regarding the relationship between morphological structure and phonological structure. Within morphology, steady, skiddy, and skitty are derived from the respective base forms by the addition of the derivative suffix -y, which produces adjectives from nouns. Within phonetically manifested phonology, we are not simply adding an [i] to the monosyllabic words stead, skid, and skit. For one thing, the bimorphemic words, which also contain a greater number of segments than the monomorphemic words, are consistently shorter, although one might expect them to be longer by something like the average duration of the final [i]. The bimorphemic words are realized as higher-level phonological units with some clearly definable phonetic properties of their own, such as the ratio between the vowels and temporal compensation between the two vowels rather than between the stem vowel and the following consonant. It is obvious that a simple distinctive features description, as might be given in a distinctive feature matrix constructed for the basic and the derived forms, would not reveal the essential differences in the temporal structure of the two word types.

This study of temporal compensation has thus produced evidence not only for the existence of temporal compensation between certain pairs of segments, but also within all the segments that constitute a word. I have tried earlier--in my studies of juncture--to define a phonological unit with reference to its boundaries; this is the first time I have found something to characterize a word as a whole, not by reference to its boundaries, but through the internal cohesiveness

of its component parts. And this appears to be a promising direction for future research.

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More on Nez Perce: On Alternative Analyses

Arnold M. Zwicky

More on Nez Perce: On Alternative Analyses

Arnold M. Zwicky

In an important series of articles,¹ a number of writers have considered the vowel systems of Nez Perce and several Sahaptin dialects, and the historical derivation of these systems from Proto-Sahaptian. The focus of interest has been the character and origin of vowel harmony in Nez Perce. To recapitulate the facts that have been clarified in the discussion: Nez Perce has a five-vowel system

i	u
	o
æ	a

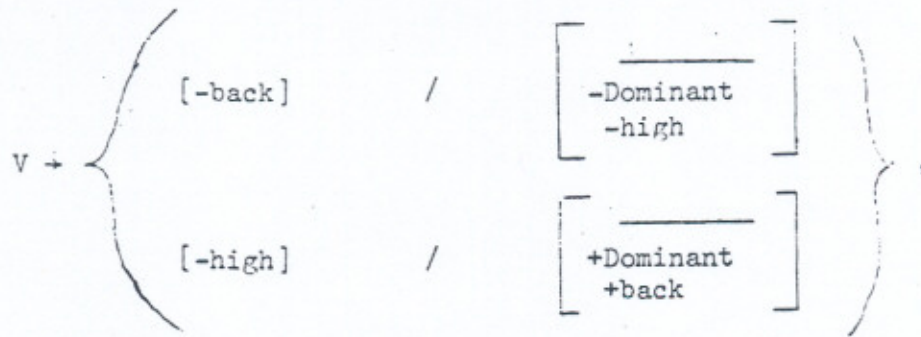
divided into two classes, a dominant class i o a and a recessive class i u æ, with the vowels paired as follows: i-i, o-u, a-æ. If a word contains a dominant morpheme (one with dominant vowels), all vowels in the word are dominant. Some morphemes with the vowel i are dominant, some recessive.

The first problem in analyzing these facts is whether the division between dominant and recessive morphemes should be accomplished by an (abstract) feature associated with morphemes as wholes, or by a (presumably phonological) feature associated with the individual vowels within the morphemes. Aoki's 1966 article, which opts for morpheme-sized features, summarizes his objections to a purely phonological

explanation: "A solution which involves segment-sized phonological features as the conditioning factor requires (1) postulation of a non-occurrent phonological entity or entities in order to distinguish Ai [dominant i] from i, (2) assignment of a phonological feature in the non-occurrent element as the triggering mechanism, and (3) inclusion of irrelevant elements, such as intervening consonants, in the rules. Furthermore, if Ai (or i) is to be represented by a non-occurrent phoneme X which is different from /i/, we need an additional rule to rewrite X as /i/" (p. 764f.). Jacobsen (p. 820) points out that the abstract analysis has the advantage of not requiring the investigator to make an arbitrary decision as to whether a dominant morpheme like ci¹ki¹l destroy has the underlying shape ci¹k¹Xl, cX¹ki¹l, or cX¹k¹Xl. In their contribution to this discussion, Chomsky and Halle stress the fact that "the sets of vowels in the two classes of words... are not natural classes in any reasonable phonetic framework,"² thus refining and expanding Aoki's second objection.

None of these objections is unassailable; note that non-occurrent phonological entities are fairly common in insightful analyses,³ that, as Rigsby and Silverstein (p. 48) observe, the problem of irrelevant elements must be solved in both the abstract and the purely phonological analyses, and that difficulties in determining the complete details of underlying representations are general in phonological analyses.⁴

The prime defect of the Aoki 1966 treatment is its totally unilluminating nature. The rule



which operates on the underlying vowel system a i u to shift a to æ in recessive words, u to o in dominant ones, has no phonetic plausibility at all. Moreover, if totally abstract features like Dominant can be employed in this fashion, we would predict that thousands of additional harmony systems with underlying a i u would be as likely as the Nez Perce system; these can be obtained by substituting different feature names (high, low, back, round, nasal, tense, etc.) and different feature values (+, -, α, -α) for the ones that appear in Aoki's rule, and it cannot be argued that any of these systems is inherently more implausible than the system postulated for Nez Perce.

Another criticism of the abstract analysis has been put forth by Jacobsen, who points out that this treatment is incoherent with respect to the historical developments: "There is a temptation to fall into the anachronism of continuing to use the 'plus Dominant' feature (or the dominant prosody A) as an environment for the sound changes leading to vowel harmony. But these features (or prosodies) are morphophonemic entities that show themselves only in the vowel harmony alternations; if vowel harmony is not present, they cannot exist either" (p. 821).

What is required is an underlying six-vowel system, with a harmony rule couched entirely in terms of phonological features. Consider first

the set of logical possibilities. On the assumption that the six underlying vowels are chosen from the 12 vowels which can be distinguished by the features high, low, back, and round (three heights, times two backness specifications, times two specifications for rounding) there are 305,280 possible underlying systems. Each such set of six vowels can be divided into two subsets with three vowels apiece in 120 different ways. Next, for each such division there are six distinct ways in which the vowels of one set can be paired with the vowels of the other, times two possible assignments of dominance to these sets. Finally, for each such assignment, there are six ways in which the underlying vowels can be made to correspond to the five actual vowels of Nez Perce. There are consequently between two and three billion logically possible analyses of vowel harmony in Nez Perce. Many of these are sufficiently preposterous to be excluded on a priori grounds; I do not believe that anyone would favor the suggestion that the underlying vowels of Nez Perce are \ddot{u} e \ddot{o} + a o, arranged into dominant-recessive pairs as \ddot{u} -a, e- \ddot{o} , o- \ddot{o} and realized phonetically as i (< o and \ddot{o}), æ (< +), u (< a), o (< \ddot{u}), and a (< o). On the other hand, many of the logically possible analyses are fairly plausible. At least four sorts of considerations bear upon the plausibility of an analysis: (a) the character of the underlying vowel system; (b) the naturalness of the classes of dominant and recessive vowels; (c) the extent to which the shift of the recessive vowels to their dominant counterparts can be rationalized, especially as some type of assimilation; and (d) the plausibility of the rule or rules required to realize the underlying system as the Nez Perce five-

vowel system (including the merger of one pair of underlying vowels into the single vowel i). The preposterous example above fails on every count: the underlying system is odd, neither the class of dominant vowels (enclosed in figure 1)

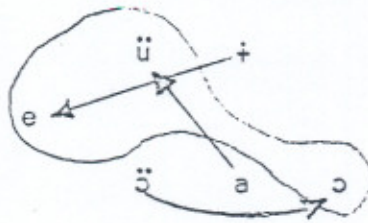


Figure 1. A Preposterous Harmony System.

nor the harmony rule (indicated by the arrows in figure 1) is natural, and the process of realization (indicated by the arrows in figure 2)

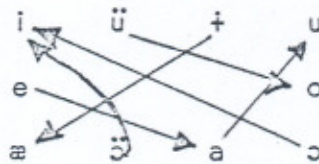


Figure 2. A Preposterous Realization Process.

is chaotic.

