Features and Categories in Language Production

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“Piglet,” said Pooh a little shyly, after they had walked for some time without saying anything.
“Yes, Pooh?”
“Do you remember when I said that a Respectful Pooh Song might be written about You Know What?”
“Did you, Pooh?” said Piglet, getting a little pink round the nose. “Oh, yes, I believe you did.”
“It’s been written, Piglet.”
The pink went slowly up Piglet’s nose to his ears, and settled there.
“Has it, Pooh?” he asked huskily. “About - about - That Time When? - Do you mean really written?”
“Yes, Piglet.”

The tips of Piglet's ears glowed suddenly, and he tried to say something; but even after he had husked once or twice, nothing came out. So Pooh went on:
"There are seven verses in it."
"Seven?" said Piglet as carelessly as he could. "You don't often get *seven* verses in a Hum, do you, Pooh?"
"Never," said Pooh. "I don't suppose it's *ever* been heard of before."

(A.A. Milne, Winnie-the-Pooh)

* * *

Acknowledgements

You might say this is my 'Hum'. It is, of course, not nearly as ingenious as the Respectful Pooh Song, that Pooh composed to pay tribute to Piglet's bravery. Moreover, Pooh - talented by nature - completed his masterpiece all on his own. This, however, is something I do not claim for myself. Quite the opposite is true: many people have contributed in one way or the other to the completion of this thesis as well as to my time at Frankfurt University and to my well-being in and out of linguistics. I would like to take a few words to thank them - albeit quite insufficiently - for their various contributions.

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Abbreviations

The following abbreviations find use in this dissertation:

1, 2, 3	first, second, third (i.e. grammatical person)
Ø	empty affix or empty position in a tree
A/Adj, AP	adjective, adjective phrase
ABS	absolutive case
ACC	accusative case
Agr, AgrP	agreement, agreement phrase
AgrS	subject agreement
AOR	aorist tense
ART	article (suffixed)
Asp	aspect
B, BP	Boolean operator, Boolean phrase
C, CP	complementizer, complementizer phrase
CL	clitic (Romanian), participle, participle feature
	class agreement (Tsez)
Conj	conjunction
COND	conditional mood
CONJ	conjoiner morpheme
CONT	contessive case
D, DP	determiner, determiner phrase
IMP	imperative
IND	indicative
INF	infinitive
l-node, LP	lexical node, lexical phrase
LF	logical form (grammat. level)
LOC	locative case
m, masc	masculine (grammat. gender)
MS	Morphological Structure (grammatical level)
n, neut	neuter (grammatical gender)
N, NP	noun, noun phrase
NEG, [±neg]	negation (particle or affix), negation feature
NegP	negation phrase
NOM	nominative case
P, PP	preposition, prep. phrase
PART, [±part]	
PAST, [±past]	past tense, past tense feature
PF	Phonological Form (grammatical level)
PL, [±pl]	plural, plural feature
POSS, [±poss]	possessive suffix, possessive feature

DAT	dative case
[±def]	definiteness feature
Deg, DegP	degree element, degree phrase
[±deg]	specification of licensing environment
DIM	diminutive
DL	dual
DM	Distributed Morphology
ERG	ergative case
f, fem	feminine (grammatical gender)
f-node	functional node (licenser)
FOC	focus element
FUT	future tense
GEN	genitivecase
PRES	present tense
REFL	reflexive pronoun
SG	singular
Spec	specifier position
SVA	subject-verb agreement
SWREF	switch reference
t_X	trace (of X)
Tns, TnsP	tense, tense phrase
v, vP	light verb ('small v'), light verb phrase
[±v]	specification of licensing environment
V, VP	verb, verbal phrase
X	stands for all kinds of things

Outline of the Thesis

Triumph! es ist geschehn!
Triumph! was nun gesollt![*]

(Quirinus Kuhlmann, 60. Kühlpsalm)

Oh Lord, thou knowest when I sit down
and when I rise up.

(Psalm 139,2)

In this thesis, I investigate a broad variety of spontaneous speech error data, i.e. slips of the tongue. Interestingly, in some slips, we observe a feature conflict, while in others, a feature conflict is resolved by means of a post-error process of accommodation. Consider, for instance, the following representative speech errors:

a. [**ein Ende** der Unruhen] **sind** nicht abzusehen
an end of.the disturbances are not in.sight
← ein Ende der Unruhen ist nicht abzusehen
← *an end of.the disturbances is not in.sight*

b. immer **der** gleiche **Chaos**, äh, Kasus
always the.m same chaos(n.), er, case(m.)

c. wie man **eine** Nadel in **den** Faden kriegt
how one a.f needle(f.) in the.m thread(m.) gets
← einen Faden in die Nadel
← *a.m thread(m.) in the.f needle(f.)*

d. es **droh**-te zu **schein**-en ← es schien zu drohen
it threat-PAST to seem-INF ← it seem-PAST to threat-INF

e. schreib-t man das mit Binde-**schrift** ← mit Bindestrich
write-3.SG one that with connect-writing ← with connect.line
"Do you write that with a hyphen?"

[*] "Triumph! it is done! Triumph! what now was due!"

In example (a), the verb does not agree with the subject DP (in brackets) which is singular but rather with a local plural DP (*der Unruhen* "of the disturbances") which is a genitive complement from within the complex subject DP. In (b), a form-based substitution, the noun *Kasus* "case" is replaced by the noun *Chaos* "chaos"; the article, however, does not accommodate to the gender feature of the intruding noun. In contrast to that, in (c), the definite as well as the indefinite article accommodate to the gender features of the exchanged nouns. In (d), two verb stems are exchanged but the tense information is left behind, that is, it is stranded. Interestingly, in the first position, it is not a suffix that is stranded, since the past tense of *scheinen* "to seem" is realized by ablaut and not by the regular past tense suffix *-te*. Finally, in example (e), the verb stem *schreib* "write" is perseverated but is spelled out as the noun *Schrift* "writing" at its landing site.

The aim of the present thesis is threefold. On the basis of a wealth of speech errors such as the ones presented above, I first argue that the processing of morphosyntactic features (such as gender, number, person, and case) plays a crucial role in language production while the processing of categorial information (such as noun, verb, and adjective) does not. Secondly, I show how the error patterns can be accounted for in a straightforward way within a particular morphosyntactic theory, viz. the Distributed Morphology framework (Halle & Marantz 1993). This theory does not only explain the available evidence, it also makes correct predictions about possible and impossible errors. Furthermore, I intend to show that the time course of the syntactic derivation as assumed in Distributed Morphology is readily mapped onto the time course of processing as assumed in multi-level models of language production (Garrett 1975; Levelt 1989). I therefore conclude that, as far as the speech error data are concerned, Distributed Morphology makes for a psychologically plausible theory of grammar.

The thesis consists of five chapters. In the first chapter, I am concerned with the notion of "psychological reality". I briefly sketch some previous work which investigates the psychological reality of grammatical rules and entities on the basis of speech error analysis and reaction time experiments. The theoretical concepts I discuss are segments and segment clusters, phonological features, phrases, as well as syntactic transformations.

In the second chapter, I present the speech error data (taken from the Frankfurt corpus as well as from my own collection of slips). These errors are of three different types: (i) anti-

agreement errors, (ii) errors of subcategorization, and (iii) errors involving accommodation or stranding. Only types (i) and (ii) result in the ungrammaticality of an utterance; anti-agreement errors, for instance, are either due to a feature conflict between subject and verb (as in (a) above) or to a feature conflict within the determiner phrase (as in (b)). Accommodations (cf. (c) and (e)) and stranding errors (cf. (d)) are dealt with in one section, since, in my opinion, some of the errors which were analyzed as accommodations in the literature should better be treated as special cases of stranding, namely as stranding of abstract features. In this section, I also present a typology of accommodations.

The third chapter of the thesis introduces the theoretical framework which I adopt, namely the theory of Distributed Morphology (DM). In DM, the computational system is taken to manipulate nothing but abstract roots and morphosyntactic features that are drawn from an inventory called "List 1". It is only after syntax that phonologically specified Vocabulary items (drawn from "List 2") are inserted into terminal nodes. Moreover, it is assumed that the traditional terms for sentence elements (N, V, A) are derivative from more basic morpheme types; that is, there is only one type of lexical node (l-node) whose categorial status is defined by its context. A noun e.g. is a root whose nearest c-commanding functional node (f-node) is a determiner, i.e. a noun is a root which is locally licensed by D°. Before Vocabulary insertion takes place, the syntactic structure is subject to well-defined manipulations, such as fusion or merger of adjacent nodes, insertion of agreement nodes, and so on. Moreover, Vocabulary items may be subject to phonological readjustment in certain structural contexts (e.g. ablaut or umlaut).

In the fourth and most extensive chapter of the thesis, I introduce the language production model and discuss the speech error data in the light of the morphosyntactic theory. The presentation of the psycholinguistic framework in section 4.1 is important in order to be able to later assess the question of how the formal grammar can be mapped onto the processing model. In section 4.2, I am concerned with semantic features in language production. In this section, I claim that - from a processing point of view - we need to assume that conceptual features are available at a very early point in the derivation in order to guide the choice of a particular root. I propose that the roots which are selected from List 1 bear indices according to what lexical concept they refer to. This view is supported by two types of slips, namely meaning-based substitutions and

anticipations/perseverations of semantic features. I also briefly discuss the role of compositional semantic features and of the Neg feature in this context.

Section 4.3 deals with the representation and processing of the gender feature. Since DM allows for the underspecification of certain features, I consider this possibility with respect to grammatical gender. After a detailed discussion of form- and meaning-based noun substitutions, I conclude that in German, roots as well as Vocabulary items must be specified for gender, since otherwise the observed identical gender effect could not be explained. Further interesting evidence comes from gender accommodations: the fact that only after meaning-based noun substitutions, accommodations occur supports the DM view that agreement relations - here: copy of the gender feature from the noun onto the determiner - are established before Vocabulary insertion takes place.

Processes of feature copy are subject to further consideration in section 4.4. In this section, I discuss different types of subject-verb agreement errors and investigate what structural facts may be responsible for erroneous feature transmission. Anti-agreement between the subject and the verb comes in two types, namely as "local agreement" (as in (a) above) and as "long-distance agreement". In particular, the analysis of the former suggests that there is no feature value [-plural] within the computational system, i.e. that singular nouns are not specified for number. In the context of subject-verb agreement errors, I also investigate how the establishment of agreement relations interacts with syntactic transformations. On the basis of the available data, I conclude that features are copied only after movement operations have taken place. Interestingly, this is exactly what is predicted by DM.

In section 4.5, I have a closer look at the DM proposal that the elements drawn from List 1 do not bear category labels. I first investigate how insertion of Vocabulary items into categorially non-specified slots is achieved. Following Harley & Noyer (1998a), I assume that Vocabulary items must be specified for certain context features in order to allow for their appropriate assignment to terminal nodes. Most importantly, in this section, I show that some quite intricate speech errors receive a straightforward explanation under the assumption that roots are acategorial in nature (e.g. correct spell-out of the root *schreib* in (e)). Problematic cases, i.e. errors in which the category of the involved elements seems to be of importance, can be accounted for when we assume that the licensing environments of the roots constrain their interaction in an error.

In sections 4.6 and 4.7, I have another look at stranding errors and accommodations, respectively. In section 4.6, I investigate the different possibilities of stranding and shift of

abstract features in speech errors, while in section 4.7, I rethink the notion of accommodation. In particular, I argue that accommodations in the true sense do not exist. All "accommodatory processes" are in fact due to a process of feature copy (e.g. in (c) above), to a phonological readjustment rule (e.g. in (d) and (e)), or to a morpheme insertion rule. That is, they are due to mechanisms that apply anyway in the course of the derivation and need therefore not be considered a second error step.

In order to further clarify the ideas developed in the preceding sections, I give a detailed discussion of three particularly complex speech errors in section 4.8. This discussion comprises syntactic structures, detailed descriptions of the derivation, Vocabulary items, phonological readjustment and morpheme insertion rules.

In chapter 5, I conclude that the morphosyntactic theory of Distributed Morphology and the multi-level processing model can and should be related to each other. Most importantly, the speech errors which I discuss in this thesis (as well as other ones) receive a straightforward explanation within the DM framework. That is, with DM, we have at our disposal a formal model of grammar which very well corresponds to the psycholinguistic model and which therefore is a psychologically real model.

1 Introduction: Grammar in Use

Um zu erkennen, ob das Bild wahr
oder falsch ist, müssen wir es mit der
Wirklichkeit vergleichen.*

(Wittgenstein,
Tractatus)

Historically, spontaneous speech error data have been collected and studied for various reasons. Many of the early studies in this field were motivated by an interest in speech errors as a possible cause of historical linguistic change (Paul 1886; Sturtevant 1917; Jespersen 1922). Meringer & Mayer (1895) point out that Paul (1886) probably was the first one to believe that the repeated occurrence of a slip might be the reason for certain sound changes. For instance, the metathesis which changed indogermanic *potmen* to *ptomen* was argued to be the result of speech errors. Meringer, however, takes such a correlation to be very unlikely, since comparable exchanges of segments are hardly ever observed in slips of the tongue. A second motivation for studying errors - and probably the most familiar one outside of linguistic circles - was to gain insight into psychological repressions (Freud 1901/1954). That is, speech errors were taken to reveal suppressed emotions and desires.

Thirdly, spontaneous errors also played an increasingly important role in psycholinguistic attempts to construct linguistic performance models (Lashley 1951; Fromkin 1971; Garrett 1975ff). The crucial question is: What kinds of (possibly ordered) processes mediate between a communicative intention and the articulation of an utterance? Closely related to this question is the issue of what role grammatical units and rules play in the generation of an utterance, i.e. the issue of the relationship between competence and performance.

In this thesis, I shall only be concerned with the third of the above mentioned possible motivations for doing speech error research. That is, I will focus on what grammar theory can tell us about the nature of speech errors and - vice versa - what speech errors can tell us about the nature of grammar. A basic assumption of psycholinguistic speech error research is that an analysis of errors contained in spontaneous speech

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* "In order to discover whether the picture is true or false we must compare it with reality."

> "can give some clues to the particular mechanisms of language production, in which the abnormal case [...] can lead to conclusions about the factors involved in normal functioning. [...] [T]he phenomena involved in spontaneously produced incorrect sentences can be of interest in sorting out questions of the linguistic system proper. This fact is not surprising, since the essential factor in linguistic behavior is linguistic competence, so that all phenomena of language production, even pathological phenomena, can be related to competence." (Bierwisch 1982:31)

Consequently, slips of the tongue (as well as other behavioral data, e.g. acquisition data and data from impaired speakers) are of interest to linguists because of the implicit or explicit acceptance of the assumption that the rules of grammar enter into the processing mechanism such that "evidence concerning production, recognition, recall, and language use in general can [...] have bearing on the investigation of rules of grammar" (Chomsky 1980:200f). This, in turn, implies that meaningful psycholinguistic analyses of error data can only be made against the background of significant hypotheses concerning the structure, i.e. the grammar, of the language in question.

In this introductory chapter, I shall have a look at some of the aspects that are related to the question of how a particular grammar is put to use. In section 1.1, I will be concerned with a mentalistic perspective on linguistic theory and with the notion of "psychological reality" of grammar. Results from a number of psycholinguistic studies that investigate the psychological reality of grammatical entities and operations will be presented in section 1.2. I will consider phonological constructs (subsection 1.2.1) and syntactic constructs (subsection 1.2.2) in turn.

1.1 On Mentalism and Psychological Reality

Mir ist's nicht um tausend Welten,
aber um dein Wort zu tun![*]

(Graf v. Zinzendorf, Kirchliche Lieder)

[*] "One thousand worlds don't matter to me, but your word does."

A linguistic theory that does not only investigate the observable physical events of an utterance but rather also takes into account mental capacities and processes involved in the generation of an utterance, is often referred to as a "mentalistic theory". In his influential article, Katz (1964:126) states that linguists who adopt the mentalistic view contend that "purely linguistic theories cannot succeed in predicting and explaining the facts of linguistic performance without making reference to the mental events, capacities, and processes of speakers, i.e. that linguistic theories must contain concepts which enable linguists to formulate the principles of mental operation that underlie speech". In contrast to that, linguists who adopt a taxonomic conception of linguistics assume that purely linguistic theories can very well succeed in predicting and explaining the facts of linguistic performance.

Therefore, a taxonomic linguist refuses to regard the internal psychological properties of speakers as part of the subject matter of linguistic theory. Moreover, he denies that theoretical linguistic concepts can have psychological reality. To be more precise, a taxonomic structuralist proposes a procedure according to which every abstract linguistic predicate can be reduced to behavioral and/or physical predicates (cf. Fodor 1968). In contrast to that, a mentalist linguist assumes that the theoretical constructions he uses in building his theories are psychologically real.[1]

Of course, the best kind of theory is one which systematizes the widest range of facts. In the spirit of Chomsky's criticisms of taxonomic theories, Katz (1964) tries to show that a mentalistic theory can account for everything that a taxonomic theory accounts for and, in addition, for many things that a taxonomic theory must fail to account for. In particular, he demonstrates that only a theory that makes reference to mental states and psychological factors is capable of providing answers to the "three fundamental questions with which a synchronic description of a particular language deals" (Katz 1964:130). These are: (1) What is known by a speaker who is fluent in a natural language? (2) How is such linguistic knowledge put into operation to achieve communication?, and (3) How do speakers come to acquire this ability?[2]

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[1] Note that this does not imply that the theoretical constructions that are used require translation into neurophysiological terms. For the linguist, it does not matter what kind of physical realization there is, since there is a critical distinction between a formal characterization of linguistic structure and a physical system that implements this structure: "For the purpose of linguistic investigation, it is immaterial whether the mechanism inside the speaker's head is in reality a network of electronic relays, a mechanical system of cardboard flip-flops and rubber bands, or, for that matter, a group of homunculi industriously at work in a tiny office" (Katz 1964:129).

[2] Cf. the three basic questions with respect to knowledge of language posed in Chomsky (1986:3): (i) What constitutes knowledge of language? (ii) How is knowledge of language acquired?, and (iii) How is knowledge of language put to use?

Traditionally, linguistic theory investigates the first question while psycholinguistics is concerned with the latter two. According to Chomsky (1980), however, a strict division of the two disciplines does not make much sense, since knowledge of language, language use, and language acquisition are in fact intimately related to each other.

> "Delineation of disciplines may be useful for administering universities or organizing professional societies, but apart from that, it is an undertaking of limited merit. A person who happens to be interested in underlying competence will naturally be delighted to exploit whatever understanding may be forthcoming about process models that incorporate one or another set of assumptions about linguistic knowledge. Furthermore, it seems evident that investigation of performance will rely, to whatever extent it can, on what is learned about the systems of knowledge that are put to use." (Chomsky 1980:202)

The distinction between question (1) on the one hand and questions (2) and (3) on the other also reflects the well-known distinction between linguistic competence and linguistic performance. Competence concerns only the knowledge of a speaker/hearer of his language. Therefore, Chomsky (1965) excludes from consideration as data for a linguistic theory of competence

> "such grammatically irrelevant conditions as memory limitations, distractions, shifts of attention and interest, and errors (random or characteristic) in applying his [i.e. the speaker/listener's] knowledge of the language in actual performance." (Chomsky 1965:3)

In contrast to that, linguistic performance is concerned with the actual use of language in certain situations. Performance can only be seen as a direct reflection of competence if we fully accept the idealization proposed in the above quotation. In reality, however, such a direct relation, of course, doesn't exist. Nevertheless, many of the issues of competence are relevant to psycholinguistics. Chomsky (1965) points out that there is no reason to question the traditional opinion that research on language use can only progress to the extent to which we gain insight into the underlying competence. That is, models of language use (performance models) should not be content with only describing certain behavioral strategies; rather, they must show in what way the observed behavior is influenced by the grammar, i.e. by a formal device that uses a finite number of rules with the help of which all the sentence of a language can be generated.

If a given theoretical construct - an entity or a rule - can be shown to have a measurable effect on linguistic behavior - that is, the acquisition, production, and comprehension of language - then we may speak of this construct as being psychologically real, in the sense that it plays an active role in linguistic behavior. Therefore, claims for the psychological reality of linguistic constructs will be justified only insofar as we are able to establish the psychological import of these constructs. In section 1.2, I will present evidence for the psychological reality of some such linguistic constructs. In the remainder of this section, I will briefly examine the notion of psychological reality itself (see Bever (1988) for a comprehensive historical overview).

Linell (1979) points out that within the scientific community, attitudes towards the goal of psychological reality vary considerably. The extreme anti-mentalistic view is that of radical physicalism. According to this attitude, everything that can be meaningfully characterized as psychological can also be more adequately characterized as physical. Therefore, talking about psychological reality is nonsense and should be abandoned (see e.g. Churchland's (1989) theory of eliminative materialism). On the other end of the scale, we find the position taken by Chomsky and many other generativists (which is termed "naive optimism" by Linell (1979)).[3] These scholars contend that speakers have at their disposal a highly internalized mental grammar and that the abstract rule formulations the theoreticians arrive at are actually rules of the speaker's internal grammar. That is, a psychologically real grammar is supposed to be a theory of covert psychological abilities underlying a speaker's linguistic practice.

But in what sense can a formal grammar reflect underlying knowledge? Once again, there are different opinions as to what degree a grammar can or should be a representational model of psychological realities. According to a strong position, "every aspect or detail of the theory is assumed to be isomorphic to some psychological (or neurological) counterpart", while according to a weak position, "the relationship between the theoretical grammar model and the speaker's internalized knowledge is more indirect" (Linell 1979:11). This opposition is what Ringen (1975) refers to as "strong" versus "weak mentalism".

Chomsky himself adopts the weak position. He points out that it is only at an appropriate level of abstraction that we may expect a psychologically real theory to

[3] In between these two extremes lie "pessimism" and "moderate realism". The former attitude corresponds approximately to what was called a taxonomic view above: Speakers may very well possess knowledge of their language but it is taken to be impossible to find out exactly what properties these psychological structures have. Under the latter attitude, speakers are assumed to possess specific structural knowledge of their language. Still, an investigation of psychological reality cannot be pursued with purely linguistic methods, but also needs to take into account many types of external evidence.

describe "properties alleged to be true of whatever the real elements of the world may be when considered at that level of description" (Chomsky 1980:104).

It is often argued that the theory of Universal Grammar - whatever its merit - has not been convincingly shown to be psychologically real (see Fodor et al. (1974) and the discussion in 1.2.2 below). But what exactly is "psychological reality" supposed to mean? Chomsky assumes that the term is to be understood on the model of "physical reality". He points out that in the natural sciences, however, one is not accustomed to ask whether the best theory we can devise in some idealized domain has the property of "physical reality". Actually, the question - when sensibly put - is the same in both cases: Is the theory accurate for a certain area of investigation, i.e. does it explain the available evidence and does it make correct predictions?

Chomsky illustrates his argument with an illuminating analogy:

> "Consider the problem of determining the nature of the thermonuclear reactions that take place deep in the interior of the sun. Suppose that available technique permits astronomers to study only the light emitted at the outermost layers of the sun. On the basis of the information thereby attained, they construct a theory of the hidden thermonuclear reactions [...]. Suppose that an astronomer presents such theory, citing the evidence that supports it. Suppose now that someone were to approach this astronomer with the following contention: 'True, you have presented a theory that explains the available evidence, but how do you know that the constructions of your theory have physical reality - in short, how do you know that your theory is true?' The astronomer could respond only by repeating what he had already presented." (Chomsky 1980:189f)

Obviously, it would be desirable to place a laboratory inside the sun to obtain more direct evidence, but being unable to do so, we must test and confirm our theory indirectly. Similarly, a cognitive theory which - at an abstract level of description - aims to characterize properties of the language faculty can only be tested indirectly, i.e. by its success in providing explanations for selected phenomena. In principle, an effort to relate this theory to other levels of description - for instance, neurophysiological and biological systems - does not involve more problems than an effort to obtain access to the thermonuclear reactions inside the sun in a more direct way than by measuring emitted light (Grewendorf 1995). Chomsky concludes that "the question of psychological reality is no more and no less sensible in principle than the question of the physical reality of the physicist's theoretical constructions" (Chomsky 1980:192).

Note that the psychological reality of linguistic structures and rules has nothing to do with their introspective accessibility or intuitive plausibility. As a matter of fact, many generativists doubt the relevance and reliability of introspective evidence.

> "Any interesting generative grammar will be dealing, for the most part, with mental processes that are far beyond the level of actual or even potential consciousness; furthermore, it is quite apparent that a speaker's reports and viewpoints about his behavior and his competence may be in error." (Chomsky 1965:8)

That is, the fact that a speaker has internalized a generative grammar that expresses his knowledge of language does not imply that the structures and rules assumed in this grammar must be conscious to the individual. But clearly, the actual data of linguistic performance - and this, of course, also comprises error data - may provide evidence for determining the correctness of certain hypotheses about linguistic structures and rules.[4] Some evidence of this kind (obtained in psycholinguistic studies in the last four decades) will be presented in section 1.2.

Note that in the present thesis, I adopt the assumptions of weak mentalism. I am going to investigate the question whether a particular theory of grammar - the Distributed Morphology framework (to be introduced in chapter 3) - is successful in providing explanations for a certain kind of psycholinguistic data, viz. spontaneous speech error data (to be presented in chapter 2). I am not going to claim that every detail of the theory - theoretical constructs like e.g. V-to-I movement or fusion of terminal nodes - must be isomorphic to some psychological counterpart. Rather, I am going to demonstrate that Distributed Morphology makes for a psychologically real theory of grammar in the sense that it is accurate for the data under investigation, i.e. it explains the available evidence and moreover, it makes correct predictions about possible and impossible errors.

1.2 The Processing of Phonological and Syntactic Structure

Il s'agit d'arriver à l'inconnu

[4] For further discussion of the psychological reality and the mental representation of grammars cf. Fodor et al. (1974), Bresnan (1978), Stabler (1983), Berwick & Weinberg (1984), Bresnan & Kaplan (1984), and Matthews (1991).

par le dérèglement de tous les sens.*

(Arthur Rimbaud, Lettres du voyant)

In order to demonstrate that a mentalistic theory of grammar can succeed in answering the three fundamental questions mentioned above (Katz 1964; Chomsky 1986), we need a performance model that shows how abstract linguistic entities and mechanisms are put to use in an actual situation. Suppose that a speaker is equipped with linguistic descriptions and procedures that define his knowledge of a language, some of them innate, some of them acquired. Further suppose that the language processing component that enables us to produce and comprehend an infinite number of sentences makes active use of these descriptions and procedures (Kean 1980). We would then, of course, expect that the functioning of the processor is necessarily constrained by this internalized knowledge, i.e. by the grammar.

In this subsection, I will examine possible constraints imposed on the processor by the grammar. That is, I will examine whether certain linguistic constructs assumed in the model of grammar play an active role in language processing. The linguistic constructs to be considered are segments and phonological features (subsection 1.2.1) as well as phrases and syntactic operations (subsection 1.2.2). The evidence I present comes from spontaneous speech errors and from experimental studies (e.g. reaction time experiments).

* "It is all about reaching the unknown through the disorderliness of all senses."

1.2.1 *Segments and Their Internal Structure*

Anomalous speech data may constitute a basis for deriving valid conclusions about the form of phonological theory. From the analyses of psycholinguists dealing with errors in speech, it is apparent that - despite the continuous nature of (parts of) the speech signal - at some level of performance, discrete units exist that can be manipulated separately from other units, i.e. they can be substituted, exchanged, anticipated, or perseverated. Fromkin (1971) points out that the fact that it is impossible to explain certain error patterns in speech production without reference to discrete performance units is further substantiation of the psychological reality of these units. One such processing unit which has received considerable attention since the early days of speech error research is the segment (or phoneme).

Fromkin notes that by far the largest percentage of slips from her corpus involves the substitution, exchange, anticipation, or perseveration of segments, either within words or across word boundaries (the latter case being the more frequent one). Consider, for instance, the examples given in (1-1):

(1-1) *Segmental errors (Fromkin 1971:30f)*

a. John dropped his cu**ff** of coffee ← his cup of coffee
b. I'm not allowing any proli**p**eration of nodes ← proliferation of nodes
c. with this **w**ing I do **r**ed ← with this ring I do wed
d. t**o**rn the c**u**rner ← turn the corner

In (1-1a), the segment /f/ is anticipated from *coffee*, in (b), the segment /p/ is perseverated within a word, and in (c), the elements /r/ and /w/ change place. Example (d) illustrates that vowels may also be affected. Data such as these show that the processor must have access to the segmental structure of a word at some point in the generation of an utterance, thereby verifying the psychological reality of segments in on-line processing.

Further justification for the assumption that individual segments are relevant units in language production comes from the observation that in some errors, only one segment of a consonant cluster is involved:

(1-2) *Split-up of clusters in segmental errors (Fromkin:1971:31f)*

a. b**l**ake f**r**uid ← brake fluid

b. at the Broadway s**p**ores the prices are ← at the Broadway stores

In (1-2a), the two segments /r/ and /l/, both of which take the second position in a consonant cluster (here: a complex syllable onset) are exchanged while in (b), the segment /p/ which is the first part of the cluster /pr/ is anticipated and takes the second position in the cluster /st/.[5]

A particularly interesting issue concerns the status of diphthongs. In many theories, diphthongs are treated as single, though complex segments. Under this view it is predicted that the split-up of a diphthong in a speech error should not be observed. However, if diphthongs are treated as a succession of a vowel and a glide, one would expect one part of the diphthong to be subject to substitution with the other part remaining unaffected. On the basis of her speech error data, Fromkin (1971:34) argues for a monophonematic interpretation: Whenever a vowel+glide sequence is involved in her corpus, the error always includes the entire diphthong (e.g. *av**oi**lable for exploitation* ← *available*). Stemberger (1983b) reaches the same conclusion in spite of the fact that he is able to provide one exception to the rule. His example is given in (1-3a); here, the /u/ of *moving* is anticipated and takes the position of the vowel in the diphthong /eI/ of *may*.

(1-3) <u>*Split-up of diphthongs in speech errors*</u>

a. they [m**u**i], may be moving back east again (Stemberger 1983b:26)

b. ich glaube, dass irgendwo ‘ne [ka**i**f], Kaufeuphorie vorhanden ist
I think that somewhere a (error) buying.euphoria existing is
(Berg 1986:201)

c. und dass du dann um [dr**ç**i], drei dort bist (Berg 1986:201)
and that you then at (error) three there are

On the basis of German slips of the tongue, Berg (1986) challenges the monophonematic view of diphthongs. In his corpus, there are a number of instances in which diphthongs split apart during the error process. Two of his examples are given in (1-3bc). In (1-3b),

[5] A fair number of errors reveals the transposition of whole clusters. Fromkin (1971), however, points out that this does not evidence the fact that such clusters are inseparable units. Rather, movement of whole clusters (as in ***dr**eater **sw**ying* ← *sweater drying*) constitutes further evidence for the assumption that a syllable is not an unstructured unit either and that syllable parts (e.g. onsets) can be affected in speech errors. Moreover, CV or VC sequences which constitute part of a syllable can also be involved in errors (as in ***pi**ss and **stre**tch* ← *stress and pitch*). For further discussion of speech error evidence that is informative with respect to the hierarchical structure of syllables see Laubstein (1987) and Treiman (1987).

two diphthongs are involved. The glide part of the diphthong /çi/ (in *Euphorie* “euphoria”) is anticipated and takes the place of the glide in the diphthong /au/ (in *Kauf* “buying”), thereby giving rise to the vowel+glide sequence /ai/. In (1-3c), the /ç/ of *dort* “there” is

anticipated and substituted for the vowel part of the diphthong /ai/ in *drei* "three".[6]

On the basis of speech error data, Fromkin (1971) also examines the status of affricates and of the velar nasal [N]. With respect to affricates, she observes that not a single example in her corpus shows a splitting of an affricate into sequences of stop plus fricative (e.g. *pinch hit**ch*** ← *pinch hit*, but not *[pInt hI_] with split-up of the affricate /t_/). With respect to the velar nasal, however, some of her data indicate that at some level of performance, [N] may be derived from an underlying sequence /ng/ (Chomsky & Halle 1968), as e.g. in *[k√**n**t] the [strIg]* ← *cut the string* where only the nasal part of [N] is shifted.

Obviously, single segments can be accessed separately in speech errors. It is, however, a well-known fact that segments are not indivisible units but rather bundles of features. As it turns out, a fair number of phonological speech errors reported in the literature may be analyzed as involving single features rather than entire segments.

Many phonological errors are ambiguous as to whether they involve whole segments or segmental features. This is true, for example, for the error given in (1-4a) which may either be analyzed as a reversal of the segments /k/ and /t/ or as a reversal of the features [-coronal] and [+coronal]. As a matter of fact, Van den Broecke & Goldstein (1980) report that the relation between consonants in segmental errors is not a random one but is dependent on their phonological similarity, i.e. "[t]ypically, one-feature errors occur more often than two-feature errors, which again occur more often than three-feature errors, etc." (Van den Broecke & Goldstein 1980:48).

(1-4) <u>*Manipulation of single features in speech errors*</u>

a. **t**eep a **c**ape ← keep a tape (Fromkin 1971:31)

b. **m**ity the **d**ue teacher, I mean, nity the poor teacher, no pity the new teacher (Fromkin 1971:35)

c. **p**ig and **v**at ← big and fat (Fromkin 1971:36)

d. ich hör die Flöhe h**ü**sten ← die Flöhe husten
I hear the fleas (error) ← the fleas cough

[6] Further - albeit somewhat anecdotical - evidence for the status of diphthongs comes from talking backwards. People who are able to talk backwards fluently usually operate on phonemes, i.e. they reverse the order of phonemes. Cowan et al. (1985) observed that eight out of ten English speaking subjects left the diphthongs intact when talking backwards while the other two tried to break them up. Interestingly, two German speakers who were also tested consistently reversed the structure of the German diphthongs.

“I imagine things.”

In contrast to the ambiguous case in (1-4a), the other three slips in (1-4) clearly show the independence of phonological features. In (1-4b), for instance, only the feature [nasal] is exchanged in the first error step (with the redundant voicing accommodation). Consequently, the /p/ of *pity* which is [-nas] becomes /m/ and the /n/ of *new* which is [+nas] changes to /d/. Interestingly, in a first attempt to correct the error, the whole segments /p/ and /n/ are exchanged (moreover, we observe lexical construal which turns the resulting non-word /pju:/ into *poor*).

The example in (1-4c) exemplifies a change of value only for the feature [voiced]: the /b/ of *big* which is [+voiced] becomes a voiceless /p/ while the /f/ in *fat* which is [-voiced] is changed to a voiced /v/. Finally, the German error in (1-4d) is best analyzed as a perseveration of the feature [-back] of the segment /ö/ in *Flöhe* "fleas". This very feature turns the /u:/ of *husten* "to cough" into an /ü:/.

Therefore, the above data indicate that distinctive features are psychologically real in that they can be independently manipulated in speech errors in the same way as segments (or feature complexes).[7] Fromkin (1971:38), however, points out that "the claim that all distinctive features (as proposed by Chomsky & Halle) are identical with phonetic properties that can in principle be independently controlled in speech is not borne out by the data of speech errors". She concludes that in actual speech performance, only some of the features can be accessed independently (e.g. [nasal], [voiced], and place features) while other features are highly dependent on the existence of other properties of the segment.

A more radical view is taken by Roberts (1975). He argues that all phonological errors should be treated as feature errors. That is, contrary to the generally held position, he claims that there is no evidence for the syllable or segment as independent linguistic units. Here, I only want to briefly mention one counter-argument against Roberts' proposal. Stemberger (1982b) points out that there appear to be no word blends in which a new segment arises that is not part of one of the intended words, but which combines features of segments from the two blended words. For instance, a blend of *cook* and *boil* could very well result in *coil* but not in **goil* where the velarity of /k/ in *cook* combines with the voicedness of /b/ in *boil* (Stemberger 1982b:241). Obviously - and contra Roberts - , in blends, all segments come as whole units from one of the two target words; that is,

[7] A different view is taken by Klatt (1981). He argues that most errors can be interpreted as segmental errors. He points out that, as a matter of fact, only three out of 6000 errors in the MIT corpus can be unambiguously analyzed as featural errors.

features of a segment from one word never combine with features of a segment from the other to produce a third segment.[8]

Finally, I also want to say a few words about suprasegmentals in language production, such as stress, intonation, and tone. In early generative phonology (Chomsky & Halle 1968), it was assumed that all phonological features - including suprasegmentals - are features of segments (e.g. [±stress], [±high tone]). More recent phonological theories, however, posit separate tiers or levels for different types of suprasegmental features (e.g. autosegmental phonology (Halle & Vergnaud 1980; McCarthy 1981) and CV phonology (Clements & Keyser 1983)). We therefore predict that suprasegmentals are relatively independent of the segments with which they are associated and that segments, syllables, or words may be transposed without any effect on the suprasegmental feature (cf. Stemberger 1984).

This prediction is in fact borne out. On the basis of speech error data, Fromkin (1971) and Garrett (1975) both show that phrasal stress must be independent of segments or even words, since there is no change in the stress pattern (or intonation contour) of the sentence when target units are disordered (also see Becker (1979) who specifically argues in favour of an autosegmental representation of stress on the basis of slip data). This phenomenon is illustrated by the examples in (1-5ab). In (1-5a), two vowels are exchanged but phrasal stress remains in place while in (1-5b), the stress pattern remains unaffected in a word exchange.

(1-5) <u>*Suprasegmental features in speech errors*</u>

a. avoid the tr**úe** pr**èe**ning ← the trée prùning (Garrett 1975:147)

b. in her **dóll pàper** bòx ← in her páper dòll bòx (Fromkin 1973b:255)

c. kin khaaw lææw ← kin khaaw lææw (Gandour 1977:132)

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[8] Mowrey & MacKay (1990) challenge the assumption that features (and segments) are transposed in speech errors. In their study, they report on the laboratory elicitation of sublexical speech errors by means of tongue twisters (such as *She sells seashells by the seashore*). In order to observe speech motor activity in phonological errors, electromyography (EMG) was used, that is, electrodes were inserted into the lower lip and into the tongue of subjects participating in the experiment and motor activity was recorded and made visible by oscillographic traces. The obtained data show conclusive evidence of subphonemic errors, many of which would not have been noted using the standard technique of transcribing errors. Most importantly, many of the errors indicate clearly, that subfeatural components, i.e. individual muscular components of articulatory gestures, may be transposed in speech errors. For instance, an [s] may be articulated with a strong labial component (typical of [_]) but may still sound like [s]. Consequently, the change in muscular activity is only revealed by the EMG recording.

The authors criticize that little or no effort has been made to address the problem of identifying the precise nature of the errors accurately. Their results indicate that the problem of error characterization is so pervasive as to render the significance of traditionally collected data corpora questionable. They conclude that "it appears that errors which have been consigned to the phonemic, segmental, or feature levels could be reinterpreted as errors at the motor output level" (Mowrey & MacKay 1990:1311).

[¬] [–] [´] ← [–] [¬] [´]
"(I've) already had dinner."

A particularly interesting example from Thai involving tonal features is given in (1-5c). Standard Thai has five contrastive tones: rising, low, mid, falling, and high. Gandour (1977) shows that suprasegmental tone features function independently of other segmental features and that the disordering mechanisms that have been proposed to account for consonant and vowel errors can also be applied to handle tone errors, i.e. tones may be anticipated, perseverated, and exchanged.. In the error (1-5c), for instance, a mid tone [–] and a falling tone [¬] have been exchanged ([´] indicates high tone). Therefore, the Thai example exemplifies the opposite of what we observe in the two English slips in (1-5): while a suprasegmental feature is exchanged in the former, in the latter, suprasegmental features are stranded.[9]

In summary of this subsection, we may note the following: There is a considerable amount of speech error evidence that proves that - from a processing point of view - the speech signal is not a continuous, indivisible sequence but rather is divided into disrete units. It is, of course, intuitively clear that the speech signal is made up of words and that words are made up of segments (and possibly syllables); the error data, however, verify that these units are not only convenient theoretical constructs but are actually processed in on-line language production. The same is true for abstract entities such as segmental and suprasegmental features. We may therefore conclude that these units are psychologically real.

1.2.2 *Syntactic Transformations*

As pointed out above, Katz (1964) argues that the grammar plays a decisive role in on-line language processing, i.e. in parsing and language production. The crucial role of the grammar is, of course, not restricted to phonological entities. Rather, the syntactic structure of a sentence has an important impact on its processing, too. In this context, one central

[9] Besides that, Stemberger (1984) presents evidence for the autosegmental treatment of length. He shows that in a large majority of errors that involve long and short vowels, the misordered vowel does not retain its original length, but takes over the length of the vowel it replaces. Note that one exception to that generalization is given in (2-28a) where a vowel is perseverated along with its length (i.e. [tense]) feature.

question is: What kinds of syntactic constituents are actually processed and how big are they? Not surprisingly, it was demonstrated in a number of psycholinguistic studies that the sentence as well as the clause - i.e. a part of a sentence that has a subject and a predicate - are major processing units (Jarvella (1971), for instance, was able to show that there is a clause boundary effect in recalling words).

One particularly controversial technique that was used to explore the size of syntactic units in parsing is the so-called "click displacement technique" (Fodor & Bever 1965; Garrett et al. 1966). The basic idea of this technique is that major processing units resist interruption. The experimental setting was as follows (see Harley 1995): Subjects heard speech over headphones in one ear that was interrupted by extraneous clicks in the other ear at certain points in the sentence. It was predicted that even if the click appears in the middle of a constituent, it should be perceived as falling at a constituent boundary. This prediction was borne out. For example, a click presented at point * in the sentence *That he was* happy was evident from the way he smiled*, was reported by the listeners to appear after the word *happy*. That is, the click was displaced by the listeners in order to maintain the integrity of the syntactic constituent. This result was taken to verify that the clause is a major unit of syntactic processing.

Note that click experiments are post-perceptual. This, however, is not true for spontaneous speech errors which therefore do not show a memory bias. Certain speech errors point to the psychological reality of phrasal units such as DPs and VPs in language production. Consider, for instance, the following two exchanges:

(1-6) <u>*Exchange of phrasal units in speech errors*</u>

a. I got into [**this guy**] with [**a discussion**] ← into a discussion with this guy
(Garrett 1980a:192)

b. He [**facilitated what he was doing**] to [**remove the barricade**] ← he removed the barricade to facilitate what he was doing (Garrett 1980a:188)

In (1-6a), two DPs are exchanged while in (1-6b), two VPs change place. Note that in example (b), the tense features are stranded.[10]

[10] Exchanges of intermediate projections are less frequent. Fromkin (1988:129) reports one such case: *there's an [**island**] on the [**small restaurant**] ← a small restaurant on the island* where *small restaurant* is an N'-constituent.

However, psycholinguistic investigations were not only concerned with the psychological reality of syntactic constituents, but also with the influence of syntactic structure and syntactic operations on the processing of a sentence.

Linguistics has provided a formal apparatus for describing the syntactic structure of sentences and for relating certain linguistic structures to others by means of syntactic transformations. But what does this formal approach contribute to our understanding of the mechanisms involved in on-line language processing? When Chomsky's work first appeared (Chomsky 1957), there was great optimism that it would also supply an account of the processes involved in producing and understanding syntactic strings.

Supporters of the so-called Derivational Theory of Complexity (DTC), for instance, claimed that the processing complexity of a given sentence is determined by the number of syntactic transformations that were applied in deriving its surface structure. The idea that the more transformations were applied in a sentence, the more difficult it is to process, was first tested by Miller & McKean (1964). They investigated "detransformation" reaction times for sentences such as those given in (1-7).

(1-7) *Sentences with increasing derivational complexity*

a. The robot shoots the ghost.
   ACTIVE AFFIRMATIVE: 0 transformations

b. The ghost is shot by the robot.
   PASSIVE AFFIRMATIVE: 1 transformation

c. The ghost is not shot by the robot.
   PASSIVE NEGATIVE: 2 transformations

d. Is the ghost not shot by the robot?
   PASSIVE NEGATIVE QUESTION: 3 transformations

Sentence (1-7a) in which - according to early generative theories - no transformational rule has applied served as a baseline. It is possible to derive increasingly complex sentences from this kernel sentence. Sentence (1-7d), for example, is derived from (a) by the application of three transformations: passivization, negativization, and question formation. Miller & McKean observed that the time needed to process sentences such as (1-7bcd), i.e. to detransform them back to the underlying sentence (1-7a) was linearly related to the number of transformations that are involved. This finding was interpreted as supporting

the psychological reality of transformational rules, since apparently transformations have an impact on the processing complexity.[11]

In further investigations, however, Miller & McKean's findings were called into question. Fodor & Garrett (1967), for instance, were able to demonstrate that the processing of some transformationally complex sentences did not require the predicted time. For example, sentences with double self-embedding (e.g. *The first shot the tired soldier the mosquite bit fired missed*) are particularly difficult to process. But obviously, this difficulty can not be put down to the transformational derivation, since it turned out that these sentences are easier to understand when they are made grammatically more complex by the application of further transformational rules (as, for instance, by the double application of a passive transformation, as in *The first shot fired by the tired soldier bitten by the mosquito missed*).[12]

In later versions of the generative framework (Chomsky 1973, 1981), it is assumed that in the transition from a deep structure to a surface structure representation, elements are moved leaving behind a trace in their original position. A moved DP and its trace are said to be coreferential. Before turning to the processing of traces, I shall say a few words about the processing of pronouns in on-line comprehension.