One has no assurance in general that the four sorts of plausibility considerations will tend in the same direction. Indeed, in many cases there is a conflict between an emphasis on natural underlying systems (for example, the 'canonical' six-vowel system i e æ a o u), in the manner of Chomsky and Halle,⁵ and attempts to restrict the arbitrariness of analyses, in the manner of Postal, who proposes that underlying representations be identical to phonetic representations,

except insofar as universal principles of phonology are operative and except insofar as required by the existence of otherwise justifiable language-particular rules.⁶ Thus, in a recent analysis of Mandarin Chinese,⁷ it is proposed, on the basis of the phonetic qualities of the vowels (slightly modified to rationalize the function of the vowels with respect to phonological rules), that the language has the underlying vowel system

i ü + u
 ə
 a

This analysis conforms closely to Postal's naturalness condition, but posits a six-vowel system wildly different from the canonical one. On the other hand, in the principal dialect of the New Guinean language Rotokas, as reported recently by Firchow and Firchow,⁸ there are six consonants, with phonetic norms

p t k
b ʔ g

Although in the closely related Aita dialect the phonetic norms of the voiced consonants are the nasals m n ŋ, the Firchows report that the nasal allophones are rarely heard in Rotokas Proper; on the basis of Postal's naturalness condition, it would be very difficult to argue that the Rotokas Proper voiced consonants were underlying nasals, despite the intuitively satisfying nature of this proposal.

In the case of Nez Perce, the two underlying six-vowel systems that have been proposed in the literature both employ what is in essence the naturalness principle. Rigsby and Silverstein, and also

Jacobsen, assume that Nez Perce has five underlying vowels identical to its five output vowels (i æ a o u), plus a sixth vowel that merges with i. Rigsby and Silverstein propose as well to achieve the canonical six-vowel system⁹ (illustrated in figure 3),

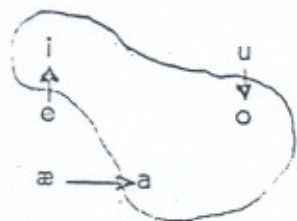


Figure 3. Nez Perce Harmony à la Rigsby-Silverstein

while Jacobsen seeks a phonetically natural¹⁰ dominant-recessive distinction and manages, in addition, to rationalize the harmony rule as an assimilation¹¹ (see figure 4).

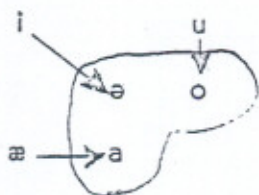


Figure 4. Nez Perce Harmony à la Jacobsen

The Rigsby-Silverstein analysis can be revised to rationalize the harmony rule in a similar fashion, if e, rather than i, is taken to be the dominant vowel (figure 5).

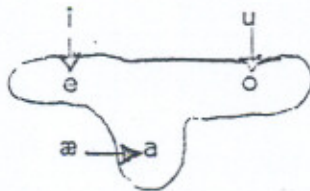


Figure 5. Rigsby-Silverstein Revised.

The realization rules needed are simple in both cases: for Rigsby-Silverstein, $e \rightarrow i$; for Jacobsen, $\text{æ} \rightarrow i$. Another possibility would be to take \ddot{i} (or \ddot{u}) as the sixth (dominant) vowel (figure 6).

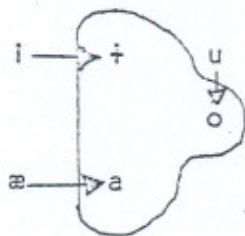


Figure 6.. A Variant of Rigsby-Silverstein.

in which case the harmony is a kind of o-umlaut.

Still other analyses involve mild violations of the naturalness principle, with a concomitant gain in the rationality of the harmony process. For example, in the system illustrated in figure 7,

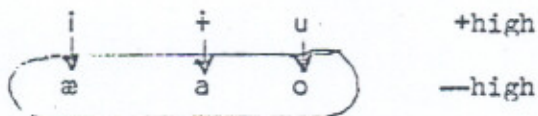


Figure 7. Harmony as Assimilation to Lowness.

two underlying vowels are displaced from their output values, with underlying i realized as æ , and underlying æ realized as i ; but the harmony rule is then a straightforward assimilation to the feature [-high]. One might even exercise ingenuity while holding fast to the canonical six-vowel system, say by adopting the definitely non-patent analysis summarized in figure 8,

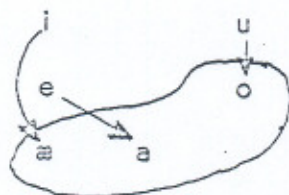


Figure 8. Another Double-Displacement Analysis.

together with the realization rules $e \rightarrow \text{æ}$ and $\text{æ} \rightarrow i$. Although these analyses appear to be vastly different, when expressed in standard notations of generative phonology they differ by relatively few features (five at the most--fewer markings than occur in almost any single rule in *The Sound Pattern of English*). If the four types of plausibility considerations are weighed intuitively, probably the analyses of figures 4 through 7 are to be preferred to the others. But additional evidence of some sort is necessary if any further decision is to be reached.

Rigsby and Silverstein have, in fact, adduced some relevant evidence, namely the palatalization of k and k^2 in Sahaptin. They find that the occurrence of palatals in Sahaptin can be explained if it is assumed that these dialects have essentially the same system of vowels and vowel harmony as Nez Perce. The Sahaptin vowels

which condition palatalization correspond to the (regressive) Nez Perce vowels e and æ in the analysis of figure 3. The distinction between dominant i and recessive e, postulated entirely on a priori grounds above, is thus confirmed by the differential behavior of these vowels in Sahaptin.

Far from supporting the analysis of figure 3, however, the Sahaptin palatalizations suggest that Jacobsen's treatment (figure 4) is essentially correct. The difficulty is that the Rigsby-Silverstein analysis has k palatalizing to č in position before e and æ, but not before i--despite the fact that i is the characteristic palatalizing influence. One expects that if any vowel conditions palatalization, that vowel is i; that if e conditions palatalization, so does i; and that if æ conditions palatalization, so do e and i. Inasmuch as palatalization is a kind of assimilation of consonants to an i articulation, these universal claims have enough intuitive plausibility for me not to defend them here.¹² It is sufficient to note that both the original Rigsby-Silverstein analysis and the revision of figure 5 (with palatalization after i and æ, but not e) are counterintuitive. This difficulty is avoided in Jacobsen's analysis, where the (recessive) front vowels i and æ correspond to the palatalizing vowels of Sahaptin; the related dominant vowels (o and a, respectively) are back vowels, hence would not be expected to condition palatalization. Jacobsen's underlying vowel system is (perhaps) less natural than the Rigsby-Silverstein system, and Jacobsen's e → i rule is slightly more complex, in terms of feature markings, than Rigsby and Silverstein's e → i rule; but Jacobsen's treatment permits the rationalization of both processes involved, harmony and palatalization, hence is clearly preferable.

Footnotes

¹Aoki, Haruo. 1962. Nez Perce and Northern Sahaptin: A Binary Comparison, IJAL 28.172-82; Rigsby, Bruce J. 1965. Continuity and Change in Sahaptian Vowel Systems, IJAL 31.306-11; Aoki. 1966. Nez Perce Vowel Harmony and Proto-Sahaptian Vowels, Language 42.759-67; Jacobsen, William H. 1968. On the Prehistory of Nez Perce Vowel Harmony, Language 44.819-29; Rigsby, Bruce J. and Michael Silverstein. 1969. Nez Perce Vowels and Proto-Sahaptian Vowel Harmony, Language 45.45-59.

²Chomsky, Noam and Morris Halle. 1968. The Sound Pattern of English. New York, Harper & Row, p. 377.

³There is a particularly nice discussion of the necessity for such entities in Charles W. Kisseberth. 1969. On the Abstractness of Phonology: the Evidence from Yawelmani, Papers in Linguistics 1. 248-82.

⁴Many examples can be found in Chomsky and Halle's The Sound Pattern of English, and the general issue has been clearly and briefly treated by Sanford Schane. 1968. On the Non-Uniqueness of Phonological Representations, Language 44.709-16.