Amongst other things, Cloitre & Bever (1988) examine if the existence of an anaphoric relation between a DP and a coreferential pronoun facilitates the retrieval of an adjective that is part of the DP. In their experiment, participants were presented with sequences of sentences like the following:

(1-8) *Sample sequence used in the experiment by Cloitre & Bever (1988)*

a. $[_{DP}$ The **skinny** bellboy$]_i$ did a softshoe routine in the lobby.

b. The hotel guests were amazed by him_i.

b.' The hotel guests could not believe their eyes.

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[11] In other studies, it was shown that transformational distance between sentences also predicts confusability between them in memory and that the ease of memorizing sentences is predicted by the number of transformations that have applied to them (Mehler 1963).

[12] In an experiment similar to that of Miller & McKean (1964), Slobin (1966) examined the processing of reversible and irreversible passive sentences (e.g. *The ghost was chased by the robot* vs. *The flowers were watered by the robot*, where the former sentence is reversible but the latter is not). He found that Miller & McKean's results could only be obtained for reversible passives. That is, the time needed to process related irreversible active and passive sentences - such as *The robot watered the flowers* and *The flowers were watered by the robot* - is approximately the same. This result implies that the DTC is not always true and that other factors than the transformational complexity may also have an impact on the processing time. Also cf. Forster & Olbrei (1973) and Marslen-Wilson & Tyler (1980) for the interaction of semantic/pragmatic and syntactic factors in language processing.

In one test version, participants were presented with the sentences (a) and (b) in succession, in the other, with the sentences (a) and (b'). In both cases, the probe word was the adjective *skinny* that is part of the subject DP of the first sentence; that is, the participants were asked to decide as quickly as possible if the probe word was contained in the text. It turned out that the decision latencies were shorter after presentation of sentence (b) which contains the anaphoric pronoun *him*. Obviously, the implicit repetition of the DP by means of the pronoun allows for a faster recognition of the probe word.

This observation leads to the question if phonetically empty coreferential elements (e.g. traces) facilitate the retrieval of an antecedent DP in the same way as anaphorical pronouns. This question was investigated in a study by Bever & McElree (1988). In this study, participants were to read sentences of the following types (note that no participant was presented with both versions of one sentence):

(1-9) <u>*Sample sentences used in the experiment by Bever & McElree (1988)*</u>

a. [$_{DP}$ The **astute** lawyer who faced the female judge] was certain [t_{DP}] to argue during the trial.

b. [$_{DP}$ The **astute** lawyer who faced the female judge] hated the long speech during the trial.

In the raising construction (1-9a), the DP is moved from its underlying position to the beginning of the sentence leaving behind a trace ([t_{DP}]), while in the control sentence (1-9b), the same DP is not moved. As in Cloitre & Bever (1988), the probe word is the adjective contained in the subject DP (*astute*). Bever & McElree (1988) found that - compared to the control sentence - the gap in the raising construction does indeed facilitate the recognition of the probe word. Obviously, coreferential empty categories behave in a way similar to anaphoric pronouns. The authors take this to be strong evidence for the psycholinguistic reality of linguistically defined traces: when the trace is detected in on-line processing, its antecedent is retrieved and the elements contained in the antecedent become more accessible.[13]

[13] Bever & McElree (1988) also investigated PRO constructions (*[The astute lawyer who faced the female judge] strongly hoped [PRO] to argue during the trial*). The results show that PRO constructions also elicited faster probe recognition times than the control sentences. The reaction time difference between PRO and raising constructions was only marginally significant. In another experiment, the authors considered passive constructions with a trace in object position (*[The astute lawyer who faced the female judge] was suspected [t] by the boys*). Again, probe adjective recognition times were faster following the passive than following the control sentence without trace (*[The astute lawyer who faced the female judge] had spoken to*

All of the results reported above were obtained in studies dealing with language comprehension. But what about syntactic operations in language production? It is clear that the process of language production is not as readily controlled in an experimental setting, i.e. by means of reaction time experiments.

In this respect, too, spontaneous speech errors may possibly give important insights. If we think of a speech production device as applying transformations to an underlying (deep) structure, we can make predictions about the ways in which this device can malfunction. In two studies, Fay (1980a,b) examines slips of the tongue that he takes to result from the wrong or non-application of a transformational rule. On the basis of his data, he hypothesizes that speech production involves a direct realization of a transformational grammar (in the style of Chomsky (1965)).

Fay points out that in general, a transformation consists of three parts: a structural analysis, a structural change, and conditions on the application of the rule. He shows that each of these aspects is error-prone. Turning first to the structural analysis, he points out that this part of a rule may go wrong in three ways (Fay 1980b). First, a phrase marker may be misanalyzed in way such that the rule applies when it should, but applies incorrectly. Second, a phrase marker may be misanalyzed in a way such that an obligatory rule does not apply at all. Third, the transformational device may misanalyze a phrase marker so as to allow a rule to apply when it should not.

A particularly illuminating example from his corpus for the first type of error is the one given in (1-10a).

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the boys). See MacDonald (1989), McElree & Bever (1989), and Bever et al. (1990) for further experiments on this issue.

(1-10) *Wrong application of a transformational rule (Fay 1980b:113)*

a. Why **do you be** an oaf sometimes? ← Why are you an oaf sometimes?

a'. DEEP STRUCTURE:	Q you PRES be an oaf sometimes why
WH-FRONTING:	why you PRES be an oaf sometimes
*SUBJECT-AUX INVERSION:	why PRES you be an oaf sometimes
do-SUPPORT:	why do+PRES you be an oaf sometimes
MORPHOPHONEMICS:	why do you be an oaf sometimes?

The transformational derivation of the error is sketched in (1-10a'). According to Fay, the subject-auxiliary inversion (SAI) transformation has misanalyzed the structure to which it applies. Wh-fronting is correctly executed, but then the SAI rule fails to move the verb along with the tense marker to the left of the subject pronoun. That is, SAI is applied incorrectly. Since the tense marker does not have a lexical carrier in the erroneous utterance, *do*-support is triggered. Fay concludes that the error follows naturally as a consequence of a single mistake in applying a rule.

The second type of structural analysis error (incorrect decision not to apply a rule) is exemplified by the slip in (1-10b). In this example, the wh-fronting rule was omitted so that the wh-phrase remains in its deep structure position. This explanation is strengthened by the fact that no errors are observed in which a wh-phrase is misplaced into any other position than that which it occupies at deep structure.[14]

(1-10) *Non-application of a transformational rule (Fay 1980b:114)*

b. Linda, do you talk on the telephone **with which ear**?
← Linda, which ear do you talk on the telephone with?

I shall skip the third type of structural analysis error (i.e. application of a rule when it should not apply) and turn to the structural change part of a transformation. Even when the production device has correctly analyzed a phrase marker and performed a transformation, errors may still be made in carrying out a follow-up transformation. In particle movement, for instance, an element is first copied into a new position and then the original is deleted. Fay assumes that the error in (1-10c) is due to an omission of the

[14] Cutler (1980a) points out that this error may also have a conceptual cause. She shows that the intonation contour of the error is that of a yes/no question such as *Linda, do you talk on the telephone with your right ear?* (the prosody of the error had been phonetically transcribed). It is therefore possible that (1-10b) is a sentence blend, not a transformational error.

obligatory deletion operation. Consequently, the particle *on* appears twice in the erroneous utterance.

(1-10) *Omission of deletion operation in an error (Fay 1980b:116)*

c. Do I have to put on my seat belt **on**? ← Do I have to put on my seat belt?

Note that due to the fact that the rule of particle movement is optional, the slip in (1-10c) can also be analyzed as a blend of the two competing sentence frames *Do I have to put on my seat belt* and *Do I have to put my seat belt on*.

Particle movement, however, is obligatory when the object DP is a pronoun, and this brings us to the third part of a transformation, namely the conditions on transformations. Errors may also result from violations of such conditions. In the following example, for instance, the condition on particle movement is not satisfied. Obviously, the rule is treated as being optional (as in (1-10c)) and therefore, the particle is not moved. In (1-10d), however, the application of the rule is obligatory due to the presence of a pronominal object (note that a sentence like *His secretary types up the manuscript* is fully grammatical).

(1-10) *Violation of a condition on transformation (Fay 1980b:117)*

d. His secretary types **up** it ← His secretary types it up

In view of the data, Fay concludes that they do in fact support the claim that transformations are carried out as mental operations in speech production. Like other mental operations, too, transformations may be subject to malfunction.

It should, however, be emphasized that for many of the errors discussed by Fay, other nontransformational explanations are available (they might, for example, be analyzed as blends or shift errors). Stemberger (1982a) criticizes Fay's analysis and tries to account for the properties of naturally occurring syntactic speech errors in a model that does not assume transformational rules. He discusses syntactic errors in terms of the selection of phrase structures in an interactive activation model. If a related phrase structure becomes overactivated, it may inhibit the target structure and replace it, even if it is not the appropriate one. According to Stemberger (1982a), this kind of phrasal substitution accounts for the accidental application of a transformation as well as for application failures (as in (1-10abd)). In contrast to that, phrasal blends can account for the apparent failure of a part of a transformation (as in (1-10c)). Stemberger therefore concludes that theories of syntax that make no use of transformations but generate surface structure directly also have the potential to be psychologically real models of syntactic processing.

In this chapter, I introduced some of the basic assumptions of a mentalistic linguistic theory. I pointed out that a mentalistic theory is not content with investigating the observable linguistic behavior but rather takes into account mental processes involved in the generation of an utterance. Most importantly, it is assumed that a speaker has internalized a generative grammar that expresses his knowledge of language and, moreover, determines and constrains the linguistic behavior. Therefore, the actual data of linguistic performance may provide evidence on the basis of which hypotheses about linguistic structures and rules can be tested.

In order to illustrate possible relations between grammatical constructs and performance data, I presented results from a number of studies that investigate the psychological reality of such linguistic structures and rules. As it turns out, speech error data supply good evidence for the on-line processing of phonological units such as abstract features, segments, and syllables. Moreover, they provide evidence for the psychological reality of phrasal units. The situation, however, is not as clear with respect to syntactic operations. While results from comprehension experiments indicate that empty categories (traces) are in fact processed in on-line comprehension, most of the available production data furnish only weak evidence for the psychological reality of syntactic transformations.

2 The Speech Error Data

Lifeless, faultless.
(Scottish proverb)

Faults? The greatest of faults, I should say,
is to be conscious of none.
(Carlyle, On heroes and hero-worship)

I shall now turn to the heart of the present study, namely its empirical part. In the preceding chapter, I tried to exemplify what kind of relation holds between linguistic and psycholinguistic investigations; in the following, I am going to present data with the help of which I shall later discuss some of the basic properties of one particular morphosyntactic theory, namely the theory of Distributed Morphology. The morphosyntactic features (*ϕ-features*) which are relevant in the present context are - depending on the type of error - the agreement features person, number, and gender as well as case features and now and then combinations of these features.

This chapter consists of four sections. In the first section, I will briefly introduce my speech error corpus. In sections 2.2 and 2.3, I will concentrate on those slips of the tongue which result in the ungrammaticality of an utterance. First of all, these are the agreement errors to be discussed in section 2.2. The first type of agreement error I am going to consider are the subject-verb agreement errors (subsection 2.2.1). In German, verbs agree with their subject DPs with regard to the features person and number; as we will see, correct spell-out of these features may be thwarted by various influences. In subsection 2.2.2, I will be concerned with agreement errors within the determiner phrase (DP). Compared to English, agreement relations within the German DP are quite complex; the relevant features in this domain are gender, number, and case. The second type of errors which may give rise to ungrammaticality, namely subcategorization errors, will be subject to discussion in section 2.3. For this kind of error, the relevant morphosyntactic feature is the case feature.

The data which I am going to present in section 2.4 have different properties: accommodations are errors in which a feature conflict is resolved by means of a process of adjustment that takes place after the actual error has occurred. Consequently, a perfectly grammatical utterance surfaces. Stranding errors will be discussed in the same section. I am going to claim that accommodations and stranding errors are not adequately kept apart in the literature. In particular, some slips which are analyzed as accommodations should rather be treated as instances of stranding.

In all sections of this chapter, I will supplement and compare the slips of the tongue from my corpus with data from other psycholinguistic investigations, especially with data from other languages.

2.1 The Error Corpus

> Pour l'esprit, la possibilité d'errer
> n'est-elle pas plutôt la contingence du bien?*
> (Breton, Manifestes du Surréalisme)

I shall begin with a brief introduction of my speech error corpus. As is well-known, the collection of speech errors has a very long tradition. Anwar (1979) points out that

grammarians have been collecting and analyzing slips of the tongue at least as far back as the eigth century when the Arab linguist Al-Ki-sa'i wrote his book "Errors of the populace". More than one thousand years later, Rudolf Meringer, a linguist from Vienna, collected his famous and extensive error corpus (Meringer & Mayer 1895). Apart from some scattered references, however, linguists regained interest in the investigation of speech errors only in the sixties of the 20th century (e.g. Boomer & Laver 1968; Fromkin 1968; Nooteboom 1969; but also see Lashley 1951).

At Frankfurt University, Helen Leuninger and her team began to compile a corpus of spontaneously occurring speech errors in 1980. On the one hand, the motivation for this effort was to obtain a new database for the comparison of German and English slips - as collected e.g. by Victoria Fromkin, Merrill Garrett, and Stefanie Shattuck-Hufnagel. On the other hand, it was intended to compare speech errors of unimpaired speakers to those of language-impaired speakers, i.e. aphasics (see Klein & Leuninger 1988, 1990; Leuninger 1989).

The news spread fast and soon students as well as colleagues were actively participating in the extension of the corpus by reporting in detail errors which they either made or heard others produce. The slips are sampled in a paper-and-pencil fashion with as much of the error context as possible (e.g. embedding of the error element(s) in a sentence or discourse as well as possible non-linguistic influences).[15] Subsequently, the data are classified according to a number of criteria (type of error, error element, grammatical domain in which the error occurs, self-correction, and so on) and are fed into a database in the computer.[16]

At the moment of completing this thesis, the Frankfurt corpus of spontaneous speech errors contains 5595 slips. The distribution of these slips is given in table 1 below:

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* "Isn't for the mind the possibility to err rather the contingency to do right?"

[15] This is scanty information when compared to what Rudolf Meringer recorded for each slip he heard someone produce. Meringer also included the birthdate of the speaker, the educational background, the time of the day, the state of health and tiredness, etc. Fromkin (1971) points out that Meringer thus became the most unpopular man at the University of Vienna. It is a well-known fact, though, that even without including all of these details, interrupting a speaker by saying "Oh, you said a funny thing" or "Wait a second, I have to grab a pen" is not conducive to one's reputation. Obviously, these are the risks one has to take for scientific advance.

[16] More recently, the Frankfurt group also began to collect spontaneous slips of the hand. Since the seminal work of Newkirk et al. (1980), slips of the hand are known to share interesting properties with slips of the tongue. Up to now, we have gathered approximately 200 slips of the hand (see Glück et al. (1997) and Keller et al. (in prep.) for discussion of some of the German Sign Language Data).

Moreover, in the context of a comparative study on language production, we tried to elicit signed and spoken errors in an experimental setting. In this setting, adult signers and speakers were to describe a picture story under various cognitive stress conditions (also see Keller et al. (in prep.) for details).

Blends:	1333
Substitutions:	1125
Anticipations:	1087
Perseverations:	938
Exchanges:	843
Omissions:	197
Additions:	42
Fusions (sequential)[17]:	30
Sum	**5595**

Table 1: *Distribution of errors in the Frankfurt corpus*

In the following, I will often speak of "my error corpus". Note that this corpus is extremely - albeit deliberately - biased in that it only contains those errors which are relevant in the present context (see below for details).[18] On the one hand, I have searched the Frankfurt corpus for relevant errors; on the other hand, in the last five years, I have also collected a fair amount of slips myself. At the moment, this corpus contains 520 slips. Moreover, in a separate corpus, I have collected relevant errors I came across in the psycholinguistic literature. This corpus comprises 338 errors from various languages.

In my corpus, the errors are not grouped together according to the type of error (blend, substitution, anticipation, etc.) but rather according to what property makes them interesting for my investigation. Since it is the purpose of this chapter to introduce the different error types, I will only briefly characterize the error classification in the remainder of this section.

Firstly, there is quite a number of errors that involve some kind of feature mismatch, be it a feature mismach within DP, a mismatch between the subject and the verb of a sentence, or a mismatch between a case-assigning element and an argument DP (errors of

[17] In a blend, two planning frames with similar semantic features - either two phrases or two words - fuse, as e.g. in *she's a real **swip** chick* ← *swinging* // *hip* (Fromkin 1971:46). In contrast, in a fusion, two sentence elements which sequentially follow each other in an utterance are fused into one; e.g. *wer hat eine **Salamizza** bestellt* ← *eine Salami-Pizza* 'who has a salami pizza ordered'.

[18] Nondeliberate bias is probably observed in all speech error collections for the simple reason that some slips are perceptually more salient than others. For instance, errors that affect whole words are noticed more often than errors that affect features, segments, or syllables (Tent & Clark 1980) and anticipations are more salient than perseverations (Nooteboom 1980). On the role of perceptual bias and on the validity of speech error data cf. Cutler (1981) and Ferber (1995).

subcategorization). Secondly, there are slips which involve some kind of post-error adaptation process (often called "accommodation"), with adaptation either affecting the error element itself or the new context of the error element. Instances of lexical construal are also included in this group. The third group comprises those errors in which an abstract (morphosyntactic) feature is either stranded or shifted. Finally, there are also some errors that involve the anticipation or perseveration of a semantic competitor (note that these errors will only be introduced in subsection 4.2.2). The distribution of errors from my corpus is given in table 2.

Errors involving feature mismatch	**264**
mismatch within DP	101
subject-verb agreement errors	82
errors of subcategorization	81
Errors involving adaptation	**147**
adaptation of error element	40
adaptation of context	93
cases of lexical construal	14
Stranding/shift of abstract feature	**64**
feature stranding	47
feature shift	17
Semantic anticipation/perseveration	**45**

Table 2: *Distribution of errors in my corpus (N=520)*

Note that slips are listed twice in my corpus when they combine two of the above properties. In some exchange errors, for instance, adaptation may affect not only the error element (e.g. stem change in the new environment) but also the context (e.g. choice of appropriate determiner). In the following, whenever there is no source given for a cited error, this error is either from my corpus or from the Frankfurt corpus.

2.2 Anti-Agreement in Speech Errors

A word fitly spoken
is like apples of gold in a setting of silver.
(Proverbs 25,11)

Various kinds of slips of the tongue - exchanges, perseverations, anticipations, and blends - may result in agreement errors. I will subsume all these types of errors under the term "anti-agreement". This term is chosen following its use in literature dealing with syntactic theory. The cases which are discussed in these studies are those in which a verb happens to not agree with its subject under certain, well-defined conditions (in languages, of course, in which subject-verb agreement is the rule in other contexts). In the Italian dialects Fiorentino and Trentino e.g., a verb always appears in its default 3rd person singular form after wh-extraction of the subject (Brandi & Cordin 1989) while in Berber, the verb appears in a special participle form in such a construction (Ouhalla 1991b). Apparantly, in both cases the verb does not necessarily agree with the subject.[19] It should, however, be emphasized that in these languages the non-agreeing verb always appears in a fixed form and that the anti-agreement effect is restricted to certain constructions. As we will see shortly, both these restrictions do not hold with respect to the data which I am going to present in the next subsection.

I will first turn to subject-verb agreement errors and then to agreement errors within the DP. As far as the agreement relation between subject and verb is concerned, experimental studies (dealing with English) were conducted in which possible influences on the correct realization of verb forms were investigated. I will also present the results from these investigations and compare the data induced in the experiments to the spontaneous speech error data.

[19] Moreover, Ouhalla (1991b) discusses interesting data from Breton and Turkish. In Breton, verbs in affirmative sentences in general do not agree with non-pronominal subjects (they do, however, agree in negative sentences). In Turkish subject relative sentences, it is observed that the verb appears in its default 3rd person singular form. Also cf. Henry (1995) and Mohammad (1990) for defective agreement patterns in Belfast English and Arabic, respectively.

2.2.1 *Feature Mismatch between Subject and Verb*

First of all, subject-verb agreement errors shall be the center of our attention, i.e. errors in which the verb does not agree with its subject DP with respect to person and/or number features but rather with some other DP which, however, - as we shall see - need not necessarily be part of the intended utterance. Subject-verb agreement (henceforth: SVA) is the classical case of a syntactic dependency where information which influences the surface form of a certain element in a sentence may be separate from this element. Features of the subject determine the phonological form of the verb which goes with it; still, a phrase, a sentence, or even more material may intervene between the subject DP and the verb.[20] Especially when this is the case, the appearance of agreement errors like the one in (2-1) seems to be most likely (nonagreeing elements are in bold-face).

(2-1) <u>*Agreement of verb with local plural noun*</u>

[**the readiness** of our conventional forces] **are** at an all-time low
← the readiness ... is at an all-time low (Bock & Miller 1991:46)

In this utterance, the complex subject DP (in brackets) is singular, the verb (*are*), however, appears in its plural form and agrees with the directly preverbal DP *our conventional forces*, which is part of a prepositional phrase modifying the nominal head of the subject DP (*readiness*).[21] Errors like the one above lead Otto Jespersen in his "Philosophy of grammar" to formulate the hypothesis that "if the verb comes long after its subject, there is no more mental energy left to remember what was the number of the subject" (Jespersen 1924; cited from Bock & Cutting 1992:99).

Spontaneous SVA-errors such as (2-1) are hardly mentioned in the psycholinguistic literature. The scarce data which are given (e.g. in Francis 1986; Bock & Miller 1991) all share the following characteristic: there always appears another DP between the nominal head of the complex subject DP and the verb whose number feature is different from that of the nominal head (and therefore from the subject DP as a whole). The phenomenon resulting from these structural facts has been referred to as "attraction" or "proximity

[20] Here, "intervene" should be understood as linear intervention. The structural relation between the subject DP and the verb - usually seen as a relation of Spec-head agreement - is, of course, always the same, no matter how much phrasal material intervenes.
[21] For ease of description, in the following, I will refer to elements such as *readiness* in (2-1) as "the nominal head of the subject DP", being aware of the fact that actually *readiness* is the head of an NP which is sister to the highest D° element of the subject DP.

concord" in the literature, since the verb agrees with a proximal or more local DP - that is, a linearly closer DP - instead of with the more distant nominal head.

However, regarding SVA, a series of experiments was carried out. In all of these experiments, an attempt was made to provoke agreement errors in an experimental setting (Mann 1982; Bock & Miller 1991; Bock & Cutting 1992; Bock & Eberhard 1993; Nicol 1995, Eberhard 1997).[22] Above all, the researchers were focusing their attention on structural differences which might have an influence on the probability of errors (e.g. complexity of the subject DP) as well as on semantic-conceptual properties of the NPs themselves.

Before comparing the properties of the experimentally induced data with the properties of spontaneous errors, I first want to briefly sketch the results of these experiments in subsection 2.2.1.1. In subsection 2.2.1.2, I am going to show that we do not only observe similarities between the experimental and the spontaneous data but also significant differences, above all concerning the source of the error. As a matter of fact, the different syntactic structure of the German sentence - the underlying word order being SOV - makes other potential error sources available than the SVO structure of the English sentence. Moreover, as we will see, the variation of structures used in the experiments to elicit errors was very limited.

2.2.1.1 Experimental Studies on Proximity Concord

A pioneering study investigating verbal agreement was carried out by Mann (1982). In his experiment, Mann used sentences containing a subject which is ambiguous with respect to number. Consequently, the number specification chosen for the verb never gave rise to ungrammaticality. However, he slightly modified the syntactic environment of the verb from sentence to sentence and examined which form of the verb was chosen by the experimentees. Students were asked to insert verbs into structures like the ones in (2-2ab).

(2-2) *Sentence frame used in the experiment by Mann (1982)*

[22] All of these experiments were concerned with the number feature in production. However, other experiments using a similar error induction procedure were conducted which investigated the computation of gender agreement (Meyer & Bock 1999; Vigliocco & Franck 1999). Since the errors elicited in these experiments differ from the spontaneous SVA-errors as well as from the gender errors within DP (to be discussed in subsection 2.2.2), they will not be presented here. They will, however, be subject to discussion when I am concerned with the copying of agreement features in section 4.4.

a. The sheep tested by the **scientist** on Saturday ___ very ill.
b. The sheep tested by the **scientists** on Saturday ___ very ill.

Mann observed that the higher the number of plural forms preceding the verb the higher was the probability of the plural form of a verb to be chosen for insertion into the slot, even if the subject was not forcing such a decision. Consequently, the plural form *were* was inserted in (b) above chance level by the students. In his conclusions, Mann proposes that the plural noun(s) preceding the verb give rise to what he calls a "plural atmosphere", which influences the selection of the corresponding verb.[23]

The question if the capacity of the memory ("mental energy"; cf. the quotation by Jespersen mentioned above) influences the selection of a particular verb form could not be investigated by Mann since his experimental setting - the presentation of printed material - made the subject DP continuously available. Therefore, his setting may safely be called an off-line condition. However, that very question was the center of attention in the first experiment conducted by Bock & Miller (1991). In this experiment, beginnings of sentences were acoustically presented to the participants who were asked to repeat and to complete the sentences. All of the sentence preambles included a complex subject DP. The nominal head of the subject DP was followed by another DP whose number specification differed from the one of the nominal head (mismatch condition). For half of the sentence beginnings, the nominal head was plural while the local noun (i.e. the one linearly closer to the verb) was singular; for the other half the opposite was true. Moreover, a control condition was added in which the number feature of the nominal head and that of the local noun was the same. The length of the modifiers which followed the nominal head (a prepositional phrase or a relative clause) was varied. In (2-3), you will find some examples for sentence preambles used in this experiment; the material in brackets was included only in the version with a more complex postnominal modifier.

(2-3) *Sentence preambles used in the experiment by Bock & Miller (1991)*

a. The **key** to the (ornate Victorian) **cabinets**
b. The **keys** to the (ornate Victorian) **cabinet**
c. The **boy** that liked the (colorful garter) **snakes**

[23] In his review, Danks (1984) correctly criticizes that control conditions were missing in Mann's experiment. Moreover, the sentences were presented to the experimentees in printed form with an empty slot for the verb. This fact allows for the possibility that metalinguistic problem solving strategies were dominating the normal production processes.

d. The **boys** that liked the (colorful garter) **snake**

The large part of agreement errors (more than 90%) occurred in the mismatch condition. The length of the constituent which contained the mismatching local noun, however, did not have any influence on the error rate, a fact which contradicts the assumption that the limited capacity of the memory can be held reponsible for the errors. In addition, it turned out that more errors were made after prepositional phrases than after relative clauses. A particularly interesting error pattern emerged when singular subjects were compared to plural subjects in the mismatch condition: agreement errors almost exclusively occurred in the experimental condition with a singular nominal head and a local plural DP (i.e. after sentence beginnings like (2-3a) and (c)). This pattern indicates that the errors are not due to a problem in correctly identifying the subject because if that had been the case, errors in the condition with a local singular noun should have occurred as often.

In a second experiment, Bock & Miller (1991) investigated if certain conceptual features of the nouns within the complex subject DP (like e.g. animacy and concreteness) possibly have an influence on the error rate. It is a well-known fact that a feature like animacy is correlated with subject status to a high degree (cf. e.g. Clark & Begun 1971). Consequently, one could easily imagine that the construction of SVA is more likely to fail when the nominal head of the subject DP lacks that "typical" subject property while another preverbal noun possesses this very property. According to this hypothesis, an agreement error like *The blanket on the babies were small* is expected to be more likely than one like *The baby on the blankets were small* since only in the former the local noun (*babies*) is [+animate].

In the experiment, however, this expectation was not borne out. The result from the first experiment that local plural nouns are more likely to trigger errors could be replicated; still, animacy and concreteness did not have any influence on the error rate. Following a given sentence preamble like *the nomad of the mountains* (local noun [+plural, -animate]), erroneous agreement was not observed more often than following a sentence preamble like *the mountain of the nomads* (local noun [+plural, +animate]). This outcome supports the assumption that a conceptual feature like animacy may very well play a role in the selection of a sentential subject, that the same feature does, however, not influence the implementation of agreement between the subject DP and the verb.[24]

[24] The authors interpret this as good proof for a modular conception of language production (as brought forward e.g. by Garrett (1975ff)) according to which different information is available at different processing

In further experiments, Bock & Cutting (1992) investigated the question why after non-clausal complements (e.g. after a PP as in (2-3a)), agreement errors were more likely to arise than after clausal complements (e.g. after a relative clause as in (2-3c)). In order to explain the errors, they compared two production models, a serial and a hierarchical model. In a serial architecture, the limited capacity of the working memory might have an impact on the emergence of errors. During the processing of intervening material, the nominal head of the subject DP must be stored in the memory until the verb appears in order to ensure the selection of the correct form of the verb. The more complex the material is which separates the nominal head from the verb, the more likely an error should be. Since clauses are structurally more complex than PPs, i.e. clauses require more processing capacity, in a serial model, intervening clauses are expected to create more SVA errors than

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levels. At the level where syntactic relations are established, semantic and conceptual features are no longer available and therefore can not have any influence on the occurrence of errors (cf. section 4.1 for details).

intervening PPs.

With a hierarchical production model, other predictions are made. Bock (1991) has pointed out that one of the biggest challenges in language processing is to regulate interferences between elements which are simultaneously activated and structurally similar. In a hierarchical model, different entities intervening between a subject DP and a verb are expected to have different effects. It is assumed that at an early processing level (the "functional level"; cf. section 4.1), separate clauses occupy separate processing components (clausal packaging). Consequently, in a sentence like *The claim that wolves were stealing babies was rejected* the matrix sentence *The claim was rejected* would be represented separately (in a separate package) from the embedded clause *that wolves were stealing babies*. Therefore, information contained in the one sentence should not interfer with information contained in the other sentence.

On the other hand, phrasal insertions - e.g. a PP like *about the stolen babies* - add further information to one processing component and therefore give rise to a potential source for distraction within that component. Consequently, in contrast to the serial model, with a hierarchical architecture the prediction is made that sentential insertions should cause a lower rate of agreement errors than non-sentential complements.

In order to evaluate the two hypotheses, the authors conducted three experiments. As in the study of Bock & Miller (1991), subjects were presented with sentence preambles and asked to complete the sentences. The first experiment focused on the influence of prepositional phrases versus relative clauses on SVA-errors (*the editor of the history books* versus *the editor who rejected the books*). It turned out that following sentential modifiers, the error rate was lower than following PP modifiers. In experiment 2, this result was replicated for complement clauses (like *the report that they controlled the fires*). Finally, in a third experiment, the authors investigated which influence the length of the postnominal modifier has. The results revealed that a higher degree of complexity did only have an impact on the error rate following preambles containing a PP complement. Once again, this result is neither compatible with a serial model nor with the assumption that the mental capacity can be held responsible for the occurrence of errors.

The same experimental setting was used by Bock & Eberhard (1993) in order to investigate if further factors might favour the probability of errors. These factors were:

- morphophonological factors: Does perhaps the fact that regular plural inflection on nouns is homophonous with 3rd person singular inflection on verbs have an impact?

In other words: Does the appearance of the one preclude the appearance of the other? In the experiment, pseudo plurals (i.e. singular forms which end in /s/ or /z/ like e.g. *cruise*) were used for local nouns in order to check if these, too, increase the rate of SVA errors.[25]

- morpholexical factors: If the morphology of the regular plural marking on nouns somehow contributes to agreement marking on the verb, then agreement errors should be more likely after irregularly inflected local nouns (like *children*). If, however, abstract features trigger the agreement operation, then no difference is expected between regular and irregular local nouns.
- semantic factors: Certain nouns are syntactically singular but represent a group of individuals, i.e. they bear a plural meaning (e.g. collective nouns like *army* or *fleet*). Following the assumption that abstract features do indeed have an influence on the establishment of agreement, it is reasonable to investigate the possibility that the semantic plural of local nouns facilitates agreement errors.

Bock & Eberhard (1993) were able to demonstrate that none of these three factors gave rise to a change of error patterns. Neither local pseudo plurals nor local collective nouns induced error rates which were comparable to the ones occurring with real plurals. Moreover, local nouns with irregular plural marking caused as many SVA-errors as those which are regularly inflected.

On the basis of further refined experiments, Nicol (1995) assumes that the specification of a verb's number is effected while a (possibly complex) subject DP is produced. At that time, several nouns may be simultaneously activated, namely the nominal head of the subject DP and DPs contained in postnominal modifiers. DPs, however, which occur in a sentence after a critical point of time are not able to interfer with the number specification on the verb. In an earlier experiment, sentence preambles like the ones in (2-4) were subject to investigation in which the distance between the nominal head (*helicopter*) and the mismatch (*flights* vs. *canyons*) varied.

(2-4) *Sentence preambles used in the experiment by Nicol (1995)*

[25] A similar phenomenon is held responsible by Stemberger & MacWhinney (1986) for another type of error. In an experiment, they found out (amongst other things) that zero-marking errors on present tense verbs (i.e. omission of the inflectional ending; e.g. *choose* instead of *chooses*) occur almost exclusively when the verb already ends with a /s/ or a /z/.

a. **The helicopter** for **the flights** over the canyon
b. **The helicopter** for the flight over **the canyons**

It turned out that following sentence beginnings of type (a) - with the mismatching DP *the flights* being structurally closer to the nominal head of the subject DP - three times as many SVA-errors were produced than following sentence beginnings of type (b). Obviously, it is

not only the distance between the nominal head of the subject DP and the verb which has an impact on the agreement process but also the distance between the nominal head and the mismatching post-head DP. Interestingly, in cases like (2-4a), the verb does not agree with the linearly more local DP *the canyon* in an error but rather with the semi-local DP *the flights*.

But why should the syntactic distance have such an impact? Nicol (1995) assumes that in a syntactic structure, a plural feature percolates from a DP to the verb while simultaneously, the post-nominal modifier is constructed. Possibly, the more local plural DP (in (2-4b) *the canyons*) is simply processed too "late" as to have an effect on the specification of the number on the verb; that is, its plural feature does not have enough time to percolate. The error rate after sentence beginnings like (2-4b) was also shown to be lower than the one after sentence beginnings of the type *the editor of the history books* (as used in the preceding experiments), although in both cases the mismatching DP is equally close (i.e. adjacent) to the verb. According to Nicol, this is due to the fact that the modifier *of the history books* is less complex than *for the flight over the canyons*, so that with the latter modifier, the plural feature of the mismatching DP has a longer way to take.[26]

To sum up, let me repeat the most important results of the experiments dealing with subject-verb agreement. All the experimental settings were designed in a way to provoke erroneous agreement on the verb. In particular, in the experiments, the verb sometimes happened to agree with a more local DP which was part of a complex subject DP but whose number specification differed from that of the nominal head of the subject DP. By far the highest number of errors occurred when this local DP was plural (cf. subsection 4.4.1 for an account of this phenomenon). Moreover, the authors were able to show that morphophonological, morpholexical, and semantic properties of the involved DPs did not have an impact on the error rate. What did have an impact, though, was the nature of the

[26] Another experiment conducted by Nicol (1995) served the purpose of checking the role of the syntactic distance. In that experiment, sentence preambles like the ones in (i) and (ii) were presented:

(i) **the owner** of the house **who** charmed the realtors

(ii) the owner of **the house which** charmed the realtors

The syntactic path which the plural feature of *realtors* has to take is shorter in (i) than it is in (ii), since the relative clause in (i) stands in a hierarchically higher position ("high attachment") than the one in (ii) ("low attachment"). Had the syntactic distance an influence on the error rate then - due to the shorter path - more errors should occur following sentence beginnings like (i). Unfortunately, Nicol's results were not significant. Altogether, there were not enough errors in order to corroborate an influence of the syntactic distance (the "attachment site").

modifying constituent: after PP complements more errors were observed than after sentential complements.[27]

In the following subsection, spontaneous errors shall be compared with the experimental data. On the one hand, it is worthwhile investigating to what extent the two groups of errors exhibit similar characteristics; on the other hand, we need to check if possibly other influences come to fruition in the German slips of the tongue. With respect to experimentally induced errors, Vigliocco et al. (1995, 1996a,b) have already pointed out that speakers of different languages may have at their disposal different devices for constructing subject-verb agreement. The authors show that the results of Bock and her colleagues are not easily generalized, since English with its poor inflectional system is not very well suited for investigating this phenomenon. In a series of experiments (analogous to those conducted by Bock & Miller (1991)) in which Italian, Spanish, French, and Dutch sentence preambles were to be completed by the subjects, they were able to detect semantic influences which did not play a role in control experiments conducted with English speakers.

2.2.1.2 SVA-Errors in Spontaneous Speech

In some of the publications the results of which I have reported in the preceding subsection, one may also find some scattered spontaneous errors like e.g. the one cited in (2-1) above and the following three (subject DPs in brackets, nonagreeing elements in bold-face):[28]

(2-5) *Some spontaneous English SVA-errors*

a. [**the cause** of layoffs such as these] **are** not the taxes ← the cause of layoffs such as these is not the taxes (Francis 1986:315)

b. [the only **generalization** I would dare to make about our customers] **are**

[27] In further experiments, Nicol et al. (1997) and Pearlmutter et al. (1999) were able to show that the by now well-known asymmetric interference from plurals arises not only during the production of sentences but is also observed in sentence comprehension tasks. Obviously, interference may arise whenever a structure containing a singular head and an intervening plural is computed, whether during production or comprehension.

[28] I was taking care to really cite spontaneous spoken errors only. Consequently, errors for which a letter or a newspaper was given as a source were not taken into consideration, even though these certainly share important characteristics with the slips of the tongue (as well as with the experimental data), e.g. stronger influence of a local plural DP. For written SVA-errors cf. e.g. Strang 1966, Francis 1986, Fayol et al. 1994, and Chanquoy & Negro 1996.

that they're pierced ← the only generalization ... is that they're pierced (Bock & Cutting 1992:99)

c. [**disputes** over health coverage] **was** the cause
← disputes ... were the cause (Bock & Eberhard 1993:59)

I only found 25 spontaneous English SVA-errors in the literature for which the trigger was

unambiguously agreement of the verb with a wrong DP.[29] In all 25 cases, this wrong DP is part of a complex subject DP; in all 25 cases, the wrong DP is more local to the verb and in 23 of them, it is adjacent to the verb. In 21 cases, the verb agrees with a local plural DP which, for the most part, is contained within a prepositional phrase modifying the head (in 16 cases; e.g. (2-5a)). More rarely, the local DP is part of a (reduced) relative clause (in 3 cases; e.g. (2-5b)), of an infinitival complement or another constituent (6 cases). Slip data as (2-5c) in which the verb agrees with a local singular DP are hardly observed; this is true for only four out of the 25 examples.

Therefore, as far as error type and source of the error are concerned, the similarities of the few English slips of the tongue to the data induced in the experiments are striking. Interestingly, a number of German slips from my corpus shows the same properties as the ones in (2-5) above:[30]

(2-6) <u>*Spontaneous German SVA-errors: Agreement of verb with local noun*</u>

a. [**eineendlos lange Schlange** von Transportern, Lastwagen und anderen
an endless long line of transporters, trucks and other
Fahrzeugen] **such-en** den Weg hinaus
vehicles look.for-3.PL the way out
← eine endlos lange Schlange von Transportern ... such-t ...
← *an endless long line of transporters ... look.for-3.SG ...*

b. [**ein Ende** der Unruhen] **sind** nicht abzusehen
an end of.the disturbances are not in.sight
← ein Ende der Unruhen ist nicht abzusehen
← *an end of.the disturbances is not in.sight*

c. [während **andere Autoren,** wie zum Beispiel Böll,] eher punktarm **ist**
while other authors like for example Böll rather period.few is
← andere Autoren, wie zum Beispiel Böll, eher punktarm sind
← *other authors like for example Böll rather period.few are*
"while other authors, like for example Böll, use few periods"

---

[29] Other cases shall not be considered here. Amongst these are e.g. shifts of agreement markers as in *he go backs to* ← *he goes back to* (Garrett 1975:163) and omissions as in *it just lose something* ← *it just loses something* (Stemberger 1983a:578).

[30] The notational conventions that will be used throughout are the following: In the first line, the erroneous as well as the intended utterance are given in standard orthography, the relevant (e.g. non-agreeing) elements being in bold-face. The second line presents a morpheme-by-morpheme translation, supplemented by gender, case, and/or agreement information where necessary. Whenever the exact meaning of the first line (be it German or some other language) is not readily inferred from the second line, I shall give an idiomatic English translation in quotation marks in a third line.

In the three examples given in (2-6), the subject DPs contain postnominal modifiers: a prepositional phrase in (a), a genitive complement in (b), and an apposition in (c). Besides the familiar types of errors in (2-6), it is particularly interesting to observe that the influences on the German SVA-errors are considerably more diverse than the English errors discussed in the preceding subsection would suggest. As a matter of fact, only seventeen out of the 82 spontaneous SVA-errors in my corpus are comparable to the data obtained in the experiments. The example in (2-6a) is one out of five in which the local DP is part of a PP complement, the one in (c) is the only one in which a comparative phrase intervenes between the nominal head of the subject DP and the verb. In the remaining eleven instances, the intervening DP is a genitive complement (as exemplified by (2-6b)). However, in three of these, additional material appears between the genitive complement and the verb, namely an object PP, as e.g. the PP *unter den Schwellenwert* "under the threshold" in (2-6d):

(2-6) d. was passiert, wenn [**die Aktivierung** aller Knoten] unter
what happens if the activation of.all nodes under
den Schwellenwert **sink-en**
the threshold sink-3.PL
← wenn die Aktivierung aller Knoten ... sink-t
← *if the activation of.all nodes ... sink-3.SG*

Superficially, this particular SVA-error resembles the ones induced by means of sentence preambles by Nicol (1995) (cf. (2-4): *the helicopter for the flights over the canyon*), since in both cases the verb happens to agree with a semi-local DP; i.e. in (2-6), the verb agrees in number with the plural DP [$_{DP}$ aller Knoten] "of all nodes" but the singular DP [$_{DP}$ den Schwellenwert] "the threshold" intervenes between this plural DP and the verb. However, an important difference between (2-4) and (2-6) is that in the German example, the intervening DP is not part of the complex subject DP.

In (2-7), you will find two remarkable errors which, however, have characteristics different from those of the errors presented so far. The slip (2-7a) is a special case, since, due to a topicalized PP, the verb precedes the subject DP in this error.

(2-7) <u>*Other types of German SVA-errors*</u>

a. für jedes geäußerte Wort **müsst-en** dann [**eine Mehrzahl** an
for every uttered word must.COND-3.PL then a multitude of
Wört-ern] aktiviert werden
word-PL activated get

←	müsst-e	dann	eine	Mehrzahl	an	Wört-ern	aktiviert	werden
←	*must.COND-3.SG*	*then*	*a*	*multitude*	*of*	*word-PL*	*activated*	*get*

b. dass [**einekriegerische Auseinandersetzung**] für die Schwede-n zu
that a military conflict for the Swedes-PL to
einem Desaster geführt **hätt-en**
a disaster lead had.COND-3.PL
← dass eine kriegerische Auseinandersetzung ... geführt hätt-e
← *that a military conflict ... lead had.COND-SG*

The error cited in (2-7b) is somewhat different from the one given in (2-6d) because here the subject is separated from the verb by two PPs and the verb erroneously agrees with a DP contained within the first PP. Therefore, once again, we are dealing with an instance of agreement with a semi-local DP.

Before looking at the characteristics of the German slips of the tongue with more scrutiny, let us briefly recollect the following facts: in all of the English errors elicited in the SVA-experiments, a verb agrees with a DP that is part of a complex subject DP which precedes the verb. This, of course, is not the only conceivable option regarding defective agreement. On the one hand, it is very well possible that constituents precede the verb which are neither the subject of the sentence nor part of a complex subject DP. On the other hand, the verb may also agree with a DP that follows it, i.e. it may anticipate person and number features.

In English, however, the possibilities for a non-subject to precede the verb are highly restricted in matrix as well as in embedded clauses. Except for wh-questions, objects can not directly precede the verb (for instance, there is no construction like *The colour of the cars likes Peter*, in which the local plural DP *the cars* would be a potential error source).[31] In fact, I only came across one instance of a spontaneous English slip in which the verb erroneously agrees with a preceding object wh-phrase, namely the one in (2-8). I have not found a single case of anticipatory agreement (like e.g. the hypothetical error **My grandmother like the pictures*).