⁵The Sound Pattern of English, pp. 408-11.

⁶Postal, Paul M. 1968. Aspects of Phonological Theory, New York, Harper & Row, chapter 4.

⁷Cheng, Chin-chuan. 1968. Mandarin phonology, unpublished Ph. D. dissertation, University of Illinois, chapter 2.

⁸Firchow, Irwin and Jacqueline Firchow. 1969. An Abbreviated Phoneme Inventory, AL 11.271-6 (1969).

⁹They say, "We are appealing here to a condition of naturalness of an underlying six-vowel system... in accordance with conventions of markedness as proposed in Trubetzkoy's Grundzüge, or other Prague-inspired works" (p. 49); among the Prague-inspired works referred to is The Sound Pattern of English.

¹⁰That is, ə was chosen as the sixth vowel, instead of + (or ə), "merely in order to give more phonetic homogeneity to the class of dominant vowels" (p. 822).

¹¹In which, as R. P. V. Kiparsky observes in an unpublished paper, the vowels move toward the low back position--an a- (or ɔ- or o-) umlaut analogous to the i-umlaut of Germanic.

¹²They do, however, require defense, by means of a survey of palatalization processes throughout the languages of the world. Such a survey would have to take up many important problems avoided here--for example, the relationship between palatalization as a shift in position of articulation (the sense of the discussion in the text) and palatalization as the assumption of a secondary articulation, and the relationship between palatalization of velars (as in Sahaptin) and palatalization of dentals.

Greek Variables and the Sanskrit ruki Class

Arnold M. Zwicky

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1. According to a well-known rule of Sanskrit internal sandhi, s is replaced by its retroflex counterpart, ṣ, when immediately preceded by r, u, k, or l (or one of their alternants, such as o or e or the syllabic liquid ṛ).¹ Thus, compare the following two sets of nominal forms containing the locative plural ending -su:

- (1) jāsu (jā- 'progeny')
marutsu (marut- 'wind')
apsu (ap- 'water')
- (2) svasṛṣu (svasṛ- 'sister')
śatruṣu (śatru- 'enemy')
vākṣu (vāc- 'voice')
agniṣu (agni- 'fire')

and compare the following two sets of verbal roots:

- (3) vas- 'clothe'
bhās- 'shine'
tsar- 'creep up on'
psā- 'devour'
bharts- 'revile'
- (4) dhrṣ- 'dare'
bhūṣ- 'adorn'
akṣ- 'attain'

dviṣ- 'hate'

kṣudh- 'crush'

Within the framework of generative phonology prior to Chomsky and Halle (1968) the class of segments conditioning the retroflexion is the class of $\begin{bmatrix} \alpha\text{consonantal} \\ \alpha\text{compact} \end{bmatrix}$ segments--that is, those which are $\begin{bmatrix} +\text{consonantal} \\ +\text{compact} \end{bmatrix}$ (the liquids r and l, of which only r occurs before s, plus all the palatal and velar consonants, all of which are realized as k before s) together with those which are $\begin{bmatrix} -\text{consonantal} \\ -\text{compact} \end{bmatrix}$ (the glides y and w, which appear before s as alternants of i and u, respectively, plus all vowels except a and ā).

This formulation, given slightly differently in Zwicky (1964), but as above in Zwicky (1965), was one of the earliest instances of the extension of the use of variables over feature values from their original domain of justification, rules of assimilation and dissimilation, to the specification of classes of segments mentioned in rules. In fact, such use of variables has been quite limited, the only common instances in the literature being the classes $\begin{bmatrix} \alpha\text{consonantal} \\ \alpha\text{vocalic} \end{bmatrix}$ (liquids and glides as opposed to true consonants and vowels) and $\begin{bmatrix} \alpha\text{back} \\ \alpha\text{round} \end{bmatrix}$ (rounded back vowels and unrounded front vowels), and their complements $\begin{bmatrix} \alpha\text{consonantal} \\ -\alpha\text{vocalic} \end{bmatrix}$ and $\begin{bmatrix} \alpha\text{back} \\ -\alpha\text{round} \end{bmatrix}$. An extensive, although not exhaustive, survey of published generative phonological descriptions (containing many hundreds of rules) revealed only six additional cases of variables employed to specify classes: two instances in which variables class some consonants together with one liquid, three in which variables distinguish a subclass of vowels, and one

in which they delimit a group of consonants.²

The first example is a Turkish gravity harmony rule, discussed by Lees (1967), which creates the "palatal-velar" alternations k-q, g-y, and l-λ. As Lees formulates this rule, it assimilates the

gravity of a

+consonantal
+compact
avocalic
αcontinuant

 segment to the gravity of a preceding

segment of the same type. The intent of the specification is to group together the back stops k q with the liquid l while excluding the liquid r from the alternation (note that Lees treats l as continuant in contrast to r).

The second example is a German ablaut rule, formulated by Ross (1967: 59f., 70, 90f.), which says that an irregular verb stem with vowel a or ā has the vowel ī in the past tense if the segment following

the vowel is

+consonantal
-grave
-compact
αcontinuant
αstrident

 ; if any other segment follows the

vowel, the past tense vowel is ū. The notation is designed to contrast the dental obstruents t, d, n, s, and z, together with l, to the remaining obstruents plus r (note that Ross treats l as a noncontinuant).

The class in question could equally well be specified as

+consonantal
-grave
-compact
{-continuant}
{+strident}

 , using a disjunction instead of variables. More-

over, the ablaut rule is a minor one affecting only 18 verbs, two of which (laden and schlafen) constitute exceptions in Ross' treatment.

The first vowel case is a Nez Perce vowel harmony rule according to which all the vowels in a word are chosen from the ("dominant") set i a o if any morpheme in the word has vowels from this set; otherwise, the vowels are chosen from the ("recessive") set i ə u. In the formulation of Aoki (1966: 765) the rule affects the recessive vowels ə u, which are specified as $\begin{bmatrix} +diffuse \\ -grave \end{bmatrix}$ --high back u and nonhigh front ə. The second vowel example appears in Harms' reformulation of Sapir's Southern Paiute rules. The rule in question is one in which ɛ occurring between i ə and i o is realized as ɛ̄. The environment

class i o is specified as $\begin{bmatrix} -consonantal \\ +vocalic \\ -grave \\ +compact \end{bmatrix}$ so that its members can

be distinguished from the $\begin{bmatrix} +grave \\ -compact \end{bmatrix}$ vowels ɪ and u and the $\begin{bmatrix} -grave \\ +compact \end{bmatrix}$ vowel ə. The final vowel example concerns the class of $\begin{bmatrix} +round \\ -low \end{bmatrix}$ vowels in Finnish, which figure in a vowel harmony rule formulated by Rardin (1969: 230). The vowels under discussion are "harmonic" a o u ä ö ü, as opposed to "neutral" i and e, and can be specified as easily with the disjunction $\begin{bmatrix} \{+round\} \\ \{+low\} \end{bmatrix}$ as with variables.

The remaining case is a rule deleting certain instances of intervocalic g and d (but not b) in Spanish (Harris 1969:140, 145).

According to Harris, the rule affects segments marked

$\begin{bmatrix} +obstruent \\ -tense \\ +coronal \\ +anterior \end{bmatrix}$

. But inasmuch as the rule is merely intended to

exclude b, the disjunction $\begin{bmatrix} \{+coronal\} \\ \{-anterior\} \end{bmatrix}$ would serve as well as

the version with variables. As in the German and Finnish cases already mentioned, if only three of the four possible combinations of values for two independent features happen to occur, then the use of variables is dispensable in favor of a disjunction. Thus, the class of underlying vowels that can occur before final η in English--specified as

$\left[\left\{ \begin{array}{l} +\text{diffuse} \\ +\text{compact} \end{array} \right\} \right]$ by Chomsky and Halle (1965: 124)--could have been formulated, with variables, as $\left[\begin{array}{l} \text{+diffuse} \\ -\text{compact} \end{array} \right]$, thanks to the absence of vowels having the specifications $\left[\begin{array}{l} +\text{diffuse} \\ +\text{compact} \end{array} \right]$.