(2-8) *Agreement of the verb with an object wh-phrase in English*

What things **are this kid**, is this kid going to say correctly?
(Levelt & Cutler 1983:206)

[31] It is, of course, possible to topicalize constituents in English, as e.g. in *The colour of the cars Peter likes*. But in contrast to German, in these constructions the subject DP always intervenes between the topicalized phrase and the verb, that is, the object DP does not directly precede the verb.

As is well known, things are different in German. Due to the underlying SOV word order, object DPs always precede the verb in embedded clauses. Moreover, in matrix clauses, object DPs may directly precede the verb in topicalizations. That is, in contrast to English, it is often the case that an object DP is closer, i.e. more local, to the verb than the subject

DP. We therefore expect instances in which the verb erroneously agrees with an object DP. And indeed: In 28 out of 82 spontaneous SVA-errors from my corpus, the verb agrees with an object DP. Interestingly, in 27 of these cases, the error occurs in an embedded clause (cf. (2-9ab)) and only in one single case, an error is observed in a matrix clause with topicalized object DP (2-9c).[32]

(2-9) *Agreement of the verb with object DP in German*

a. dass **man** Prüfmethoden finden **müss-en**
that one testmethods find must-3.PL
← man Prüfmethoden finden muss
← *one testmethods find must.3.SG*

b. wenn **eine hirnorganische Störung** zur Störung einer oder
if a brainorganic disorder to.the disorder of.one or
mehrerer Verarbeitungskomponenten **führ-en**
more processing.components lead-3.PL
← wenn eine hirnorganische Störung zur Störung ... führ-t
← *if a brainorganic disorder to.the disorder ... lead-3.SG*

c. die unschönen Sachen **vergess-en ich**, vergess-e ich
the not.nice things forget-3.PL I forget-1.SG I
meist ziemlich schnell
mostly quite fast
"Mostly, I forget the unpleasant things quite fast."

In all the examples discussed so far, the verb agrees with a local DP which either is part of a complex subject DP (modifier) or which is the object of the intended utterance. In the following, I will point out some other triggers for SVA-errors. First of all, there are 22 instances in my corpus in which the verb happens to agree with a wrong subject, for the most part with the subject of a matrix clause, as exemplified by (2-10ab). In both cases, the verb in the embedded clause appears in the second person singular which is the person and number specification of the matrix subject.

[32] In their collection of experimentally induced writing errors in French, Chanquoy & Negro (1996) found a number of errors in which the verb agrees with a local object pronoun. Such errors were most likely to occur when the subject pronoun was singular and the object pronoun was plural, i.e. in sentences of the form *Il les montrait dans les foires* "He showed them at the fairs" (also compare the results of e.g. Bock & Miller (1991)). Note that we are dealing with written errors here; phonetically the singular and the plural form of the verb (*montrait/montraient*) are, of course, undistinguishable.

(2-10) *Agreement of the verb with wrong subject*

a. wenn du annimmst, dass **sie** Überzeugungen und Meinungen **hast**
if you assume that she beliefs and opinions have.2.SG
← dass sie Überzeugungen und Meinungen hat
← *that she beliefs and opinions has*

b. das bist ja auch du, **die** das **schreib-st** ← die das schreib-t
that are just also you who that write-2.SG ← *who that write-3.SG*
"That's indeed you who writes that."

c. das gab's noch nie, dass **ich** später als du aufgestanden **bist**
that gave.it yet never that I later than you got.up be.2.SG
← dass ich später als du aufgestanden bin
← *that I later than you got.up am*
"That never happened before, that I got up later than you did."

The error (2-10c) is somewhat different, since in that example, the verb agrees with the pronoun *du* "you" which is part of an adverbial phrase. Within that phrase, however, the pronoun has nominative case and is therefore a potential candidate for subject status.

Moreover, there are four instances of SVA-errors in relative clauses. In both examples in (2-11), the relative clause modifies a noun from within a complex DP: in (a) the nominal head of the subject DP (*Formen* "forms") and in (b) a noun (*Kleidung* "clothing") which is part of a complement PP. In both instances, however, the relative pronoun is ambiguous; *die* is the relative pronoun for all plural forms (irrespective of gender) as well as for the feminine singular forms. Due to the fact that *Kriminalität* "crime" in (2-11a) and *Kleidung* in (2-11b) are feminine, the relative pronoun may relate to the nominal head as well as to the noun within the PP complement in both examples. Since the head and the complement have different number features, the wrong reference of the relative pronoun gives rise to an SVA-error. Coincidentally, in (2-11b), this does not result in ungrammaticality of the utterance. What is being said here is that the suppliers should be attractive but not necessarily the clothing.

(2-11) *Agreement errors in relative clauses*

a. es gibt **Formen** von Kriminalität, **die** importiert zu sein **schein-t**
there exist forms of crime which imported to be seem-3.SG
← Formen von Kriminalität, die importiert zu sein schein-en
← *forms of criminality which imported to be seem-3.PL*

b. die Anbieter von ökologischer **Kleidung**,
the suppliers of ecological clothing
die auch attraktiv sein **soll-en**
which too attractive be shall-3.PL
← ökologischer Kleidung, die auch attraktiv sein soll
← *ecological clothing which too attractive be shall.3.SG*

Finally, we also observe instances of defective subject-verb agreement in which the verb agrees with a DP which itself is not part of the actual utterance; these are the blends. In some blends, the respective subjects of the competing planning frames have different number and/or person features. A feature conflict arises whenever the subject of one planning frame intrudes into the other frame but the verb does not accommodate to the new subject. In this type of error, we are not to speak of the influence of a local (or non-local) DP since the agreement features on the verb do not match the features of any DP in the utterance. There are eleven such cases in my collection, two of which are given in (2-12).

(2-12) <u>*Agreement errors in blends*</u>

a. weil **man** das Kind nicht fragen **könn-en**
because one the child not ask can-2.PL
← weil man ... nicht fragen kann // wir ... nicht fragen könn-en
← *because one ... not ask can.3.SG // we ... not ask can-2.PL*

b. da **waren ein spanischesPärchen** dabei
there were a Spanish couple there
← da waren zwei Spanier dabei //
← *there were two Spaniards there //*
da war ein spanisches Pärchen dabei
there was a Spanish couple there

In both examples in (2-12), the subject DPs (*man* "one" and *ein spanisches Pärchen* "a Spanish couple", respectively) are 3rd person singular but the respective verbs appear in their plural forms. In both cases, we may either assume that the frame with the plural DP was actually planned and that the competing singular DP somehow found its way into that frame, or that the frame with singular subject was planned and that the plural verb is the intruder.

With that, all variants of SVA-errors from my corpus have been briefly described. Table 3 serves as a synopsis of the different error types and their distribution. With respect to the errors that are comparable to the experimentally induced errors, i.e. those

errors in which the verb agrees with a wrong DP appearing under the same CP projection as the verb, the observed error patterns are similar to those from the experiments: for the most part, a plural DP is triggering the error (one exception was given in (2-6c) above) and moreover, the source of the error is always a local DP. In this respect, then, the spontaneous and the experimentally induced errors resemble each other.

Serious differences, however, are revealed on closer examination of the structural position of the source of the error. As far as agreement errors within a CP are concerned, the German data illustrate that verbs may very well agree with a local object DP - a phenomenon which, due to the different word order, is not expected in English. In addition to that, we observe instances of verbs erroneously agreeing with the subject of a matrix, an embedded or a coordinated clause as well as instances of agreement errors in blends, i.e. after fusion of two planning frames with differently specified subjects. I take this to be a remarkable result, since the experiments reported in the preceding subsection did not suggest such a broad range of variation. And they could not possibly do so, since the experiments were not designed accordingly. As a matter of fact, in these experiments, only one type of error was intended to be provoked.[33]

	TRIGGERING DP IS	
AGREEMENT OF THE VERB WITH	plural	singular
□ wrong DP within subject DP	14	3
□ an object DP	23	5
□ wrong subject[34]	4	18
□ wrong DP in relative clause construction	2	2
□ intruding DP in blend	altogether: 11	

Table 3: *Distribution of subject-verb agreement errors (N=82)*

[33] In a single case study with a paragrammatic patient, Glück (1995) obtained results which are very similar to those from the experiments and the analysis of the spontaneous errors reported above. In a verb agreement task in which given uninflected verbs were to be inserted in a clause structure, the patient tended to interpret the DP closest to the verb as being the one relevant for the agreement information - independent of morphological case marking on that DP.

[34] This type of SVA errors as well as the errors in relative clause constructions should not be lumped together with those mentioned in □ and □, since completely different structural conditions hold. Only in the former two, do the verb and the DP which the verb agrees with stand in different CPs. As mentioned before, in blends there is no triggering DP in the true sense.

By the way, in English with its rather poor inflectional system it is much more likely that the phonological surface form of a constituent which is not the subject of the sentence does not indicate its non-subject status, i.e. this constituent's case feature is not morphologically visible. In the English example (2-13a) e.g., the bracketed elements *[these figures make]* could be interpreted as a subject-verb sequence in isolation, since the DP *these figures* happens to have the same phonological form in the dative (which is assigned by the preposition *of*) and in the nominative. In contrast to that, this is not true for the German examples in (2-13bc). Neither the genitive DP in (b) nor the dative DP in (c) allow for a nominative interpretation; the nominative forms of these DPs would be *ihre Unterhaltszahlungen* and *morphologische Struktur*, respectively.

(2-13) *Phonological surface form of 'wrong' subject in SVA-errors*

a. **the sheer weight** of all [these figures **make**] them harder to understand
   ← the sheer weight of all these figures makes them ... (Francis 1986:314)

b. **die Höhe** [ihrer Unterhaltszahlungen **richt-en**] sich nach
   the size [of.her maintenance.payments depend-3.PL] REFL on
   der Höhe ihrer Einkünfte
   the size of.her income
   ← die Höhe ihrer Unterhaltszahlungen richt-et sich ...
   ← *the size of.her maintenance.payments depend-3.SG REFL ...*

c. alle **Dinge,die** mit [morphologischer Struktur **zusammenhäng-t**]
   all things which with [morphological structure be.connected-3.SG]
   ← Dinge, die mit morphologischer Struktur zusammenhäng-en
   ← *things, which with morphological structure be.connected-3.PL*

I wish to point out that this implies that the errors occur at a point in the derivation at which the phonological surface form of the derivation has not yet been specified. The local DP, however, must have already been marked with the feature [±plural] since it is that very feature which is responsible for the error (see section 4.4 for further discussion). In the next subsection, too, the richer inflectional system of German will play an important role.

2.2.2 *Feature Mismatch within DP*

Since the seminal work of Abney (1987), it is generally assumed that noun phrases are contained within a functional projection which is headed by the functional element D°, the

determiner. On the one hand, this assumption is based on the specific grammatical properties of determiners which - as is well-known - may be inflected for number, gender, and case; typically, it is the head of a construction which enters into an agreement relation. On the other hand, the DP analysis is an attempt to embed noun phrases in a functional structure which parallels the one of sentences. Such an analysis is in fact corroborated by certain similarities between CPs and DPs (cf. Ouhalla 1991a).

In the preceding subsection, we have observed that in subject-verb agreement, the elements which enter the agreement relation may now and then be separated by extensive phrasal material. This kind of agreement is often termed agreement by coindexing. The verb (or the agreement node, respectively) is coindexed with the subject DP, receives the agreement features person and number from that DP and is spelled out according to its feature specification.[35]

As for agreement within DP, the situation is somewhat different, since in this context, we are dealing with an instance of agreement by inheritance. In German, the elements within the DP agree in the features number, gender, and case. Moreover, the article (definite vs. indefinite) determines the inflectional class of the adjectives (e.g. *der* ***kluge*** *Student* "the clever student" vs. *ein* ***kluger*** *Student* "a clever student"). The purpose of table 4 is to illustrate the complexity of agreement within the German DP (the examples used are *der kluge Mann* "the clever man", *die kluge Frau* "the clever woman", and *das kluge Kind* "the clever child"):

	masculine	
	Sg.	Pl.
NOM	der kluge Mann	die klugen Männer
GEN	des klugen Mannes	der klugen Männer
ACC	den klugen Mann	die klugen Männer
DAT	dem klugen Mann	den klugen Männern
	feminine	
	Sg.	Pl.

[35] Strictly speaking, it is not the verb which is coindexed but rather the functional head AGR. In the course of the syntactic derivation, the verb will raise to AGR. Consequently, the structure in (ii) will be derived from a (simplified) underlying structure like (i), in which the hyperscript represents the agreement features 3rd person singular:

(i) Hans^{i} [$_{AgrP}$ [$_{VP}$ Tina küss] AGR^{i}]
Hans *Tina kiss*
(ii) Hans^{i} [$_{AgrP}$ [$_{VP}$ Tina t_{V}] küss-AGR^{i}]

NOM	die kluge Frau	die klugen Frauen
GEN	der klugen Frau	der klugen Frauen
ACC	die kluge Frau	die klugen Frauen
DAT	der klugen Frau	den klugen Frauen

---

	neuter	
	Sg.	Pl.
NOM	das kluge Kind	die klugen Kinder
GEN	des klugen Kindes	der klugen Kinder
ACC	das kluge Kind	die klugen Kinder
DAT	dem klugen Kind	den klugen Kindern

Table 4: *Agreement within the German DP*

With respect to agreement within the German DP, it should be taken into account that - in contrast to subject-verb agreement - different facts are to be held responsible for the assignment of the different features. Gender, for instance, is an inherent, i.e. lexical, feature of nouns which is transmitted from the noun to the other elements within DP. The number feature, too, has its origin within the DP; it is, however, not an inherent feature. Rather, its specification depends on the communicative intention of the speaker. Finally, the case feature has very different properties since it is assigned from outside the DP, the argument structure of the respective verb being responsible for its assignment (see section 4.6 for a survey of feature errors).

We are dealing with an agreement error within DP in case the elements within DP (article, adjective(s), quantifier, noun) do not match with respect to one or more of the above mentioned features. Such a feature conflict may have various reasons, as is illustrated by the examples in (2-14) (the nonagreeing elements are in bold-face).[36]

(2-14) *Spontaneous errors resulting in gender mismatch*

a. das wird **ein** ganz **spannend-es** **Wettkampf**, äh, Finale
that be.FUT a.m/n very exciting-n. competition(m.), er, final(n.)
← ein ganz spannend-es Finale // ein ganz spannend-er Wettkampf
← *a very exciting-n. final(n.)* // *a very exciting-m. comp.(m.)*

b. immer **der** gleiche **Chaos**, äh, Kasus
always the.m. same chaos(n.), er, case(m.)

c. **der** **Christa** und **die** **Helmut**,
the.m *Christa(f.)* *and* *the.f* *Helmut(m.),*
der Helmut und die Christa (Berg 1987:297)
the(m.) *Helmut(m.)* *and* *the(f.)* *Christa(f.)*

d. jetzt hab ich selber **den** **Hand** vor **die** **Mund**,
now *have* *I* *myself* *the.m.ACC* *hand(f.)* *in.front.of* *the.f.ACC* *mouth(m.),*
äh, die Hand vor den Mund gehalten
er, *the.f.ACC* *hand(f.)* *in.front.of* *the.m.ACC* *mouth(m.)* *held*

e. man muss die Wurzel an **der** **Übel** packen
one *must* *the.f.ACC* *root(f.)* *at* *the.f.DAT* *evil(n.)* *grab*
← das Übel an der Wurzel packen
← *the.n.ACC* *evil(n.)* *at* *the.f.DAT* *root(f.)* *grab*

f. mir steht **die** **Schweiß** auf der Stirn
me *stands* *the.f* *sweat(m.)* *on* *the.f.DAT* *forehead(f.)*
← der Schweiß auf der Stirn
← *the.m* *sweat(m.)* *on* *the.f.DAT* *forehead*

g. die Zwei Pik ist neben **der** **As** Herz
the.f *two(f.)* *spade* *is* *next.to* *the.f.DAT* *ace(n.)* *of.hearts*
← neben dem As Herz
← *next.to* *the.n.DAT* *ace(n.)* *of.hearts*

In all the errors given in (2-14), the mismatch only concerns the gender feature; still, the errors result from different types of slips. The error in (a) is a blend of two DPs in which the adjective *spannendes* "exciting" of the intended phrase is neuter, the head of the intruding compound (*-kampf*), however, masculine. The slip in (b) represents the rare instance of an N°-substitution (due to formal similarity) which results in a gender conflict. The definite article of the planned noun *Kasus* "case" is masculine, but the substituted noun *Chaos* "chaos" is neuter. The examples (c), (d), and (e) are all exchanges. I am citing three errors of this type, since they have different characteristics. In (c), the repair suggests that the nouns were exchanged (and not the articles); since the involved nouns are of different gender, a conflict arises in both positions.[37] The same is true for the slip (d), only that in this example, the articles have been exchanged. The error in (e) is special insofar as one of the articles accommodates to the gender of the new noun after the exchange has taken place (cf. subsection 2.4.2). Therefore, only one gender error surfaces (and not the

[36] When there is no case feature specified in the interlinear translation, the DP is nominative.
[37] In a similar slip of the tongue without repair as e.g. *ob da* ***ein Frau*** *oder* ***eine Mann*** *sitzt* 'if there a.m woman(f.) or a.f man(m.) sits', it is impossible to decide if the nouns have been exchanged (intended

double-error sequence **man muss **das Wurzel** an **der Übel** packen*). Finally, the error in (f) exemplifies the anticipation of a gender feature ([+feminine] from *Stirn* "forehead"), the one in (g) the perseveration of a gender feature ([+feminine] from *Zwei* "two").[38]

In a language without a distinction of grammatical gender, as e.g. English, such errors are of course not to be observed. However, for languages such as Swedish and French - both of which have a two-way distinction of grammatical gender - gender errors have also been reported.

(2-15) *Gender mismatch in Swedish and French*

a.	**jos-et**	med	glas	←	glas-et	med jos
	juice(n-n.)-ART.n	*with*	*glass(n.)*	←	*glass(n.)-ART.n*	*with juice(n-n.)*

(Berg 1987:288)

utterance *ob da ein Mann oder eine Frau sitzt*) or rather the articles (intended utterance *ob da eine Frau oder ein Mann sitzt*).

[38] In (2-14f) and (g), such an analysis is uncontroversial, since the DPs involved in the error have different case. In contrast to that, a slip like e.g. ***der Helen**, äh, die Helen ist der Versprecherstar* 'the.m Helen(f.) is the.m slip-of-the-tongue-star(m.)' is ambiguous because it is not clear if the article has been anticipated or only the gender feature.

b. c'est **le** même **ligne**, le même livre
that.is the.m same line(f.), the.m same book(m.)
à la ligne près
to the.f line(f.) exact
"This is exactly the same book." (Rossi & Defare 1995:28)

Swedish distinguishes the two gender forms neuter and non-neuter, definite articles appear as suffixes on the noun. In (2-15a), the definite neuter article of *glas* "glass" has been stranded. Since *jos* "juice", the new host of the article, is non-neuter, a gender conflict arises. If accommodation of the article had taken place, the legitimate form *jos-en* (with non-neuter article) would have surfaced. In the French example in (2-15b), a noun has been anticipated. Once again, accommodation does not occur. The article *le* belonging to *livre* "book" is masculine, the anticipated noun *ligne* "line", however, is of feminine gender.

Actually, the cases in which a gender conflict alone gives rise to the ungrammaticality of an utterance have the highest share in the DP agreement errors in my corpus. But other factors may cause errors, too, as is illustrated by the examples in (2-16).

(2-16) *Other instances of feature mismatch within DP*

a. die Hosen müssen auf **jeden** **Fäll-e** in den Schrank
the trousers must in every.SG case-PL into the wardrobe
← auf jeden Fall // auf alle Fäll-e
← *in every.SG case.SG* // *in all.PL case-PL*

b. ich habe so **leicht-es** **Kopfschmerz-en**
I have such slight-SG.n headpain(m.)-PL
← leicht-es Kopfweh // leicht-e Kopfschmerz-en
← *slight-SG.n headache(n.)* // *slight-PL.m headpain(m.)-PL*

c. die schießen aus **der** **Pilz-e**,
they shoot up.from the.SG.f.DAT mushroom(m.)-PL
aus der Erde wie Pilz-e (Berg 1987:297)
up.from the.SG.f.DAT ground(f.) like mushroom(m.)-PL

Since in the blend (2-16a), the two competing phrases contain the same noun, a gender conflict can not come to fruition. The one and only reason for the mismatch in this example is the number feature: the quantifying expression *jeden* "every" is singular while the noun *Fälle* "cases" is plural. In (b), the mismatch is due to two features, namely gender and number. The adjective *leichtes* "slight" contained in the one frame is [+singular,+neuter], the head of the compound (-*schmerz* "pain") contained in the other, however, is

characterized by the features [+plural,+masculine]. Finally, in example (c), all of the three relevant features are jointly responsible for the error. The anticipated plural noun *Pilze* "mushrooms" is nominative plural, but the article of the intended noun *Erde* "ground" is singular feminine and has dative case: a maximum of discrepancy, one might say. If accommodation of the article had occurred, the grammatical sequence *die schießen aus den Pilzen* would have surfaced.[39]

In the preceding subsection, we saw that in SVA-errors, the agreement relation sometimes happens to be established between two elements (the "pseudo subject" and the verb) which may appear in considerable distance from each other. This is less true for DP agreement errors, since for these, the domain within which the agreement relation is established is much narrower: everything happens within the DP. Of course, the errors often have their source outside of the DP (namely whenever the error is not a blend like (2-14a) or a substitution like (2-14b)), but this source does not itself enter into the agreement relation.

Blends make up the highest percentage in DP agreement errors, followed by exchanges. For instance, elements from coordinated DPs may be exchanged (cf. (2-14c)). Moreover, the exchange of elements from two object DPs (as e.g from the direct object and the DP complement of the preposition in (2-14d)) is sometimes observed. In (2-17), I cite the two only examples from my corpus in which the involved DPs appear in different clauses. In (a), the gender feature (or the article, respectively) is anticipated from an infinitival complement, while in example (b) the gender feature (or the demonstrative pronoun, respectively) is perseverated from the matrix clause into the embedded relative clause.[40]

(2-17) <u>*Gender mismatch involving DPs from different clauses*</u>

a.	dass	mal	jemand	auf	**den**	**Idee**	kommt,
	that	*once*	*someone*	*on*	*the.m.ACC*	*idea(f.)*	*comes*

[39] Note that due to the self-repair right after the error item *Pilze*, we are not in a position to decide whether the slip (2-16c) is an exchange error or an anticipation, i.e. whether the full utterance would have been *die schießen aus der Pilze wie Erde* or *die schießen aus der Pilze wie Pilze*. Stemberger (1989) terms such errors "incompletes".