Quite aside from the question of whether or not any one of the descriptions cited is correct, it is remarkable that they, and the more typical occurrences of variables in specifications, utilize only a few sorts of feature combinations. Briefly, it appears that variables used to specify classes must relate features of the same type--either two cavity features (back and round, grave and compact, round and low, diffuse and grave, coronal and anterior, or diffuse and compact) or two manner features (vocalic and consonantal, vocalic and continuant, or continuant and strident). The Sanskrit ruki class, however, is specified by variables relating a cavity feature, compact, and a manner feature, consonantal. In general, such uses of variables yield classes that are highly unnatural, for example, the

$\left[\begin{array}{l} \text{aconsonantal} \\ \text{around} \end{array} \right]$ segments, i.e. the class consisting of labialized consonants and unrounded vowels.

2. Is, then, the Sanskrit ruki class a natural one? In fact, is the Sanskrit g-retroflexion a single process, or is it two (or more) processes unified only by virtue of their effects?

The general problem of determining the unity of phonological

processes has been approached by a few recent investigators. As Kiparsky (1968) has noted, the fact that two rules can be ordered adjacent to each other and share some formal features cannot be taken as evidence that they should be combined by existing abbreviatory conventions and treated as subrules of a single rule: this cannot be so because virtually any two phonological rules, however unrelated their nature or effect, have sufficient formal similarity to be consolidated by the notational conventions of Chomsky and Halle (1968). Kiparsky suggests that some evidence as to the unity of rules can be obtained from diachronic changes in them.

Chomsky and Halle approach the problem of rule unity tangentially in a discussion of subrules and exceptions (1968: 175f.). They consider the possibility of requiring that any item which is an exception to one subrule of a rule be an exception to every relevant subrule of that rule, but conclude, with reservations, that the exceptionality of a lexical item must be marked with respect to each subrule. The facts are by no means clear, but it does seem that normally one can expect a lexical item to be exceptional with respect to all applicable subrules of a rule, or to none, so that the exceptionality of an item to several processes can be taken (ceteris paribus) as supporting evidence for the unity of these processes in a single rule.

Analogously, one expects (again ceteris paribus) that exceptions to a rule will be distributed essentially evenly among (mutually exclusive) subrules of that rule, so that if one putative subrule is nearly or entirely exceptionless while other subrules have the usual assortment of exceptions (or vice versa), the unity of the former with

the latter is suspect. Exactly this situation obtains in the case of the Sanskrit s-retroflexion rule, which has no exceptions when the conditioning segment is k, but has numerous exceptions when the conditioning segment is r, u, or i.

Some of the exceptions fall under various subregularities in the retroflexion rule--for instance, retroflexion does not occur when the s is followed by an r (thus, us-ra- 'daybreak', from vas- 'burn', instead of the expected *uṣra-). Other exceptions are entirely idiosyncratic;³ for example:

(5) br̥sT- 'seat of an ascetic'

busa- 'vapor'

kusuma- 'flower'

bisa- 'lotus root'

The fact that there are no exceptions, partially regular or idiosyncratic, to the retroflexion after k, although there are many after r, u, and i, lends some support to the hypothesis that the two processes are different rules, not subrules of the same rule (even though no facts are known which would prevent them from being ordered adjacent to each other).⁴

A final remark: in the revised feature system of Chomsky and Halle (1968), the ruki class can be specified, without the use of variables, as $\left[\begin{array}{l} -\text{anterior} \\ -\text{low} \end{array} \right]$. If, however, the ruki class is not a natural one, then the ability to specify it so simply (with two features, the same number required to specify the class of all vowels) must count as a defect, not an advantage, of this system of notation.⁵

Footnotes

¹See the standard discussions in Whitney (1960: 61-64) and Renou (1961: 12-16).

²Two additional cases were uncovered by this survey--one (Wang 1968:703f.) which is eliminated by the writer's own reanalysis, and another (Smith 1969: 441) which appears to be an error.

³Macdonell (1916: 45) observes that "words in which s otherwise follows r or any vowel but ā must be of foreign origin."

⁴I am aware of the fact that rules very similar to the Sanskrit s-retroflexion rule applied historically in Slavic and Iranian. But as I am not familiar with the details of these processes I shall do no more than mention them in connection with the Sanskrit phenomena.

⁵I am indebted to David M. Perlmutter and David L. Stampe for their comments about the content and organization of this note.

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Review of J. W. F. Mulder, *Sets and Relations in Phonology: An
Axiomatic Approach to the Description of Speech*, Oxford, Clarendon
Press/Oxford University Press, 1968, xv + 259 pp.*

Arnold M. Zwicky

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Review of J. W. F. Mulder, Sets and Relations in Phonology: An Axiomatic Approach to the Description of Speech, Oxford, Clarendon Press/Oxford University Press, 1968, xv + 259 pp.

Arnold.M. Zwicky

This book, a revised version of the author's Oxford doctoral thesis of 1966, sets forth a theory of phonology along the lines of Martinet's functionalism, with application to the description of Pekingese.¹ Mulder proposes as well to fulfill the promise of the work's subtitle, via an axiomatization of the principles of opposition and double articulation, and (in accordance with the main title) to ground certain central concepts of phonology in the mathematical theory of sets. Still another concern appears in a sketchy introductory essay on the philosophy of science as Mulder sees it. These diverse interests--philosophy of science, exposition of theory, axiomatization of theory, set-theoretic formalization, and description of Pekingese--are poorly integrated. The axiomatization and formalization, in particular, are only marginally relevant to the other sections;² moreover, the appearance of rigor in these two sections is largely illusory, and the notation of set theory is more decorative than functional.

In brief, this work says very little that is new, and it does not illuminate the material treated. Despite a concern for empirical

validation expressed in the introduction, Mulder makes no serious attempt to evaluate the consequences of his assumptions or the adequacy of his descriptions. It turns out that "the English plural morpheme has only two regular phonological forms, i.e. /S/ [the archiphoneme /s/ \cup /z/, i.e. the set of features common to both /s/ and /z/] and /z/ on the one hand and /iz/ on the other. The prediction of /z/ and /iz/ belongs to the domain of morphophonology; the prediction of /S/ belongs to phonology proper" (196), but Mulder never asks whether this result is of more than terminological interest. And again (203-4): the English verb link is transcribed /liNK/, where /N/ = /m/ \cup /n/ \cup /ŋ/ and /K/ = /k/ \cup /g/, while linked and links are transcribed as /liŋt/ and /liŋs/, respectively, with no discussion of the merits of this description. Occasionally there are hints of a more interesting approach, as when Mulder observes that "in some languages, for example in Japanese, one does not want to call whole syllables 'phonemes,' and in some other languages, for example Pekingese, one does not want to have merely two phonemes for most of the syllables" (26)--the important issue being, of course, why one might want one or the other.

Although in general the book is technically correct, if unexciting, Mulder warrants special censure for the obscurity of his axiomatizations, which have all the faults of Bloomfield's celebrated postulates (vast numbers of undefined terms, weak statements of axioms, failure of theorems to follow from the axioms, tautologies masquerading as theorems). From informal statements of the two basic axioms--"language is a system of oppositions" and "language has a

double articulation" (7)--which are terse but capable of explication, he moves through three difficult preliminary definitions ('functional' for "separately relevant to the purport of the whole of which it is a part," 'system' for "set of functional entities," and 'semiotic system' for "any system of conventions for communication") to the following opaque, and perhaps tautologous, reformulations of the axioms: "All elements in semiotic sets are functional" and "Semiotic systems may [or may not?] contain complex elements which can be articulated into elements which have both form and meaning or elements which have only form" (10). One looks forward to a presentation of Mulder's analysis of Pekingese (or English or Dutch, for that matter) in which issues of adequacy are recognized and from which these regrettable axioms and all ornamental mathematics have been excised.

Footnotes

¹The work of reviewing was supported in part by the 1969 Advanced Research Seminar in Mathematical Linguistics, sponsored by the National Science Foundation through a grant to the Center for Advanced Study in the Behavioral Sciences, Stanford, Calif., and held at the University of Illinois.

²Indeed, an early version of the set-theoretic chapter was published separately as Some operations with sets in language, Foundations of Language 1.14-29 (1965).

A Double Regularity in the Acquisition of English Verb Morphology*

Arnold M. Zwicky

*Sponsored in part by the National Science Foundation through Grant GN-534.1 from the Office of Science Information Service to the Computer and Information Science Research Center, The Ohio State University.

A Double Regularity in the Acquisition of English Verb Morphology

Arnold M. Zwicky

Some of the most valuable information to be gained from children's acquisition of language concerns the nature of their expectations of language, the regularities in the form taken by their 'analogical extensions' of the speech they hear. The present note treats an aspect of the development of verb forms in the speech of one child, my daughter, Elizabeth, between the ages of four and five. As Leopold remarks of his older daughter, 'the more important morphological forms were learned, with many mistakes along the way. Such mistakes are more interesting than the correct forms, because they show the grasping of a pattern more clearly' (Leopold 1953-4:13). This note concerns Elizabeth's stages in grasping the rather complex patterns of regularities and subregularities in part of the English verbal system, the relations among the present (I often take a cookie), the past (I often took a cookie), and the participle (I've often taken a cookie, A cookie was taken), within the class of verbs having participles in -n. My intent is to demonstrate the conjunctive, rather than disjunctive, character of two principles of participle formation:

- (1) The participle is identical to the past.
- (2) The participle is formed by the suffixation of -n.¹

Certain aspects of the acquisition of verb morphology are sufficiently well known not to require extensive comment here. There

is an early stage in which the present, the past, and the participle normally are all realized by a single form, with a few exceptional forms learned in context. There follows the apprehension of principle (1) together with (in several stages) the content of principle (3):

- (3) The past is formed by the suffixation of [t - d - ed], distributed according to the (phonological) nature of the verb.²

The child thus may go from saying I gave to saying I gived, to his parents' annoyance. Next, while continuing to follow principle (1) he learns that (3) is restricted:

- (4) Some verbs are special, in that they have past forms which are not phonologically predictable, but must be individually learned.

At this stage the child will retrieve I gave, and produce I have gave as well. This was characteristic of Elizabeth's speech on her fourth birthday, at which time she had acquired some of the most conspicuous irregular pasts (e.g. gave, went, came, knew, took, saw, ate, got) and acted in accord with principle (1) in all except a few cases, the participles gone, seen, and given, in which (1) is restricted:

- (5) Some verbs are special, in that they have participles which are not identical to the corresponding past forms, but must be individually learned.

The succeeding developments I cannot speak about with any assurance in general, but only in Elizabeth's case.³ Shortly after her fourth birthday her speech suggested that her understanding of irregular verb forms involved more than the item-by-item learning of (4) and (5).

Instead, she began to class verbs together with respect to the applicability of principles like (2)--a subregularity not expressed in (5)--and like (6)--a subregularity not expressed in (4).

(6) Presents in [I] correspond to pasts in [æ].

The evidence for this more sophisticated treatment of a class of exceptions comes from the rapid acquisition of sets of items conforming to the class principle, from the extension of the principle to verbs other than those to which it properly applies, and from the resistance of such 'false analogies' to adult correction (subtle or straightforward). From such evidence, it is fairly clear that Elizabeth had perceived the subregularity of (6), as in sat, sang, rang, and drank, and possibly also that of (7),

(7) The vowel of the past is [uɪ].

as in blew, knew, grew, flew, drew, and threw, but not the principle operative in the formation of such pasts as built and bent. However, the clearest and most striking example of the progression from pure exceptions to subregularities is her treatment of the -n participles.

As already remarked, Elizabeth's first -n participles were gone, seen, and given. By age 4:2 she produced -n participles for most of the 28 irregular verbs for which she can reasonably be supposed to have had models.⁴ Principle (2) was extended least easily to some of the verbs ending in t (notably beat, get and forget) and to the seven verbs to which both (2) and (7) apply in adult speech; but even here, by age 4:4 Elizabeth acted in accord with principle (2) with only one exception, invariable beat. New verbs were added to the -n class quite rapidly, including some verbs not in the -n class in adult speech (baken,

dranken, and singen).

Principle (2) does not specify the form of the stem to which the -n is to be added. In adult speech this is sometimes identical to the present (e.g. blown, fallen, seen, eaten), sometimes identical to the past (e.g. bitten, spoken, torn), sometimes different from both (e.g. flown, written, driven). Insofar as it was possible to observe Elizabeth's development reliably, she seemed to imitate the adult models at first, but by the time (4:4) that she had determined the membership of the -n class she was beginning to produce 'doubly regular' forms, participles in which the suffix -n was attached to the past despite the adult models: aten, gaven, roden, sawn, shooken, tooken, and wroten. At age 4:6 she invariably produced these instead of eaten, given, ridden, seen, shaken, taken, and written. And six subsequent months of frequent corrections by her parents had no noticeable effect. At age 5 she is beginning to replace the doubly regular forms, only occasionally in unstudied speech but with some frequency when she is asked to complete sentences like 'After someone writes you, you can say that he has _____' and 'If someone eats an apple, then that apple was _____'.

The extent of the double regularity is considerable. Of the 28 verbs in question, ten do in fact have participles identical to the past with an -n suffix. Next, the learning of principle (7) seems to have interfered with the learning of principle (2) in all the relevant cases, so that no forms with participles having the vocalic nucleus [uw] exhibited the double regularity. The participle gone was probably not treated as an instance of principle (2), but rather learned

as a unit, and beat was never properly assigned to the -n class. Of the remaining verbs, eight exhibit the double regularity, only two do not (fallen and the not very frequent risen). That is to say, there are eight instances, six explicable counterinstances (the [uw] class), two exclusions (gone and beat), ten neutral cases (those in which the past and participle stems are identical in adult speech), and only two anomalies (no fellen or rosen).

There are at least two observations to be made about these developments in Elizabeth's speech. First, she treated suffixation of -n (principle (2)) as a 'grammatical process' of the same type as formation of the irregular pasts. She can be said to have learned (on good, but misleading, evidence) that in English there are two logically coordinate operations: (a) form irregular past; (b) in certain cases add the suffix -n to form the participle.

Second, Elizabeth cannot be said to have generalized in any straightforward way on the basis of the -n participles she had heard. Presumably, she heard about as many participles identical to the present with suffixed -n as she did participles identical to the past with suffixed -n; indeed, the two early -n participles seen and given (presumably the bases for the formulation of principle (2)) are constructed on the present, not the past. It seems an inescapable conclusion that the crucial factor was the prior existence of principle (1) relating the past and the participle.

Footnotes

¹With regular alternants [ŋ] after a consonant or l, [n] otherwise.

²Berko 1958 observed that children typically acquire the [əd] alternant later than the two others, so that there is a period during which the past of jump is jumped, but the past of verbs like pat and wade remains identical to the present.

³Ervin and Miller's observations on seven children turned up relatively little 'extension of irregular patterns' (Ervin 1966:178).

⁴I have excluded eight participles (borne, proven, shorn, sworn, woken, woven, forbidden, and forsaken) for which the models were infrequent (in the case of woken and woven because waked and weaved were the adult standards) or were probably treated as isolated forms (forbidden). Also excluded were verbal forms in -n that are used only attributively (shrunken) and certain archaic or literary participles in -n that I felt sure were unfamiliar to Elizabeth (e.g. shriven, slain, smitten, striven, trodden).

References

- Berko, Jean. 1968. The child's learning of English morphology. *Word* 14.150-77.
- Ervin, Susan M. 1966. Imitation and structural change in children's language. *New directions in the study of language*, ed. by Eric H. Lenneberg, 163-89. Cambridge, Mass., M.I.T. Press.
- Leopold, Werner. 1953-4. Patterning in children's language learning. *Language Learning* 5.1-14.

An Annotated Bibliography on the Acquisition of
English Verbal Morphology*

Mary Louise Edwards

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An Annotated Bibliography on the Acquisition of
English Verbal Morphology
Mary Louise Edwards

Adams, Sidney. 1938. Analysis of Verb Forms in the Speech of Young Children, and their Relation to the Language Learning Process, Journal of Experimental Education 7.141-144.