[40] In addition to that, there are two slips of the tongue in my corpus in which a relative pronoun does not agree with the relativized noun, e.g. the anticipation of the number (plural) feature in *es ist eine tägliche **Gefahr**, **denen** unsere Leute ausgesetzt werden* ← *Gefahr, der unsere Leute ausgesetzt werden* 'it is a daily danger.SG to.which.PL our people.PL exposed are ← danger.SG to.which.SG our people exposed are'.

Note that the error in (2-17a) might also be analyzed as a blend of the two DPs *den Gedanken* 'the.m.ACC thought(m.)' and *die Idee* 'the.f.ACC idea(f.)'.

auf die Idee kommt, den Herd zu putzen
on the.f.ACC idea(f.) comes the.m.ACC stove(m.) to clean

b. das ist hier nur die Umlautung,
that is here only the umlaut.formation
die **das** **Plural** macht ← den Plural macht
which the.n.ACC plural(m.) makes ← the.m.ACC plural(m.) makes

To sum up, let me repeat the following facts: DP agreement errors may be caused by all types of slips; blends and exchanges, however, have the greatest share. The errors result from a conflict between one or more of the features gender, number, and case. In contrast to the SVA-errors for which I was able to show that a certain feature value, namely [+plural], increases the likelihood of an error, such a tendency is not observed with respect to the DP errors. Apparently, no particular gender or case specification is involved in agreement errors significantly more often than another such specification, and as far as number is concerned, the slip in footnote 26 is the only one in which the plural value unambiguously overwrites a singular specification (agreement errors within DP will be subject to further discussion in subsection 4.7.2).

2.3 Errors of Subcategorization

Attache-toi à nous
avec ta voix impossible, ta voix![*]
(Arthur Rimbaud, Phrases)

The subcategorization errors which I will present in this section constitute another error type which gives rise to the ungrammaticality of an utterance. Agreement conflicts are not at issue here; rather, these errors result from a conflict between the case-assigning verb and a case-marked argument. As is well known, verbs have specific lexically determined subcategorization frames, i.e. they require certain case-marked arguments. Consequently, the lexical entry of a bitransitive verb like e.g. *geben* "give" must state that this verb requires three argument DPs: *geben* V, [DP_{NOM}, DP_{ACC}, DP_{DAT}]. The lack of one of these arguments as well as the selection of an argument with wrong case specification lead to the ungrammaticality of the utterance.

What might be the cause of such errors in spontaneous speech? In my corpus, the subcategorization errors are almost exclusively due to blends in which two verbs requiring differently case-marked arguments are in competition. In the error, the substituting verb appears in the planning frame of a verb with distinct subcategorization properties. This phenomenon is illustrated by the examples in (2-18):

* "Bind yourself to us with your impossible voice, your voice!" (transl. Louise Varèse).

(2-18) *Subcategorization errors due to blends*

a. **mich** **macht** das nichts
1.SG.ACC *makes* *that* *nothing*
← mich stört das nicht // mir macht das nichts
← *1.SG.ACC bothers that not* // *1.SG.DAT makes that nothing*
"That doesn't bother me."

b. dass wir keine Sprache erwerben, die **bestimmten UG-Prinzipien verletzt**
that we no language acquire that certain.DAT UG-principles violates
← die bestimmten UG-Prinzipien widerspricht //
← *that certain.DAT UG-principles contradicts* //
die bestimmte UG-Prinzipien verletzt
that certain.ACC UG-principles violates

c. **dies-en** **Ausdruck** **gefällt** mir gut
this-m.ACC *expression(m.)* *pleases* *1.SG.DAT* *a.lot*
← dies-en Ausdruck finde ich gut //
← *this-m.ACC expression(m.) find I good* //
dies-er Ausdruck gefällt mir gut
this-m.NOM expression(m.) pleases 1.SG.DAT good
"I like this expression // This expression pleases me (a lot)."

The verb *machen* "to make" in (2-18a) actually requires a nominative argument (the demonstrative pronoun *das*) and a dative argument (the personal pronoun *mir*). Instead of the latter, however, the verb happens to appear with an accusative argument (the personal pronoun *mich* "me") which is part of the competing phrase containing the verb *stören* "to bother". In example (b), we observe the opposite distribution: the verb *verletzen* "to violate" which subcategorizes an argument with accusative case is accompanied by a dative DP (from the alternative frame containing the verb *widersprechen* "to contradict"). Eventually, in the slip cited in (c), the verb *gefallen* "to please" lacks its obligative nominative argument whose position has been taken by the accusative DP *diesen Ausdruck* "this expression". Once again, this DP comes from a competing sequence in which it is subcategorized by the verb *finden* "to find".

Since prepositions, too, subcategorize case-marked arguments, the selection of a wrong preposition may also result in a case conflict. In example (2-19a), the preposition *mit* "with" which needs a dative complement appears with the nominative DP *süßer Senf* "sweet mustard" (from the alternatively planned coordinated structure). In the error in (b), the anticipated preposition *von* "by" surfaces with an accusative pronoun; however, *von* requires a dative argument (namely the pronoun *mir*).

(2-19) *Subcategorization errors involving prepositions*

a. das hat echt Stil, Leberwurst **mit süß-er Senf**
that has real style liver.sausage with sweet-m.NOM mustard(m.)
← mit süß-em Senf // und süß-er Senf
← *with sweet-m.DAT mustard(m.)* // *and sweet-m.NOM mustard(m.)*

b. das war sehr schön **von mich**, für mich gemacht von X
that was very nicely by 1.SG.ACC for 1.SG.ACC made by X
"That was very well done for me by X." (Berg 1987:284)

All the examples cited in this section so far have in common that an erroneously case-marked argument appears in the utterance. Further possible errors of subcategorization are those in which we either find one case-marked argument too much or in which one such argument is missing.

(2-20) *Other cases of subcategorization errors*

a. das **lohnt sich den Aufwand** nicht
that is.worth REFL the.ACC effort not
← das lohnt sich nicht // das lohnt den Aufwand nicht
← *that is.worth REFL not* // *that is.worth the.ACC effort not*

b. es konnte nicht bewiesen werden, dass **es Gott** nicht **existiert**
it could not proven be that it god not exists
← dass es Gott nicht gibt // dass Gott nicht existiert
← *that it god.ACC not gives* // *that god.NOM not exists*
"It could not be proven that god doesn't exist."

c. das kann sagen ← das kann sein // das kann man sagen
that can say ← *that.NOM can be* // *that.ACC can one say*
"That's possible // You can say that."

The verb *lohnen* "to be worth" may either be a reflexive verb (*sich lohnen*) or have an accusative complement. In the error (2-20a), however, it appears with the reflexive element *sich* and the accusative DP *den Aufwand* "the effort", a fact that inevitably leads to ungrammaticality. In the blend in (b), we find the verb *existieren* "to exist" with two arguments, the expletive *es* and the DP *Gott* "god". That's one superfluous argument for sure, no matter if we are dealing with two nominative DPs or rather with one nominative and one accusative DP. The former would be the case if we assume that the expletive has slipped into the planning frame of *existieren* while the latter would be true in case we

analyze the verb *existieren* as being the intruder which has taken the position of the verb *geben* “to give”. Finally, in the slip in (c), there is one argument missing, since the verb

sagen "to say" needs a nominative as well as an accusative argument.[41]

By and large, subcategorization errors are errors concerning the argument structure of verbs (and sometimes prepositions). Mostly due to a blend, a verb appears with an argument which shows wrong case-marking (for further discussion see subsection 4.7.2). Less frequently, we observe verbs with one argument too many or with one argument missing.

2.4 On Accommodation and Stranding

> All the words of my mouth are righteous;
> there is nothing twisted or crooked in them.
> They are all straight to one who understands
> and right to those who find knowledge.
> (Proverbs 8,8f)

In the preceding two sections, I focused on slips of the tongue which give rise to the ungrammaticality of an utterance, namely subject-verb agreement errors, agreement errors within DP, and errors of subcategorization. The errors which I shall discuss in the following section have different characteristics. It is true, they also concern the grammatical structure of an intended utterance; they do, however, not result in ungrammaticality. Rather, the grammatical structure either remains unaffected (as is true for the stranding errors) or a grammatical discrepancy is repaired after the actual error has taken place (such a repair is often called "accommodation"). In this sense, accommodations can be seen as the opposite to the errors discussed in subsections 2.2.1 and 2.2.2; we might therefore term accommodations an anti-anti-agreement phenomenon.

Stranding errors will be subject to discussion in subsection 2.4.1 while different types of accommodations will be considered in some deatil in subsection 2.4.2. In my opinion these two types of slips have not been adequately differentiated in the literature. In particular, I am going to show that a fair amount of data that have been analyzed as accommodations are in fact special cases of stranding errors. Both error types will play an

[41] Blends in which there is not a superfluous argument but rather a superfluous case-assigner are a special case. Such an error may occur whenever a prepositon competes with a postposition but no decision is achieved, as e.g. in *nach meiner Meinung nach* ← *nach meiner Meinung* // *meiner Meinung nach* 'after my opinion // my opinion after' ("according to my opinion") and in the English example *would you turn on the light on* ← *turn on the light* // *turn the light on* (Fay 1980a:450).

important role in context of the evaluation of the morphosyntactic theory (Distributed Morphology) in chapter 4.

2.4.1 *Affixes vs. Features in Stranding Errors*

Let us first consider the class of stranding errors in some detail. The term "stranding" was chosen due to the fact that it is a typical property of these errors that only word stems are displaced while other morphological material remains in its original position, i.e. it is 'stranded' in that position. As far as the stranded material is concerned, it may be part of a compound or may be a derivational or an inflectional affix. The examples in (2-21) illustrate that all potential combinatory possibilities are in fact attested (for clarification, the exchanged elements are in bold-face in the following examples):

(2-21) *Different kinds of word formation interacting in stranding errors*

a. Gab's noch was zwischen **Haupt**-suppe und **Tomaten**-gang?
gave.it else sth. between main-soup and tomato-course
← zwischen Tomatensuppe und Hauptgang
← *between tomato.soup and main.course*

b. Er leidet mal wieder unter **schmerz**-lich-en **Schreck**-anfäll-en
he suffers once again from pain-ADJ-PL terror-attack-PL
← unter schrecklichen Schmerzanfällen
← *from terrible pain.attacks*

c. Wusstest du, dass er auf einem **Wohn**-boot **haus**-t,
knew you that he on a life-boat house-3.SG
äh, Hausboot wohnt?
er, house.boat lives

d. Ursache für die Probleme war womöglich
reason for the problems was possibly
ein **dämpf**-ig-er Stoß-**rost**-er ← ein rostiger Stoßdämpfer
an absorb-ADJ-m.NOM shock-rust-er ← a rusty shock.absorber

e. Ich glaube, mein **Stirb**-chen **bäum**-t ← mein Bäumchen stirbt
I think my die-DIM tree-3.SG ← my tree.DIM dies

f. Ich kann nur über die Teile **kenn**-en, die ich **sprech**-e
I can only about those parts know-INF that I speak-1.SG
← über die Teile sprechen, die ich kenne (Bierwisch 1982:32)
← *about those parts speak that I know*

All the examples in (2-21) are exchange errors. In (2-21a), two compounds interact; the exchanged elements are the two specifiers of the respective compounds, namely *Haupt-* "main" and *Tomaten-* "tomato".[42] In (b), the adjectival suffix *-lichen* and the head of the compound *Schmerzanfällen* "pain attacks" remain in their original positions. In example (c), too, a compound participates in the error, this time, however, interacting with an inflected verb. As expected, the head of the compound (*-boot* "boat") as well as the inflectional ending *-t*, indicating present tense third person singular, strand. Turning to example (d), we notice that two derivational endings have been left behind, namely the adjectival suffix *-ig* and the nominal suffix *-er*.[43] Another option is illustrated by the slip in (e), in which two stems are exchanged leaving one derivational ending (the non-category changing diminutive suffix *-chen*) and one inflectional ending (3rd person singular) behind.[44] Finally, in (f), we encounter an instance of two inflected words interacting in the error; both inflectional endings - the infinitival suffix *-en* as well as the first person singular present tense suffix *-e* - remain in their respective slots.

In stranding errors in which bound morphemes are involved, it is always the case that the free morphemes are exchanged. Therefore, the grammatical structure of the utterance is not affected by the exchange. The conceivable opposite case, i.e. exchange of bound morphemes and stranding of content words, is not attested.[45] For instance, there is no exchange error in the Frankfurt Corpus which results in an utterance of the type *mein Bäum-**t** stirb-**chen*** 'my tree-3.SG die-DIM'.[46] Note that such an error is not excluded by the principle of structural parallelism (see footnote 28), since the displaced elements, two morphological heads, are certainly structurally parallel.

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[42] This verifies the structural parallelism of the entities involved in exchanges. Structural parallelism means that we do not observe errors of the type ***Gang**suppe und Haupt**tomaten*** "course soup and main tomato" or *Tomaten**haupt** und **Suppen**gang* "tomato main and soup course", in each of which the specifier of one compound has been exchanged with the head of the other. The same observation has been made concerning the syllable position in sound exchanges. Here, onsets change place with other onsets, nuclei with nuclei, etc. (Fromkin 1971).

[43] Admittedly, some of the analyses are somewhat simplified. In example (b), for instance, the inflectional ending *-en* on the adjective (indicating the dative plural masculine) also strands, and in (d), the suffix for nominative singular masculine *-er* as well as the specifier *Stoß-* "shock" of the compound remain in their original position (cf. sections 4.5 and 4.6 for further discussion of stranding errors).

[44] Actually, in (2-21e), the stem *sterb-* "die" has been affected by a phonological readjustment rule in the 3rd person singular (cf. subsection 3.2.4). Interestingly, the readjusted stem is exchanged and not its base form (which would have given rise to *mein **Sterb**-chen **bäum**-t*).

[45] In (2-21a), two content words strand but it is also content words that are exchanged. Therefore, strictly speaking, this error is a word exchange.

[46] Now and then, however, it happens that a bound morpheme is shifted, as e.g. the adverbial suffix in the slip of the tongue *easy enoughly* ← *easily enough* (from Garrett 1980b:263) or the genitive *-s* in *das Ende der Schrecken-herrschaft-**s*** ← *der Schrecken-s-herrschaft* 'the end of the terror-GEN-reign' ("the end of the reign of terror").

What elements exactly may strand in a given language is of course highly dependent on the grammatical rules of this language. In general, all material that constitutes an affix is capable of stranding, and different kinds of word formation rules may therefore give rise to different error patterns. The examples given in (2-22) illustrate some of these language-specific phenomena:

(2-22) *Language-specific phenomena in stranding errors (Norwegian, Turkish, Arabic)*

a. ikke ei **sol** for **sky**-a ← ei sky for sol-a
not one sun in.front.of cloud-ART ← one cloud in.front.of sun-ART
(Foldvik 1979:119)

b. **güne**_-im **yüz**-de ← yüz-üm güne_-de
sun-POSS.1.SG face-LOC ← face-POSS.1.SG sun-LOC
"my face is in the sun"

c. **ʔuxt** **zooj**‡-ha ← zooj‡ ʔuxt-ha
sister husband-POSS.3.SG ← husband sister-POSS.3.SG
"the husband of her sister"
(Abd-El-Jawad & Abu-Salim 1987:153)

d. fii **_aay** fi s-**sukkar** ← sukkar fi _-_aay
there tea in ART-sugar ← sugar in ART-tea
"there is sugar in the tea"
(Abd-El-Jawad & Abu-Salim 1987:149)

e. **sa**aa-**a** **kaliim** ← kalaam-ha sa**ii**
talk-POSS.3.SG correct
"what she says is correct"
(Abd-El-Jawad & Abu-Salim 1987:149)

In the examples (2-22a) to (d), we observe stranding of affixes that neither exist in German nor in English. In the Norwegian slip in (a), stranding affects the definite article which appears as the suffix *-a* attached to the noun. In the Turkish example in (b), the possessive suffix *-im* (for first person singular) as well as the locative ending *-de* strand.[47] And in the Arabic utterance in (c) as well, a possessive pronoun is affected, namely *-ha* (indicating third person singular). In Arabic, articles are prefixed to the noun; their phonological shape depends (amongst other things) on the first consonant of the noun they attach to. Consequently, articles in Arabic are capable of stranding, as is exemplified by the sequence (d) in which the content words *_aay* "tea" and *sukkar* "sugar" have been exchanged.

Particularly remarkable, however, is the error in (2-22e). As is well-known, word formation in Arabic (as well as e.g. in Hebrew and Maltese) is fundamentally different from word formation in the Germanic and Romance languages: in Arabic, word stems are formed on the basis of a triliteral root, a fixed sequence of three consonants between which vowels

[47] Moreover, in this example as well as in (d), morphophonological accommodation of the stranded material plays a crucial role (for details cf. subsection 2.4.2).

are inserted. The sequence of C- and V-positions (the CV-skeleton or prosodic

template) is always fixed for a certain derivation.[48] Example (e) verifies that such discontinuous morphemes (transfixes) may also strand. What is exchanged in that example are merely the consonantal roots *klm* and *s*, while the stem-forming vowels are left behind. Moreover, we also observe - as in (c) above - stranding of the possessive suffix-*ha* (for a more thorough discussion of these errors cf. Berg & Abd-El-Jawad (1996)).

This concludes the short discussion of the data from other languages which illustrate that - as expected - language-specific word formation rules influence the observed error patterns. I will now have a closer look at stranding errors involving inflectional morphology. I am going to present data which make clear that it is not necessarily detachable prefixes, suffixes, or transfixes (i.e. phonological material) which are left behind in their original position. Rather, abstract information, as e.g. tense and case information, may also strand or shift, a fact that will be of some importance when I discuss the manipulation of morphosyntactic features in section 4.6.

Let us first briefly reconsider the example (2-21f): *ich kann nur über die Teile* ***kenn****-en, die ich* ***sprech****-e* ← *über die Teile sprechen, die ich kenne* "I can only speak about those parts I know". This slip is readily analyzed as an exchange error in which two suffixes - the infinitival ending and the marker for first person singular - are stranded.

Errors like the ones in (2-23a) and (b), however, suggest that in fact in such cases, it is not the phonological material which strands, but rather abstract tense features that are subsequently spelled out according to the requirements of the adjacent stem.

(2-23) <u>*Stranding and exchange of abstract (tense & case) features*</u>

a. es **droh**-te zu **schein**-en ← es schien zu droh-en
it threat-PAST to seem-INF ← it seem.PAST to threat-INF

b. I don't know that I'd **hear** one of I **knew** it
← that I'd know one if I heard it (Garrett 1980b:264)

c. für **Familien** aus unterprivilegierten **Kinder**-n
for families from underprivileged children-DAT
← für Kinder aus unterprivilegierten Familien
← *for children from underprivileged families.DAT*

[48] There are 15 different derivational classes (binyanim) for the triliteral roots which determine the arrangement of the root consonants with respect to the vowel positions. The precise nature of these derivations is quite intricate and the reader is referred to McCarthy (1981) and Spencer (1991:134ff) for details.

d. ich vermisse eine **Kette** in dem **Glied**-e der Schlussfolgerungen
I miss one chain in the.DAT link-DAT of.the inferences
← ein Glied in der Kette (Stemberger 1985:154)
← *one link in the chain*

e. (er/sie) stellte **mich** **ihm** vor,
(he/she) introduced 1.SG.ACC 3.SG.m.DAT to
mir ihn vor
1.SG.DAT 3.SG.m.ACC to
"(He/she) introduced him to me." (Berg 1987:283)

f. I **wind** up re-**wrot**-ing twelve pages
← I wound up rewriting (Stemberger 1985:163)

The verbal stem *droh-* "threaten" in (a) appears with its regular imperfect suffix; that suffix, however, was not part of the intended utterance, since the imperfect of the verb *scheinen* "to seem" is marked by ablaut alone (*schien*). On the other hand, the verbal stem *schein-* appears in the error in its infinitival non-ablaut form. If the tense features had not been spelled out according to the exchanged verb stems, the ungrammatical utterance **es **droh** zu **schien**-en* would have surfaced.

The same is true for the English example in (2-23b). In the intended utterance, the verb *know* appears in its infinitival form and *hear* in the imperfect (with the regular ending *-d* as well as a change in vowel quality: [hŒ:d]). After the exchange has taken place, however, both verb stems are realized according to their new tense specification. Therefore, the ungrammatical sequence **...that I'd [hŒ:] one if I **know**-ed it* does not surface.

In the examples (2-23c) and (d), we are obviously dealing with stranded case information. The dative plural suffix *-n* which accompanies the noun *Kinder* "children" in (c) was not part of the intended utterance. Dative case is also involved in (d), although we are encountering a somewhat antiquated form in that example (which originates from the error corpus of the slip pioneer Rudolf Meringer from the year 1895): after the exchange, the (no longer used) dative *-e* appears on the noun *Glied* "link". Once again, that suffix was not part of the intended sentence. Moreover, in that example both of the articles accommodate to the respective nouns.[49]

[49] The following French example cited by Cutler (1980b:692), I consider quite unusual and complex: *la **femme** de son **père** ← la mère de son mari* "the wife of her father ← the mother of her husband". What has happened here? It seems as if two concepts have been exchanged which are unspecified with respect to certain semantic information. In combination with the stranded information [+female], the concept SPOUSE is spelled out as the wife (*femme*), while the concept PARENT is turned into the father (*père*) when combined with the information [+male] (also cf. subsection 4.2.3).

Finally, the examples given in (e) and (f) do not constitute stranding errors; rather, we are dealing with the opposite of stranding, namely with the exchange of case and tense information, respectively. These examples are another proof of the fact that such abstract information may indeed be considered in isolation by the language processor. In (e), it is the case information only which is exchanged (dative and accusative change place) while all the other morphosyntactic features associated with the pronouns - person, number, and gender - are stranded. Last but not least, in (f), tense information - which manifests itself in both verbs in a change of vowel quality - changes position. This results in an ungrammatical utterance, since the continuous form of a verb may never be formed with a stem that is marked as [+past].[50]

All of the errors discussed in this subsection so far are exchange errors. As a matter of fact, in general the term "stranding" is mainly used in the context of stem exchanges. This restricted use of the term, however, is not at all necessary, since we may also observe stranding of material in anticipations, perseverations, and even in blends. This is illustrated by the following three examples:

(2-24) *Stranding in anticipations, perseverations, and blends*

a. wenn ihr Vater sie aus-**wein**-t, muss sie wein-en
when her father her off-cry-3.SG must she cry-INF
← sie ausschimpft
← *her off.tell.3.SG*
"When her father tells her off, she must cry."

b. er begrüßt immer alle **Begrüß**-ung-en, äh, Neuer-ung-en
he welcomes always all welcome-ion-PL, er, innovat-ion-PL

c. das ist ziemlich **hart**-er Tobak
that is quite tough-m.NOM tobacco
← ziemlich hart // ziemlich stark-er Tobak
← *quite tough // quite strong-m.NOM tobacco*
"That's a bit thick // a bit much!"