From records of 12 four-year-olds, the first 50 verbs in each child's record were tabulated and compared with a short sample of adult spoken language. A table shows all the tenses and their frequency of occurrence in the speech of the children and adults. The future tense, present progressive, simple present, present indicating customary action, and preterite or simple past are found fairly frequently. Some tenses, for example, past perfect, are never found in the children's speech.

Adams discusses the importance of the child's language usage in the light of how the child learns to use the words and forms of his language and concludes that the child's apparent preoccupation with the present follows from the fact that the stimuli that bring out speech responses to present situations are associated in more stable groups than those that bring out responses to remote ones.

Bateman, W. G. 1916. The Language Status of Three Children at the Same Ages, Pedagogical Seminary 23.211-240.

Bateman analyzes the vocabularies of three 28-month old children by parts of speech and compares them.

In the vocabulary lists the inflected forms of verbs are not given. However, Bateman does mention verbal morphology briefly (p. 228). Two of the children at this age formed present participles from verbs and used many past tense forms. The other child did not. The first two children had considerable difficulty with irregular forms, so that seed, felled, falled, runned, etc., were common in their speech. All three children lacked many auxiliary verbs.

Berko, Jean. 1958. The Child's Learning of English Morphology, *Word* 14.150-177; reprinted in: S. Saporta (ed.) 1961, *Psycholinguistics: A Book of Readings*, New York, Holt, Rinehart and Winston, 359-375.

The major contribution to the study of the acquisition of English morphology. A list of common vocabulary items of first-graders was examined to determine which features of English morphology are most significant. The verbal forms among these were the third person singular present, the progressive, and the past.

A test was then devised to explore the child's ability to apply morphological rules to nonsense words. The subjects were preschoolers and first-graders.

An example of Berko's procedure: The children were shown a picture of a man dangling an object on a string. "This is a man who knows how to bod /bad/. He is bodding. He did the same thing yesterday. What did he do yesterday? Yesterday he _____."

Some results are: Boys and girls performed equally well; first graders did significantly better than preschoolers on slightly less than half the items; on verb forms, children performed best on the progressive. The subjects used the /-t/ and /-d/ allomorphs of the past correctly, but not the /-əd/ allomorph, nor did they have control of the irregular past form rang. Berko found that her subjects were most successful in providing endings for the forms that are most regular and have the fewest variants.

Brown, Roger, and Ursula Bellugi. 1964. Three Processes in the Child's Acquisition of Syntax, *Harvard Educational Review* 34.131-151; reprinted in E. Lenneberg (ed.). 1964. *New Directions in the Study of Language*. Cambridge, Mass., M.I.T. Press, 131-161.

The authors' observations of two children concentrated especially on the acquisition of noun phrases. They found that imitations with reduction were extremely common; for example, the inflection on the verb was often omitted. Imitations preserve the word order of the model sentence, indicating that the model is processed as a whole rather than as a list of words. When models increased in length, there was no corresponding increase in the imitation. The authors feel that this follows from a limitation on the length of utterance children are able to program or plan.

The retained words are usually nouns, verbs, and adjectives, and the omitted words are "functors"--inflections, auxiliaries, articles.

The authors also discuss imitations with expansion, and, finally, in an attempt to induce latent structure, some utterances not likely to be imitations. The mistakes probably externalize the child's search for the regularities of English syntax. The authors say that forms like digged reveal latent structure.

Brown, Roger, and Colin Fraser. 1963. The Acquisition of Syntax, in C. N. Cofer and B. Musgrave (eds.), Verbal Behavior and Learning, 158-197, New York, McGraw-Hill; also in U. Bellugi and R. Brown (eds.), 1964. The Acquisition of Language, Monographs of the Society for Research in Child Development, 29 (1), Chicago, Ill., The University of Chicago Press, 43-79.

The authors describe a study of the acquisition of a generative grammar in children. They believe that the child implicitly induces a grammar from the regularities in the sentences he hears.

The first section of the paper reviews some studies with invented linguistic materials which show that children do have rules of word and sentence construction. The next section treats techniques by which an investigator might discover a child's generative grammar from a collection of his utterances and by which the child could have induced that grammar from parental utterances. The final section discusses some substantive results from the records of 13 children between two and three years of age. Morphology is mentioned (pp. 45-47) primarily by way of review of Berko's study; the authors feel that inflection is a rather trivial grammatical system for English, and therefore they focus on syntax.

Carlton, Lilyn E. 1947. Anomalous Preterite and Past Participle Forms in the Oral Language of Average Fourth Grade Children, American Speech 22.40-45.

This study sought to determine the percentage of anomalous preterite and past participle forms used by a group of children in an informal situation. Ninety-six fourth-grade children of normal intelligence and of varying backgrounds were shown four picture sequences and were asked to tell stories about the pictures.

The anomalous forms were classified under the headings used by Fries in American English Grammar, plus three others. For example, under the heading, "Dental suffix added to present tense of strong verbs to form preterite" appears, "She threwed it in the trash basket." And under "Other anomalous forms" is found, "The little girl is saved and taken to her mother."

The anomalous forms constituted a very small percentage (less than 4%) of the entire output of preterite and past participle forms, and the 83 anomalous forms were used by only 40 (less than half) of the subjects.

Carroll, John B. 1960. Language Development in Children, in C. Harris (ed.), Encyclopedia of Educational Research, third edition, New York, The Macmillan Co.; also in S. Saporta (ed.), 1961. Psycholinguistics: A Book of Readings, New York, Holt, Rinehart and Winston, 331-345.

A general discussion of language development. Concerning morphology, Carroll states that there is abundant evidence to support the notion that the child learns inflected forms first by imitating the forms spoken by more mature speakers. Some forms (song, are, am) are learned as separate items. But not all forms can be learned this way, and, sometime during the third year, the child may be heard experimenting with false analogical forms like bringed. The fact that analogical formations occur attests to the ability of the child to respond to patterning in language at an early age. The period from three to eight is marked by considerable difficulty in learning irregular forms, although errors decrease during this period.

Chamberlain, Alexander F. 1906. Preterite Forms, Etc., in the Language of English-Speaking Children, Modern Language Notes 21.42-44.

Chamberlain deals with odd preterite and past tense forms (those different from adult models) in his daughter's speech. Some examples are cited in context. Fifty-five verbs are listed, many with more than one odd form. The

forms are divided into eight groups. For example, group 2 contains weak verbs with double suffix (loseded), group 5 verbs formed according to "strong" analogies (tooken, blewn, sawn, wroten..).

There is little discussion, but Chamberlain does remark that Wright's English Dialect Grammar cites nearly every form listed here as used by some adults in some dialects.

Diebold, A. Richard, Jr. 1965. A Survey of Psycholinguistic Research, 1954-64, in C. E. Osgood and T. A. Sebeok (eds.), Psycholinguistics: A Survey of Theory and Research Problems, Bloomington, Indiana, Indiana University Press, 205-291.

Diebold reviews briefly some recent work in language acquisition, bilingualism, and language change (pp. 242-255). With respect to the child's acquisition of grammar, he says that most earlier studies agreed that children tend to generalize on the basis of the most productive morphophonemic, inflectional, and derivational rules, with the result that they sometimes "over-generalize."

Ervin, Susan M. 1964. Imitation and Structural Change in Children's Language, in E. H. Lenneberg (ed.), New Directions in the Study of Language, Cambridge, Mass., M.I.T. Press, 163-190.

Ervin sought to find out whether imitated utterances are grammatically different from free utterances and, if different, whether they are more advanced grammatically. Grammatical rules were written for free sentences, and then imitations were tested for their consistency with these rules.

She found that imitations selected the most recent and most emphasized words and preserved word order. Even under optimal conditions (immediate recall) they were not grammatically progressive, so that this study provides no evidence that progress toward adult forms of grammar arises merely from practice in imitating adult sentences.

Ervin also reports on a study with Wick Miller on English plural inflection and concludes that these forms cannot develop solely by imitation of familiar forms plus extension by generalization to new items. In a concurrent study of past tense inflections, she found that children use some forms (e.g. toasteded) indicating that the pattern

of adding a vowel is particularly difficult. Having observed few verbs with regular inflection, she hypothesizes that tense inflection begins with irregular forms. She found that some non-imitative extensions of the regular past tense suffix (doed, comed) occurred before the child had produced any other regular past tense forms (the extension of irregular patterns was quite rare, although she did find tooken); the early appearance of forms like doed suggests that few instances and little practice are required to motivate analogic extension.

Ervin, Susan M. and Wick R. Miller. 1963. Language Development, in Child Psychology, Sixty-Second Yearbook, Part I., National Society for the Study of Education, Chicago, University of Chicago Press, 108-143.

The authors discuss language development in general, mentioning Jakobson, Velten, Leopold, the 'system of contrasts', and 'rules of substitution'.

In the case of morphology, the work of Berko, Miller, and Ervin is cited. The authors assert that mastery of familiar forms precedes their generalization, when the patterns are extended to irregular forms (go-goed). In discussing grammatical development after four years of age, the authors say that after the learning of fundamental structural features and some details, there is a long period of 'consolidation', a period of overlearning, during which some irregular patterns are learned and others, already learned, become firmly established. An irregular form may exist beside a false analogical form. When the child corrects himself, he indicates that he knows the adult norm but has not yet firmly established a habit.

Ervin-Tripp, Susan M. 1966. Language Development, in L. W. Hoffman and M. L. Hoffman (eds.), Review of Child Development Research, Vol. 2, New York, Russell Sage Foundation, 55-105.

A thorough discussion of language development. The author gives the history of the study of language development, while viewing language change from the point of view

of the child's system and its relation to the system of the parents.

Concerning morphology, Ervin-Tripp says that in languages like English (with few markers) it is usual for children to develop syntactical regularities before any morphological rules appear. She outlines stages in the evolution of markers: (1) random variation of different forms, (2) use of contrasts of the different forms meaningfully in a few familiar contexts, and (3) months later, generalization to other forms, indicating a productive pattern. It appears that diversity of the contexts in which the contrast appears aids in its acquisition; in addition, hearing forms may be more important than actually using them.

The generalization of -ed is illustrated by forms like doed and comed; did and come may be used at this same period, but not necessarily to indicate past tense.

Ervin-Tripp notes that idiosyncratic rules regularizing verb inflections decrease significantly between nursery school and first grade.

Fodor, Jerry A. 1966. How to Learn to Talk: Some Simple Ways, in The Genesis of Language, Frank Smith and George A. Miller (eds.), Cambridge, Mass., M.I.T. Press, 105-122.

The acquisition of verbal morphology is mentioned in passing; the forms referred to are have, has, is and are.

Fraser, Colin, Ursula Bellugi, and Roger Brown. 1963. Control of Grammar in Imitation, Comprehension, and Production, Journal of Verbal Learning and Verbal Behavior 2.121-135.

The claim that understanding precedes production was tested for ten grammatical contrasts (among them, singular vs. plural, and present progressive vs. past) with 12 three-year-old children. Understanding was taken to be the correct identification of pictures named by contrasting sentences. Production was operationalized in two ways: (a) as correct imitation, without evidence of understanding; and (b) as correct production in sentences applied appropriately to pictures. In three-year-olds, production in the second sense proves to be less advanced than understanding.

However, imitation was more advanced than understanding.

Lenneberg, E. H. 1964. The Capacity for Language Acquisition, in J. A. Fodor and J. Katz (eds.), The Structure of Language: Readings in the Philosophy of Language, Englewood Cliffs, N.J., Prentice-Hall, 579-603.

Behavior patterns and biological predispositions are discussed, towards the end of developing criteria to distinguish behavior patterns based on specific predispositions from those based on general ones; Lenneberg finds that language falls between these two poles, though considerably closer to the side of special predispositions.

In support of the claim that speech activity is virtually never a mechanical play-back device, Lenneberg adduces evidence on the morphological level, where children automatically extend inflectional suffixes both to nonsense words and to words that have irregular forms (such as go, goed). He cites Berko's study.

Leopold, Werner F. 1953-4. Patterning in Children's Language Learning, Language Learning 5.1-14, reprinted in S. Saporta (ed.), 1961, Psycholinguistics: A Book of Readings, New York, Holt, Rinehart and Winston, 350-358.

Using an approach derived from Jakobson, Leopold discusses briefly all aspects of language learning. He focuses on the sequence of the acquisition of sound categories, which he feels is everywhere the same. Vocabulary and the gradual refinement of the semantic system are also discussed. In the field of grammar, he declares, syntax precedes morphology. Morphological devices are a luxury of fully developed languages; the small child gets along quite well without them for a long time. Although his daughter was syntactically well equipped by the end of the second year, practically no morphological devices were learned before the third year. Imperfections of communication were, however, an incentive to learn standard morphological features. During the third year, the more important morphological forms were learned, with many mistakes, which show the grasping of patterns.

The neglect of endings is, he says, in line with the principle that the child learns in every area of language a coarse pattern, later refined by the development of subcontrasts and formal distinctions.

Leopold, Werner F. 1949. Speech Development of a Bilingual Child: A Linguist's Report, Vol. III, Grammar and General Problems in the First Two Years, Evanston, Ill.: Northwestern University Press, 86-100.

Verbal morphology played a very small part in Hildegard's language at this time, but it is discussed in sections 573-589. Real verbs came late in her development (not beginning until 1.8). The imperative was a frequent form, and don't was used often, but was seldom followed by a verb form.

The present tense was the most commonly used, but the verb form was invariable, not differing from the imperative and the infinitive. No ending was attached, and no morphological pattern was recognized.

Two words (ironing and snowing) occurred in the form of the present participle at 1.8, but only the vowel of the ending was reproduced, and the progressive form did not gain a foothold, and only at 2.1 did I going and Carolyn ironing appear.

The verbs to be and to have were always omitted, and no formal expression of modal auxiliaries was found. The auxiliary do did exist from 1.11, but it was a mechanically imitated formula, and does did not occur.

A few past participle forms (broken, 1.9, gone 1.10) appeared but were used as adjectives, not as verbs. Hildegard did not learn to make a formal distinction between present and the simple past or future, and no trace of passive constructions appeared.

Lyman, R. L. 1929. Summary of Investigations Relating to Grammar, Language, and Composition, Supplementary Educational Monographs 36, University of Chicago, Chicago, Illinois.

This book is a summary of faults in and ways to improve instruction in language arts. There are discussions of investigations on curriculum, correct usage, and methods of teaching. The outlook is dated.

Verbal morphology is not mentioned as such. Rather, grammatical errors, some relating to verbs, are treated.

In errors reported by teachers, from 49-62% were in verb forms: failure to agree with subject, confusion of past and present tenses, confusion of past tense and past participle, wrong tense form, and wrong verb. For example, saw and seen are confused, as are do, did, and done, and come and came, give and gave. Lyman finds that even eighth-grade pupils confuse past tense and perfect participle forms.

McNeill, David. 1966. Developmental Psycholinguistics, in F. Smith and G. A. Miller (eds.), *The Genesis of Language: A Psycholinguistic Approach*, Cambridge, Mass.: M.I.T. Press, 15-84.

McNeill mentions verbal morphology briefly, summarizing Ervin, 1964, and supplying a few examples of regularized past tense forms (comed, sitted).

Menyuk, Paula. 1963. A Preliminary Evaluation of Grammatical Capacity in Children, *Journal of Verbal Learning and Verbal Behavior* 2.429-439.

In the context of a wider study, substitution, redundancy, and omission were examined. Menyuk found that, for example, the past tense of the verb push may be first push (omission), then pushted (redundancy), and finally pushed (complete).

Menyuk, Paula. 1964. Alternation of Rules in Children's Grammar, *Journal of Verbal Learning and Verbal Behavior* 3.480-488.

Menyuk analyzes the use of alternate restricted rules (which produce structures that are not completely well-formed) in children's grammars. Language samples were obtained from 159 children ranging in age from 2.10 to 7.1. For each sample a three-part generative grammar (phrase structure, transformations, and morphology) was devised.

At the morphology level, omission, redundancies, and substitutions of rules took place [see following abstract for explanations]; affected were verbs, nouns, adverbs, pronouns, and possessive forms.