[50] Particularly interesting in the context of tense features is Victoria Fromkin's favourite speech error *Rosa always date shranks* ← *Rosa always dated shrinks* (Fromkin 1973a:32). Obviously, the abstract past tense information of *date* is shifted and attaches to the noun [$_N$ shrink] which possibly has the verb [$_V$ shrink] as its base. In any case, the tense information is spelled out correctly, i.e. by ablaut formation, on the verbal base while the plural information is stranded (also cf. Leuninger & Keller 1994:102f; cf. section 4.6 for further discussion).

In the anticipation in (2-24a), the verbal stem *wein-* "cry" is anticipated; in the new position of that stem, the prefix *aus-* as well as the inflectional ending *-t* of the intended utterance have been stranded. In contrast to that, in (b), the verbal stem *begrüß-* "welcome" is perseverated and replaces another verbal stem which is part of a derived noun. The nominalizing suffix *-ung* as well as the plural marker *-en* strand.[51]

In blends, it is sometimes impossible to unambiguously determine which of the competing planning frames has been the successful one. For (c), however, the facts are clear: two idiomatic expressions have been in competition and it is the more complex frame [$_{DP}$ Spec Adj N] which was realized. From the simultaneously planned sequence, the adjective *hart* "tough" intrudes. Originally, this adjective is part of a predication (*das ist ziemlich hart*) and is neither inflected for gender nor for case. In its new environment, however, it takes over the stranded information for nominative masculine realized by the suffix *-er*.

In summary, we may note the following facts with respect to stranding: All kinds of morphemes involved in word formation processes - i.e. compound formation, derivation, and inflection - may be subject to stranding. Moreover, all of the six logically possible combinations of stranded affixes are in fact attested (cf. (2-21)). What exactly may strand of course depends on language-specific facts. The data show that any material that constitutes an affix - be it a prefix, suffix, or transfix - is a potential candidate for stranding. Quite obviously, the internal structure of words is relevant for the language processing system.

Interestingly, not only separable phonological material may be stranded or shifted, but also abstract features. In particular, the possibility of isolating the phonological material from the morphsosyntactic features will play a prominent role in the discussion of the data in the context of a morphosyntactic theory (cf. sections 4.5 and 4.6 for a thorough analysis of different types of stranding errors). As a last group of data, I am now going to consider in some detail the accommodations which should be properly distinguished from the stranding errors.

2.4.2 *Resolving Conflicts by Means of Accommodation*

[51] If we analyze exchanges as anticipations with subsequent perseverations (as e.g. Shattuck-Hufnagel (1979) and Berg (1988) do), then the fact that material may strand in 'simple' anticipations and perseverations, too,

Accommodations are a multifarious and rather complex matter. Merrill Garrett defines accommodations as errors "in which the phonetic shape of elements involved in errors accommodates to the error-induced environment" (1980b:263), a definition which, in view of the data, I am not going to stick to. As will become clear in a moment, for Garrett, the "elements involved in errors" may be the shifted elements themselves as well as the environment in which a shifted element happens to land. I am going to claim, however, that we are dealing with an accommodation only in those cases in which the environment adjusts to an element which erroneously appears in that environment.

Garrett takes accommodations to be a particularly clear piece of evidence for the assumption that in the generation of an utterance, several processing levels must be involved between the message level and the articulation. The examples in (2-25) exemplify two accommodations from his corpus (accommodated elements are in bold-face).

(2-25) *"Context accommodation" and "error accommodation"*

a. **an** anguage lacquisition problem
   ← a language acquisition problem (Garrett 1980b:263)

b. I don't know that I'd **hear** one if I **knew** it
   ← that I'd know one if I heard it (Garrett 1980b:264)

Obviously, in (a), the sound exchange must have occurred first, and after that, the indefinite article accommodates to the new environment. Therefore, the sequence *an anguage* surfaces and not the ungrammatical string **a anguage*. Garrett also subsumes cases like the one already cited in (2-23b) - repeated here as (2-25b) - under the phenomenon of accommodation. His line of argumentation is that two stems have been exchanged and subsequently adjust to the new environment.

As a matter of fact, however, the examples in (2-25a) and (b) exemplify different phenomena. While in (a), the first error element (the glottal stop /?/) induces a phonological change in an adjacent element (the indefinite article), in (b), the exchanged elements themselves (the two verbs) change their phonological shape. Berg (1987) has pointed out that very difference. The former case in which the error element changes the context, he terms "context accommodation"; the latter case in which the context has an impact on the error element, he terms "error accommodation".

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is not at all surprising.

This observation brings me to a very important point. I agree with Berg (1987) with respect to the distinction he makes; however, in contrast to him, I take the view that only context accommodations are in fact accommodations. Only context accommodations can be interpreted as errors involving two steps, although, as Leuninger & Keller (1994) emphasize, the second step is possibly a 'free of charge' adjustment of the environment to grammatical and phonological wellformedness conditions (note that this interpretation of facts is preliminary; it will be subject to further discussion and modification in the light of the morphosyntactic theory in subsection 4.7.1). In my opinion, error accommodations should actually be analyzed as instances of stranding, strictly speaking, as stranding of abstract information (e.g. tense information in (2-25b)). My claim is that not word forms are exchanged but rather roots which are not phonologically specified and bundles of morphosyntactic features (in the sense of e.g. Halle & Marantz (1993); cf. chapter 3). The stranded information will be integrated into these feature bundles and the word form will be spelled out accordingly. Consequently, the exchanged elements are unspecified with respect to one or several features and must pick up that feature/these features at their 'landing site'. The subsequent spell-out of features takes place anyway and must therefore not be considered a second error step.

With that in mind, let us now have a look at the following four examples:

(2-26) *Error accommodations as stranding of abstract features*

a. **er** hat **ihr** einen Schock versetzt,
3.SG.m.NOM has 3.SG.f.DAT a shock given
sie hat ihm einen Schock versetzt
3.SG.f.NOM has 3.SG.m.DAT a shock given
"She has given him a shock." (Berg 1987:282)

b. **you** must be too tight for **them**
← they must be too tight for you (Stemberger 1982a:345)

c. bis **er**'s bei **dir** abholt,
until 3.SG.m.NOM'it from 2.SG.DAT pick.up
bis du's bei ihm abholst
until 2.SG.NOM'it from 3.SG.m.DAT pick.up
"until you pick it up from him" (Berg 1987:282)

d. I thought **you** were finishing **my** beer
← I was finishing your beer (Garrett 1980b:267)

Berg (1987) analyzes all errors of this type as accommodations. He points out that in each of these errors, the exchanged pronouns accommodate to the respective syntactic environments. However, as far as the pronouns are concerned, in my opinion, these four examples should be analyzed as stranding, namely as stranding of case features: nominative and dative in (2-26a) and (c), nominative and accusative in (b), and nominative and genitive in (d). In none of the four examples is a pronoun accommodated, since accommodation always implies an adjustment operation, i.e. the change of at least one feature. Such a feature change, however, is not observed in any of the examples given in (2-26), since in each instance the involved pronouns which are not specified for case land in case-marked slots, take up that case information and are spelled out accordingly. Therefore, the four examples should be interpreted on a par with the stranding errors cited in subsection 2.4.1, the only difference being that in one case, phonological material (affixes) is left behind, while in the other case, abstract information is stranded. Still, there is also an accommodation process at play in the sequences (c) and (d), in both of which we observe accommodation of the verb with respect to its agreement features to the new pronoun in subject position. Consequently, none of the ungrammatical utterances **bis **er**'s bei **dir** abhol-st* ('until he'it from you pick.up-2.SG') or **I thought **you** was finishing **my** beer* surfaces.

In this context, I do not want to fail to point out that for phrasal blends in particular, it is often impossible to unambiguously determine whether we are dealing with a case of stranding or rather with a case of accommodation. Usually, in phrasal blends, the more complex planning frame wins through against the less complex one, and upon the assignment of words to slots, an intended element is substituted by an equivalent element from the competing frame.[52] The blend is therefore to be equated with a substitution process (cf. Wiegand 1996). For the example (2-24c) - repeated below as (2-27a) - the analysis is straightforward: the more complex frame wins through against the less complex one. One element from the alternative frame, however, intrudes and takes over the stranded case and gender information.

(2-27) <u>*Stranding vs. accommodation in blends*</u>

a.	das	ist	ziemlich	hart-**er**	Tobak
	that	*is*	*quite*	*tough-m.NOM*	*tobacco(m.)*

[52] To a high percentage, this is also true for word blends as e.g. *querbeetein* ← *querbeet* // *querfeldein* "at random // across country" (i.e. the conceivable less complex blend *querfeld* does not surface) which, however, I will not consider in more detail in the present context.

← ziemlich hart // ziemlich stark-er Tobak
← *quite tough // quite strong-m.NOM tobacco(m.)*
"That's a bit thick // a bit much!"

b. als grau-**es** Mauerblümchen wurde er in die Welt geschickt
as grey-n.NOM wallflower(n.) was he in the world sent
← als grau-e Maus // als Mauerblümchen
← *as grey-f.NOM mouse(f.) // as wallflower(n.)*

c. Analysen, wie immer aus berufen-**er** Hand
analyses as always from competent-f.DAT hand(f.)
← aus berufen-em Mund // aus erst-er Hand
← *from competent-m.DAT mouth(m.) // from first-f.DAT hand(f.)*
"from an authoritative source // from first hand"

d. das ist wirklich ein dick-**es** Stück
that is really a.n thick-n.NOM piece(n.)
← ein dick-er Hund // ein stark-es Stück
← *a.m thick-m.NOM dog(m.) // a.n heavy-n.NOM piece(n.)*
"That's really a bit much!"

In contrast to the slip in (2-27a), the one in (2-27b) is a clear instance of an accommodation. The intended noun (*Maus* "mouse") and the substituted noun (*Mauerblümchen* "wallflower") are of different gender. After the error has taken place, the adjective *grau* "grey" from the intended frame accommodates to the intruder *Mauerblümchen* with respect to the gender feature.

Things are not as clear in the examples (c) and (d): In both examples, the competing planning frames are of equal complexity, [$_{PP}$ P [$_{DP}$ Adj NP]] in (c) and [$_{DP}$ Spec Adj NP] in (d). For this reason, it is impossible to decide which frame is the successful one. Consequently, for both errors, two possibilities for analysis are available. In case, the frame *aus berufenem Mund* "from an authoritative source" is the winner in (c), then *Hand* "hand"

is the intruder and the adjective *berufen* is accommodated. If, however, by mistake the adjective *berufen* is inserted into the planning frame *aus erster Hand* "from first hand", then we are dealing with a case of gender stranding. Similarly, for the error in (c), we cannot decide with certainty whether the adjective *dick* "thick" accommodates to the intruding noun *Stück* "piece" or if rather the adjective itself is the intruder and picks up stranded gender information (as has been claimed by Leuninger & Keller (1994:89)).

At this point, let me sum up the following facts: Speech errors may affect abstract features such as gender, tense, and case; these features may be stranded, exchanged, and shifted. This observation indicates that the so-called error accommodations are not really instances of accommodation but should rather be analyzed as special cases of stranding, namely stranding of abstract features. Like other stranded material, too, these features will be subsequently spelled out together with the new word stem. We may therefore conclude that error accommodations in the original meaning do not exist (see section 4.6 for further discussion of feature stranding).

Before concluding this chapter, I want to investigate one final aspect, namely the question of what kinds of accommodations have to be distinguished. Once again, the important study by Berg (1987) will serve as a starting point. I will, however, propose a classification according to different criteria (remember that this analysis will be subject to modification in subsection 4.7.1).

In order to classify accommodations, Berg (1987) proposes two parameters. The first one concerns the character of the accommodation process itself which - according to Berg - may be phonological, morphological, or lexical in nature. The second parameter has to do with what kind of element is displaced in the error: is it a phoneme, a morpheme, or a word (= lexical level)? The combination of the two parameters results in nine different categories, as illustrated in table 5.

NATURE OF THE ACCOMMODATION-PROCESS	MOVED UNIT IS A		
	phoneme	morpheme	word
phonological	1	2	3
morphological	4	5	6
lexical	7	8	9

Table 5: *Range of accommodations (cf. Berg 1987:280)*

For all of the nine categories, Berg presents examples (from different corpuses) or hypothetical examples, respectively. I do, however, not agree with all of his interpretations of the examples. Moreover, I take his division of accommodation processes not to be sufficiently fine-grained. The four types of accommodation processes I would like to propose are (a) phonological, (b) morphological, (c) morphophonological, and (d) morpho-syntactic accommodation. For all four of them, I am going to present examples from various languages. Nothing has to be added to Berg's division of the elements involved in the error; this division, however, is not of central significance for the present study.

The fact that phonological features are processed in language production has already become apparent in section 1.2.1. We may only speak of a phonological accommodation in cases in which, due to a slip, a segment changes with respect to one (or several) of its phonological features. Note that in this context, we are not concerned with featural changes which may be due e.g. to the perseveration of a feature (as in *eine geschlossene Lüste* ← *Liste* "a closed list" where the feature [+round] of the /ç/ is perseverated), but rather with featural changes affected on adjacent segments. One example each from German, French, and Dutch will serve to illustrate this phenomenon; according to Berg (1987), all three examples are errors of type 1 (cf. table 5).

(2-28) <u>*Cases of phonological accommodation (German, French, Dutch)*</u>

a. wohnt er in Kosel, äh, in Kassel ?
lives he in Kosel, er, in Kassel

b. ils ont colvolé en justes noces
← ils ont convolé en justes noces (Rossi & Defare 1995:7)
they have married in right wedding(celebrations)

c. pankeren ← kamperen (Cohen 1965:183)
to camp

In (2-28a), the vowel /o:/ is perseverated together with its phonological feature [+tense] and takes the position of the lax vowel /a/ in [kas´l]. The tenseness of this vowel requires that the adjacent fricative /s/ appears as [-tense], since otherwise the ungrammatical sequence *[ko:s´l] would surface. However, the surfacing string is [ko:z´l], i.e. the fricative is accommodated. In the French example in (b), the consonant /l/ is anticipated. Due to the new neighborhood resulting from the error, the first /ç/ in *colvolé* appears in its non-

nasalized form. In the intended word, however, the /ç/ has to be nasalized because of the nasal which follows it. Therefore, phonological accommodation suppresses the ungrammatical form *[kç)))lvçle:]. Nasality is also relevant in the Dutch error given in (c) in which /k/ and /p/ are exchanged. The labial consonant /m/ is adjusted to its new environment, i.e. it assimilates to the place features of the following velar and surfaces as the velar nasal [N].

In contrast to that, we are dealing with a morphological accommodation whenever the appropriate allomorph is selected in a given error context. It is, however, crucial that the selection of this allomorph is triggered by morpholexical rules alone and not by phonological factors. I take the following three examples to be instances of morphological accommodation (the accommodated elements are in bold-face; for an account of these accommodations cf. subsection 4.5.2):

(2-29) *Cases of morphological accommodation (German, English)*

a. er war nur darauf aus, seine Befriedig-**ung** zu bedürf-en
he was only interested in his satisfy-N to need-INF
← sein Bedürf-nis zu befriedigen
← *his need-N to satisfy-INF*
"He was only interested in satisfying his need."

b. I think it's care-**ful** to measure with reason
← it's reasonable to measure with care (Fromkin 1973a:31)

c. ge-monat-ete Arbeit-**en** ← gearbeitete Monat-e
month-PART work-PL ← worked month-PL

In (2-29a), after the stem exchange, the appropriate nominalizing suffix *-ung* is chosen (in addition to that, the possessive pronoun *sein* undergoes morphosyntactic accommodation); therefore, the ungrammatical utterance **sein(e) Befriednis zu bedürfen* does not surface (an English equivalent would look like *he was only interested in needing his satisfaction* instead of *satisfying his need*). The English slip in (b) is quite similar, the only difference being that here an adjectival ending is adjusted. Once again, the uttered sequence may be awkward from a semantic point of view but is grammatically well-formed. The impossible form **careable* is not produced. Finally, in (c), you will find an instance in which the correct plural allomorph for *Arbeit* "work" is selected after the exchange has taken place. Here, accommodation prevents the appearance of the ungrammatical form **gemonatete Arbeite* (cf. section 4.5 for further discussion).

In German, the selection of a plural allomorph is triggered by morpholexical rules.[53] Not so in English where the spell-out of plural information depends on phonological factors. The accommodation of German and English plural allomorphs therefore constitutes different phenomena; in the former, we are dealing with morphological, in the latter with morphophonological accommodation. An English example which involves plural allomorphy is given in (2-30a).

(2-30) *Cases of morphophonological accommodation (English, Arabic, Turkish)*

a. track cow-**s** [z] ← cow track-s [s] (Fromkin 1973a:27)

b. give **the** nipple **an** infant ← the infant a nipple (Garrett 1976:238)

c. fii _aay fi **s**-sukkar ← sukkar fi _-_aay
there tea in ART-sugar ← *sugar in ART-tea*
"there is sugar in the tea"
(Abd-El-Jawad & Abu-Salim 1987:149)

d. ev-**in** adam-~~**i**~~ ← adam-~~i~~n ev-i
house-GEN man-POSS.3.SG ← *man-GEN house-POSS.3.SG*
"the house of the man"

Further cases of morphophonological accommodation from different languages are cited in (2-30bcd). A familiar phenomenon is the accommodation of definite and indefinite articles in English, the phonological shape of which is determined by the onset of the following word (vowel vs. consonant). In (2-30b), we observe that the word exchange does not result in the ungrammatical utterance **gave [Ti:] nipple a infant*. In Arabic, too, the shape of the (prefixed) articles depends on the following segment; analogous to the English example, accommodation takes place in (2-30c).

Errors like the one in (2-30d) are particularly impressive. In Turkish, the spell-out of a suffix is determined by vowel harmony. Turkish shows the characteristic pattern of a symmetric vowel harmony system, i.e. only suffixes alternate and the alternating suffix vowels agree with the nearest stem vowel with respect to certain phonological features (cf. Clements & Sezer 1982). In the present example, these are the features [back] and

[53] This is illustrated e.g. by the two nouns *Haus* "house" (Pl. *Häuser*) and *Maus* "mouse" (Pl. *Mäuse*), in which the phonological environment for the plural suffix is exactly the same in both nouns. By the way, morphological accommodation of a plural suffix is also observed in Swedish; the following accommodation may serve as a proof: *flagga på sina färg-**er*** ← *färg på sina flagg-**or*** "colour of its flags" (Berg 1987:280).

[round].[54] After the stem exchange has occurred in the genitive construction in (2-30d), the stranded suffixes accommodate - as expected - to the new phonological environment; both of them harmonize with the closest stem vowel and consequently, the ungrammatical sequence **ev-ɨn adam-i* does not surface.

Let us now turn to the fourth and final type of accommodation, the morphosyntactic ones. We are dealing with the morphosyntactic type whenever the structure of an utterance is adjusted with respect to morphosyntactic features after the error has taken place. All the slips given in (2-31) are exchanges. The errors in (a) and (b) are certainly accommodations; in both cases, the exchange unambiguously affects NPs, since there is different material in D. In the German example in (a), the indefinite and the definite article subsequently accommodate with respect to gender; in the Spanish example (b), the same is true for the indefinite article of the first NP.[55] Consequently, the ungrammatical phrases **wie man einen Nadel in die Faden kriegt* and **una duro de veinte monedas* do not surface.

(2-31) *Cases of morphosyntactic accommodation (German, Spanish, English)*

a. wie man **eine** Nadel in **den** Faden kriegt
how one a.f needle(f.) in the.m thread(m.) gets
← einen Faden in die Nadel
← *a.m thread(m.) in the.f needle(f.)*

b. **un** duro de veinte moneda-s
a.m 5.pesetas(m.) of twenty coin-PL
← una moneda de veinte duro-s
← *a.f coin(f.) of twenty 5.peseta-PL*
"a one hundred pesetas coin" (Garcia-Albea u.a. 1989:152)

c. sie war 21, als ich gestorben **bin**
she was 21 when I die.PART be.1.SG
← ich war 21, als sie gestorben ist
← *I was 21 when she die.PART be.3.SG*

d. you'**re** too good for that
← that's too good for you (Stemberger 1982a:344)

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[54] The crossed-out /ɨ/ represents the [+high] counterpart to /a/, i.e. a vowel which is characterized by the features [+high], [+back] and [-round].

[55] In contrast to the examples (2-31a) and (b), the analysis of an exchange like *mir ist der Boden auf das Bild, das Bild auf den Boden gefallen* 'me is the ground on the picture, the picture on the ground fallen' ("I have dropped the picture on the floor") is not straightforward. Since there is a definite article in both D°-positions, we are not able to unambiguously determine whether we should analyze the error as a case of DP-

In (2-31c) and (d), pronouns are exchanged. After the exchange, the respective subject positions are both taken by pronouns with different person features: [1st singular] instead of [3rd singular] in (c), and [2nd singular] instead of [3rd singular] in (d). The verbs, however, accommodate to the new situation, i.e. they are spelled out according to the new features in subject position. Therefore, neither of the sequences **als ich gestorben ist* or **you (i)s too good* arises.

Finally, I want to briefly reconsider the classification proposed by Berg (1987). On the one hand, the cases which Berg interprets as instances of morphological accommodations (his categories 4, 5, and 6; cf. table 5) are in fact one morphophonological (***an*** *anguage lacquisition problem* ← *a language acquisition problem*), one morphological (*flagga på sina färg-**er*** ← *färg på sina flagg-or*), and one morphosyntactic (*I **look** as if ...* ← *it looks as if ...*) accommodation each. On the other hand, according to his analysis, all of the examples given in (2-31) would be treated as lexical accommodations to lexical errors (his category 9), since in each of these errors, a new lexical item - be it an article or a verb - is inserted after the error (word exchange) has occurred. Such an interpretation, however, disguises the fact that the selection of the new lexical item is based on the spell-out of the respective morphosyntactic features.