Menyuk found that, in general, the use of alternate rules gradually declines as children mature. At the

morphology level, omissions peak earliest, then substitutions, and finally redundancies.

Menyuk, Paula. 1969. Sentences Children Use. Research Monograph No. 52, M.I.T. Press, Cambridge, Mass.

Although this book is primarily concerned with syntax, Menyuk mentions the developmental trends in inflectional rules for person, number, tense, and possessive. All the children in the study could employ the grammatical markers for these categories in various restricted contexts. But on occasion they would not use the markers or would use them in conflict with selectional restrictions or would use them twice.

Nonexpansion of a grammatical marker (omission) takes place in examples like, I walk yesterday; conflict with selectional features (substitution), which usually takes place in the context of strong forms, is illustrated by comed, breaked, catched; further application of a marker after it has already been applied (redundancy) takes place with both strong and weak forms, although much more frequently with strong forms (liketed, splashted, comed).

Menyuk maintains that omission is most common, redundancy second, and substitution least common (except in the nursery school group).

Miller, Wick R., and Susan M. Ervin. 1964. The Development of Grammar in Child Language, in U. Bellugi and R. Brown (eds.), The Acquisition of Language, Monographs of the Society for Research in Child Development, 29.1.9-34, Chicago, Ill., The University of Chicago Press.

The authors describe a research project comprising three tests: a plural test, a pronoun test, and two forms of discourse agreement test.

Verb morphology is mentioned briefly (p. 24), where it is observed that, although most children had past tense markers for many verbs, at least one boy had trouble marking have in the past tense. Overgeneralization of morphemic combinations (including -ed in the past tense) is mentioned on page 26.

Osgood, Charles E., and Thomas A. Sebeok (eds.). 1965. *Psycholinguistics: A Survey of Theory and Research Problems*, Indiana University Press, Bloomington, Indiana.

In the section entitled "First Language Learning" (pp. 126-138), verbal morphology receives a rather theoretical treatment. According to the authors, a sharp awareness of error when wrong signals are received indicates that the decoder is reacting to grammatical information. For example, the absence of an -s ending on a verb (the boy live) delivers an error signal to the sophisticated listener. Some process, set in motion by the noun form and persisting through reception of the verb form and predictive of the nature of the verb form, must be postulated to account for this sensitivity to error. When the 'past oriented' human communicator encodes any verb, a dispositional set operates to add some one of the allomorphs of -d.

They describe how interference results when two messages have the same semantically determined content and the same dispositionally determined set (e.g. psst tense), but where a divergent set of suffixes must be encoded. For example, with the irregular forms of a language having a constant dispositional set (e.g. past tense) and semantic determinants similar to regular forms (like walk: walked), the youngster typically encodes breaked and catched as the past of break and catch. Osgood and Sebeok predict that errors in encoding irregular verbs are inversely related to frequency of occurrence.

Slobin, Dan I. 1968. *Early Grammatical Development in Several Languages with Special Attention to Soviet Research*, to appear in *The Structure and Psychology of Language*, W. Weksel and T. G. Bever (eds.), New York, Holt, Rinehart and Winston, in preparation.

Slobin concentrates on Russian children's development of grammar, but he makes references to the learning of English and other languages.

He maintains that syntax develops earlier than morphology, and inflections generally emerge a few months after the beginning of two-word sentences. Once the principles of inflection are acquired, they are immediately applied in a wide range of contexts.

But constant application of a rule is more difficult than its mastery. Mastery of the basic grammatical categories and rules seems to take place universally by about age 5 or 6.

Three broad classes of interacting variables seem to account for the rate and order of acquisition of grammatical devices: (1) their frequency of occurrence in the speech environment, (2) their formal complexity and diversity (although this is often confounded with frequency of usage), and (3) the semantic content expressed.

Those classes whose reference is clearly concrete emerge first (i.e., noun plural), and classes based on relational semantic criteria (tenses and persons of the verb) emerge later.

Overregularizations and overgeneralizations, universally noted as a feature of child's speech, form one of the major bodies of evidence that child speech is productive and systematic. Slobin says that the first past tenses used by children are the correct forms of irregular verbs (came, broke, etc.), which are frequent in adult speech and are learned as separate vocabulary items at an early age. Then, as soon as the child learns a few regular past tense forms, he incorrectly generalizes these to the irregular (strong) forms producing comed, breaked, and goed. The crucial point, according to Slobin, is that irregular verbs do not follow a pattern, and evidently it is patterns that children are sensitive to.

Slobin, Dan I. 1968. Recall of Full and Truncated Passive Sentences in Connected Discourse, *Journal of Verbal Learning and Verbal Behavior* 7.876-881.

Subjects of various ages retold stories presented in full passive sentences and truncated passives. There was a general tendency to retell stories in the active voice, but this was more evident in the case of full passives. Slobin believes that the semantic content influences the selection of a particular grammatical form in encoding a sentence.

It was found that irregular verb forms pose difficulties for young children attempting to produce passive sentences. For example, a preschooler may say, "Judy and Dave were taken... token... to the zoo." (p. 880).

Smith, Frank, and George A. Miller (eds.). 1966. The Genesis of Language, Cambridge, Mass., M.I.T. Press, under General Discussion: McNeill and Slobin Presentations, 98-100.

The past tense of weak and strong verbs is discussed. McNeill hopes that studies of the development of noun and verb inflections might reveal something about the way a child chooses among rival hypotheses. Premack proposes a reclassification phenomenon as the appropriate explanatory device. McNeill finds the explanation to arise from little practice on weak verbs and a lot of practice on strong verbs.

Smith, Madorah E. 1935. A Study of Some Factors Influencing the Development of the Sentence in Preschool Children, Journal of Genetic Psychology 46.182-212.

Smith studied the development of the sentence by analysis of 305 records of the conversation of 220 children ranging from 18 to 72 months in age. The children were observed at play and in conversation with adults. Number of words per sentence, types of sentences found, and parts of speech found are among the items tabulated.

Smith found that more inflected forms were used when children were speaking to adults. For verbs, the proportion of conjugated forms for all verb forms increased from 17.7 at two years to 47.4 at five years. The participles were the earliest inflected forms to appear. The proportion of past participles to all verbs actually decreased with age, while the proportion of present participles increased up to three years and remained constant thereafter. The early use of the past participle is attributed to its presence in learned phrases.

The past tense was found to be acquired next after the participles. The difficulty with the past tense lies primarily with the irregular verbs, for which children supply regular endings by generalization.

Smith, Madorah E. 1933. Grammatical Errors in the Speech of Preschool Children, Child Development 4.183-190.

Smith proposed to determine, by examining the extent and types of grammatical errors found in the speech of preschool children, (a) the average age at which children are able to form sentences that are approximately correct, and (b) the most troublesome grammatical points.

After incomplete sentences, verb errors were next in frequency. Failure to use the proper auxiliary was the most frequent verb error. Many errors were found in conjugated forms; half of these involved the past tense, and many of these were in irregular verbs. Smith attributes these verb errors to generalization. For example, the children say catched and runned instead of the correct but irregular forms. Sometimes a participle was used in place of the correct form: e.g. done for did, or seen for saw.

Smith remarks that "this tendency [to generalize in the use of inflected words] is so marked that a high percentage of their errors of inflection are due to the extending of rules for the formation of regular forms to other words irregularly inflected" (p. 190).

Templin, Mildred C. 1966. The Study of Articulation and Language Development During the Early School Years, in The Genesis of Language, Fred Smith and George A. Miller (eds.), Cambridge, Mass., M.I.T. Press, 173-180.

Reviews the major facts from Berko's study.

Velten, H. V. 1943. The Growth of Phonemic and Lexical Patterns in Infant Language, Language 19.281-292.

Velten is concerned with problems of phonemics in his daughter's language from the 11th to the 36th month.

He does mention that the period from the 27th to the 30th months is a period of rapid morphological and syntactical development. Auxiliaries, preterite forms, etc., appear. By the end of the 33rd month his daughter had mastered the syntax and, on the whole, the morphology (except for some analogical weak preterites) of English.