If one would consistently stick to the idea that a phonological accommodation implies adjustment to phonological conditions (e.g. tenseness of a vowel), morphosyntactic accommodation implies adjustment to morphosyntactic conditions (e.g. gender features), and so on, then, in my opinion, the term "lexical accommodation" should be used exclusively for cases in which adjustment to lexical conditions is observed. Therefore, cases of lexical construal may be interpreted as lexical accommodations, i.e. errors like *wieder einmal landet der Ball im **Bett*** ← *im Netz* 'once again lands the ball in.the bed ← in.the net' ("once again, the ball hits the net") in which - due to lexical conditions (available lexical entries) - the perseveration of the segment /b/ does not result in the non-word *Betz* but rather in the existing word *Bett* "bed" which is stored in the mental lexicon (see subsection 4.7.1).

At the beginning of this subsection, I cited a statement by Merrill Garrett in which he describes accommodations as errors "in which the phonetic shape of elements involved in errors accommodates to the error-induced environment" (1980b:263). Above, however, I

---

exchange with stranding of case, or rather as an NP-exchange with subsequent accommodation of the two articles.

have pointed out why I take this definition not to be sufficiently subtly differentiated. For Garrett, the "elements involved in errors" may be the error elements themselves (as e.g. the exchanged verbs in *that I'd **hear** one if I **knew** it ← that I'd know one if I heard it*) as well as the environment of the error elements (as e.g. the indefinite article in ***a n** anguage lacquisition problem ← a language acquisition problem*). In contrast to that, I have argued that only in the latter case, we are dealing with a true instance of accommodation, i.e. only the latter is an error in two steps - in the present example a sound exchange and subsequent adjustment of the article - while the former phenomenon in fact should be analyzed as the stranding of grammatical information - here stranding of tense features.

Moreover, using data from various languages, I have shown that four types of accommodation should be distinguished, namely phonological, morphological, morpho-phonological, and morphosyntactic accommodation.

In conclusion of the data chapter, let me emphasize the following points: We have seen that almost every type of slip may result in an ungrammatical utterance, with the ungrammaticality always being due to conflicting morphosyntactic features. Whenever features of the error element - gender, number, person, or case - do not correspond to features of the error-induced new environment, a feature conflict arises. In some instances, however, such a feature mismatch is rectified by means of a process of accommodation which is effective after the actual error has occurred.

3 Distributed Morphology: A Sketch of the Framework

O a word to clear one's path ahead endlessly!
O something ecstatic and undemonstrable!
O music wild!
(Walt Whitman, Leaves of Grass)

The goal of this chapter is to introduce some of the basic assumptions of Distributed Morphology, highlighting those aspects of the theory which are relevant for the discussion of the speech error data in chapter 4 while neglecting those details which are not of direct importance in the present context.

In the last ten years, several clearly articulated approaches to the theory of word formation have emerged which are quite different in spirit. One such approach is a lexeme-based account according to which only stems of lexical categories (i.e. nouns, verbs, adjectives,

and possibly prepositions) are really morphemes. Such an affixless (or a-morphous) theory was e.g. brought forward by Anderson (1992) and Aronoff (1994).

According to Anderson (1992), the terminal nodes of syntactic phrase markers are not lexical elements but morphosyntactic representations which consist of a list of (morpho-logically relevant) features; morphosyntactic representations also serve as representations of the inflectional properties of words. Anderson's theory of word structure is not based on the classical notion of the morpheme, but rather on the premise that words are related to one another through the operation of morphophonological rules called word formation rules. These word formation rules apply to affixless stems (of lexical categories); they either insert phonological material according to the respective morphosyntactic representation or they possibly change phonological material. On this view, the inflected word *dogs*, for example, is not represented by concatenating /dçg/ and the plural marker /-z/, but rather by having *dog* undergo a rule whose change consists of /X/ → /Xz/, whenever it represents a noun with the property (i.e. with the morphosyntactic feature) [+plural] (Anderson 1992:72). Consequently, in Anderson's theory, inflectional affixes are seen as the by-product of word formation rules.

In contrast, Lieber (1992) supports a lexicalist approach to morphology by clinging to the traditional notion that affixes as well as stems are lexical items which contain both phonological and morphosyntactic features and which relate phonological form to meaning and function. It is crucial for her theory that these lexical items combine to create words manipulated in the syntax.

The theory of Distributed Morphology (Halle 1990, 1994; Halle & Marantz 1993, 1994; Harley & Noyer 1999, Marantz 1995, 1997) which I will describe in some detail below combines features of the affixless and the lexicalist approach to morphology. With the affixless approach, Distributed Morphology (hereafter: DM) endorses the separation of the terminal elements involved in the syntax from the phonological realization of these elements. In DM, terminal nodes obtain phonological features only at the post-syntactic level of Phonological Form. DM, however, parts company with Anderson's approach with regard to the assumption that affixes do not play any role in word formation. In contrast to a-morphous morphology, in DM, affixes very well play a central role in word formation processes.

With the lexicalist approach, on the other hand, DM takes the phonological realization of terminal elements in a syntactic structure to be governed by lexical entries

(Vocabulary items). Stems as well as affixes are taken to connect morphosyntactic feature bundles with phonological feature complexes. But once again there are also crucial differences between the two theories: most importantly, in DM it is assumed that the assignment of phonological features to terminal nodes takes place after the syntax and consequently does not create or determine the terminal elements manipulated in the syntax.

Halle & Marantz (1993:111f) state that the name "Distributed Morphology" was chosen in order to emphasize the fact "that the machinery of what traditionally has been called morphology is not concentrated in a single component of the grammar, but rather is distributed among several different components". Consequently, word formation may take place at any level of grammar through different processes such as head movement and/or merger of adjacent heads.

According to Halle & Marantz, DM "shares important traits with traditional morphology (e.g. in its insistence that hierarchically organized pieces are present at all levels of representation of a word), but deviates from traditional morphology in other respects (most especially in not insisting on the invariance of these pieces but allowing them to undergo changes in the course of the derivation)" (Halle & Marantz 1993:112). Above all, the inability of other theories to capture the observed changes in the hierarchical organization of morphological pieces was the main motivation for Halle and Marantz to propose an alternative theory.

On the one hand, they criticize that Anderson's lexeme-based theory contradicts much current practice in generative syntax, where inflectional morphemes (or features) are treated as heads of functional projections and must therefore constitute terminal nodes. Anderson motivates his analysis by citing a number of violations of "the one-to-one relation between components of meaning and components of form which is essential to the classical morpheme" (Anderson 1992:70). Halle & Marantz (1993) point out that in Anderson's theory, any parallel between the layering of syntax and the layering of phonology is just an accident. Therefore, rather than to eliminate all affixes from morphology, they choose to redefine the notion of morpheme.

On the other hand, Chomsky (1995) suggests that affixation takes place in the lexicon prior to lexical insertion and that the interface between a verb's internal morphological structure and the syntax involves a system of feature checking. That is, as the verb raises to functional heads in the syntax, it checks its features with the features of the functional heads to which it adjoins. Affixation and checking, however, are independent of each other. Most importantly, affixation in the lexicon does not impose any particular structure on the

organization of features and consequently, no particular order is imposed on the checking operations. Therefore, in Chomsky's framework, the connection between the internal phonological structure of the verb and its inflectional features (to be checked off in the course of the derivation) has no consequences for the rest of the grammar.

These shortcomings of the affixless and the checking theory sketched above lead Halle and Marantz to propose an alternative account. As will become clear shortly, a central claim of DM is that terminal nodes mediate the connection between syntactic/semantic information and phonological information in a uniform manner, regardless of the source or identity of the terminal node.

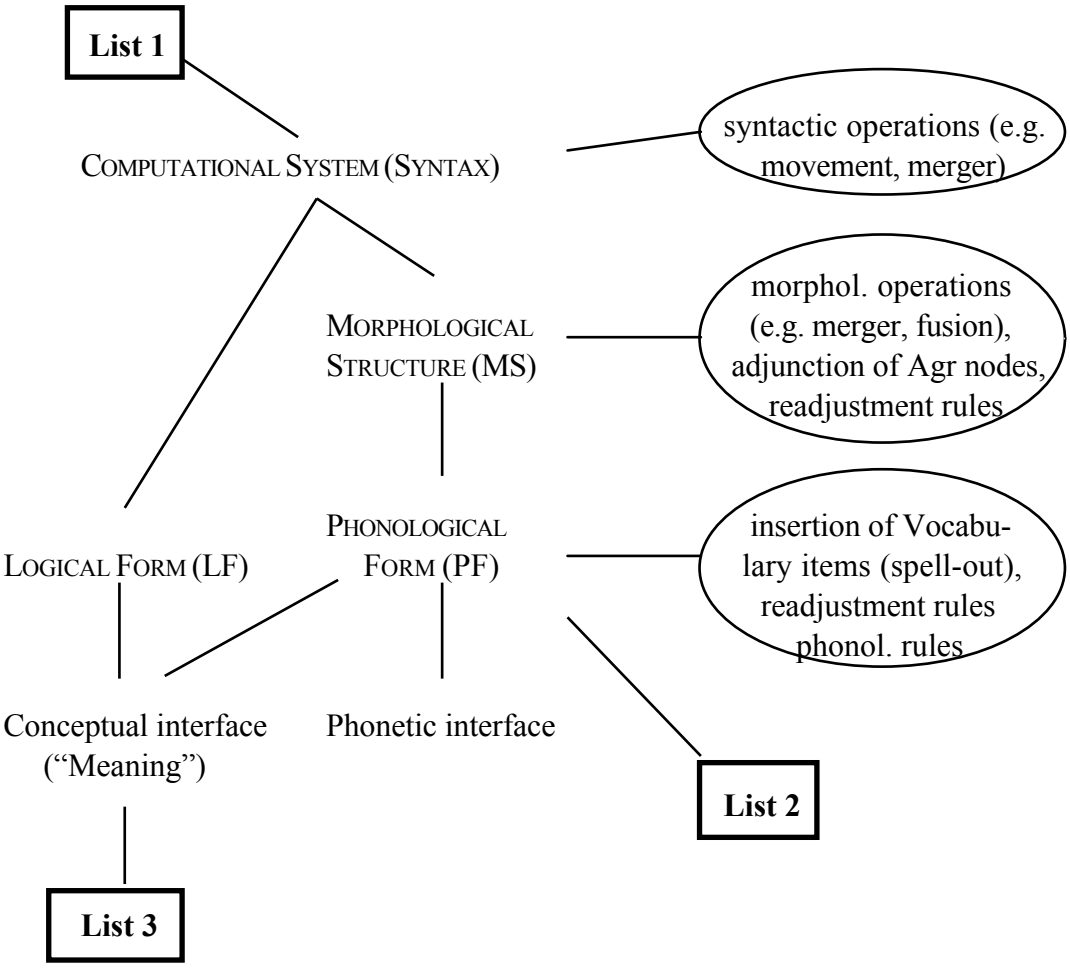
3.1 The Structure of the Grammar

> Ha! très grand arbre du langage
> peuplé d'oracles, de maximes ...*
>
> (Saint-John Perse, Vents)

The theory of Distributed Morphology is separationistic in nature in that it adopts the idea that the mechanisms which are responsible for producing the form of syntactically and semantically complex expressions are separate from the mechanisms which produce the form of the corresponding phonological expressions. One of the core assumptions of DM is that syntax proper does not manipulate anything resembling lexical items, but rather, generates structures by manipulating and combining morphosyntactic features by means of various syntactic operations (such as movement and merger). The model of grammar as adopted in Halle & Marantz (1993) and subsequent work is sketched in (3-1):

* "Ha! very large tree of language, crowded with oracles, with maxims ..."

(3-1) *The DM model of grammar*



It is only after syntax at the level of Phonological Form that phonological expressions, called Vocabulary items, are inserted in a process called spell-out. Vocabulary insertion is therefore referred to as "late insertion". At the level of Morphological Structure which is taken to be the interface between syntax and phonology, various operations may change the structure and/or number of terminal nodes (cf. subsection 3.2.2). For a given Vocabulary item to be inserted in some terminal node at PF, none of its morphosyntactic features may conflict with a morphosyntactic feature present in that terminal node. Again, certain operations may apply, at this time altering the phonological shape of already inserted Vocabulary items (cf. subsections 3.2.3 and 3.2.4).

In DM, there is no lexicon in the sense familiar from generative grammar of the 1970s and 1980s. Rather, there is a number of distributed lists which take over the jobs assigned to the lexicon component in earlier theories (Marantz 1997). In the syntax, the terminal nodes

are purely abstract; they consist only of features that actually play a role in the syntactic computation. Thus, all features that are only relevant at the phonological or semantic interface are not part of the terminal nodes in the syntax. The morphosyntactic features which are relevant to the computational system, such as e.g. [definite], [plural], [1st], and [root], are drawn from a feature set which is made available by Universal Grammar. In a sense, List 1 in the illustration above most directly replaces the lexicon in that it provides the units which the syntax operates with; it contains the atomic roots of the language as well as the atomic bundles of grammatical features. List 1 (which Marantz calls "pure" or "narrow" lexicon) is generative in nature in that sets of grammatical features may be freely formed, subject only to combinatorial constraints about feature cooccurences.[56]

List 2, the Vocabulary, provides the phonological forms for the terminal nodes from the syntax. Thus, the Vocabulary establishes a connection between sets of grammatical features and phonological features. The Vocabulary is non-generative in nature but expandable. Within DM, the Vocabulary items come very close to matching usual notions of 'morphemes'. Note that the Vocabulary items may be underspecified with respect to the features of the syntactic position in which they can be inserted. Various items may compete for insertion at a given terminal node, with the most highly specified item that does not conflict in features with the specification of this terminal node winning the competition. Vocabulary items connect the paradigmatic space defined by the features of a given terminal node to phonological form by mentioning some of these features and by describing how they relate to phonological features.

The third and final list in (3-1) is List 3 or the Encyclopedia. The Encyclopedia lists the special meanings of particular roots. In other words, it relates Vocabulary items to meanings. In DM, the Encyclopedia is taken to be the list of idioms of a given language. Here, the term "idiom" embraces more than the conventional use of the term; it is used to refer to any expression (even a single word or subpart of a word) whose meaning is not wholly predictable from its morphosyntactic structural description (Marantz 1997, 1998). As with the Vocabulary, the Encyclopedia is non-generative but expandable. Two examples - one single word idiom and one phrasal idiom - are given in (3-2):

(3-2) *Single word and phrasal idiom*

[56] Note that according to Marantz (1995, 1997), certain compositional semantic features such as [±animate] or [count noun] may also be contained in List 1 and may therefore also enter the computational system in case that they are relevant to that system.

a. *cat*: a domestic animal with claws, miaows, ...
b. *(rain) cats and dogs*: a lot, heavily

As mentioned before, lexical features (from List 1) entering the computational system do not include any semantic features that play no role in the computational system. For example, the semantic difference between "dog" and "cat" does not have an effect on any syntactic principle, rule, or constraint and consequently, the computational system does not need to 'know' whether a certain terminal node contains "dog" or "cat". It is, however, clear that the PF component must 'know' whether a node contains "dog" or whether it contains "cat", since otherwise Vocabulary insertion would proceed at random (see subsection 4.2.1 for discussion). Moreover, the Encyclopedia (List 3) which relates Vocabulary items to meanings must also 'know' which of these elements ("cat" vs. "dog") appears at a given node, i.e. the use of the Encyclopedia must involve knowledge of Vocabulary insertion at PF, where a choice between "dog" and "cat" must have been made. Consequently, the choice of one Vocabulary item over the other (and, of course, as opposed to all the other items that might be inserted into a terminal node marked as "animate count noun") must be registered in order to allow for interpretation of that item with the help of the Encyclopedia.

According to Marantz (1997), it is an open question how much information about roots is present in the narrow lexicon (List 1) and how the particular choice of a root from the lexicon or from the Vocabulary (List 2) feeds semantic interpretation. Presumably, the roots which are manipulated in the syntax must contain some kind of information which allows for insertion of the correct Vocabulary item at PF (dog?, cat?, girl?, ...); it is, however, not clear what kind of information that might be since - as discussed above - (noncompositional) semantic features are not present in the computational system (for further discussion cf. subsection 4.2.1).

Below I summarize the most important characteristics of the three components which replace the traditional lexicon in DM (following Marantz 1998:5):

> List 1: the Lexicon: The list of bundles of features that enter the computational system; this list contains only those features which are relevant to the principles of syntax.
>
> List 2: the Vocabulary: contains the Vocabulary items which are connections between lexical features and phonologically relevant features. All the Vocabulary items compete for insertion at a given terminal node.

> List 3: the Encyclopedia: Encyclopedia entries connect (pieces of) the output of the grammar to noncompositional meanings; these entries are used in the interpretation of linguistic structure.

In this section, I have sketched the basic structure of the grammar as assumed in Distributed Morphology and have pointed out how the grammatical levels interact with linguistic and nonlinguistic "lexical" knowledge stored in different lists. In the following section, I am going to have a closer look at the operations which apply at the post-syntactic levels of Morphological Structure and Phonological Form.

3.2 Morphological Structure and Phonological Form

Wo ist dies Schweigen und wo ist die Stätte,
in der dieses Wort gesprochen wird?*
(Meister Eckhart, Mystische Schriften)

In this section, I will be concerned with the various operations that apply at the postsyntactic levels of Morphological Structure (MS) and Phonological Form (PF).

In DM, every expression acquires at least two structural descriptions in the course of its derivation. In a morphosyntactic description, the morphemes that are part of an expression and their arrangement are indicated (using features from List 1); the morphosyntactic description of e.g. "dogs" would look like [[root] [+pl]]. In a morphophonological description, an expression's phonological pieces (its Vocabulary items taken from List 2) are indicated.

The morphosyntactic structure of an expression is generated by several mechanisms. In the syntax e.g., head movement plays a crucial role in constructing complex morphosyntactic structures; a verbal root, for instance may be moved through various functional heads. Moreover, in DM, several additional structure-changing mechanisms are postulated which apply post-syntactically at the grammatical level of Morphological Structure. These mechanisms will be subject to closer examination in subsection 3.2.2.

At the level of Phonological Form, Vocabulary items are inserted into abstract bracketed morphosyntactic structures. In addition to that, phonological readjustment rules may alter the phonological structure of Vocabulary items in the context of other such items. The process of Vocabulary insertion will be sketched in subsection 3.2.3 while the role of phonological readjustment rules is subject to discussion in subsection 3.2.4. First of all, however, I will concentrate on morpheme type distinctions in DM in the subsection to follow.

3.2.1 *The Status of Morphemes*

Harley & Noyer (1999) note that in DM, the term "morpheme" properly refers to a syntactic terminal node and its content; it does not refer to the phonological expression of

that terminal node, which is provided as part of the Vocabulary item. As described in detail before, the content of a morpheme which is active in the syntax consists of morphosyntactic (and compositional semantic) features drawn from a set made available by Universal Grammar. In this subsection, I will consider possible distinctions between morpheme types which may be relevant for the computational system and/or Vocabulary insertion in order to yield a correct (or desired) output.

Presumably, only words stored in the Vocabulary of a particular speaker can figure in actual utterances processed by that speaker. Words such as e.g. "dog", "sell", and "red" appear in the Vocabulary as single constituents, i.e. they have no internal morphological structure. This, of course, is not true for all the words of a language. A large set of the words a speaker knows has internal structure. To illustrate this point, Halle (1990) gives the somewhat extreme example in (3-3):

(3-3) *A morphologically complex word*

[[anti [[[dis [establish]$_V$]$_V$ ment]$_N$ arian]$_A$]$_A$ ism]$_N$

On the one hand, "morpheme" refers to the bracketed elements in (3-3) which are combined to make up a complex word. On the other hand, the term is also used for unitary constituents such as "dog", "sell", and "red". Thus, morphemes are of two major kinds: stems and affixes. In many languages, stems may constitute words by themselves.[57] In contrast to that, affixes in general do not constitute words by themselves; rather, they attach to stems (which may be the product of prior affixation) and usually determine the lexical category of the word they form.

Speakers of a language do not only know the words of their language but also the bound morphemes and the precise conditions for their occurrence, since not every affix may attach to every stem. For example, the English suffix *-ness* as well as the prefix *un-* attach to adjectival stems only. Halle (1990) assumes that the knowledge English speakers have of these bound morphemes is essentially of the form illustrated in (3-4):

(3-4) *Two English affixes*

a. *-ness* b. *un-*

---

* "Where is this silence and where is the place at which this word is spoken?"

[57] This, however, does not hold without exception; in English e.g., stems like *-mit* (as in *remit*, *admit*, *submit*) and *-ceive* (as in *receive*, *deceive*, *conceive*) can not function as independent words (cf. Aronoff 1976).

/nes/	/√n/	: phonological representation (= identifying index)
N	A	: syntactic category
"quality, degree of X"	"not X"	: meaning
$[X]_A$ ___	___ $[X]_A$	: contextual condition

Halle (1994) assumes that a morpheme is represented by a complex symbol consisting of two separate parts: an identifying index and a set of grammatical markers. Each of the morphemes - free or bound - that has been mentioned in this subsection so far has a single fixed underlying phonological representation. For these formatives the identifying index is a sequence of phonemes; they are referred to as "concrete morphemes". For a minority of morphemes, however, this does not hold. The English plural morpheme e.g. has strikingly different phonological manifestations in various classes of English nouns, as illustrated in (3-5) (Halle 1990):

(3-5) *Manifestations of English plural morpheme*

a.	sheep	fish	deer	moose
b.	rad-i	mag-i	alumn-i	sarcophag-i
c.	ox-en	childr-en	brethr-en	
d.	dog-s	cat-s	fox-es	

Apparently, the contextual variants of the English plural morpheme are phonetically unrelated. Morphemes that do not have a fixed phonological shape are referred to as "abstract morphemes". They differ from concrete morphemes such as those in (3-4) in that they lack a phonological representation in their Vocabulary entries. Halle (1994) claims that abstract morphemes are supplied with a special identifying index - represented by the capital letter Q - whose phonetic realization is determined by special rules in the morphophonology. Most abstract morphemes are inflectional morphemes (such as plural, past etc.) but there also exist inflectional morphemes that are concrete as e.g. the English progressive aspect marker *-ing*. The status of noninflectional morphemes is not straightforward either; the verb *be* e.g. has surface forms of great variety and consequently has to be seen as an abstract stem morpheme.

Halle (1990, 1994) proposes that only abstract morphemes are inserted postsyntactically while all concrete morphemes may be inserted, with their phonological features, at deep structure. More current work in DM, however, endorses late insertion of all phonological expressions; no Vocabulary items appear at deep structure (i.e. within the

computational system), only bundles of features in terminal nodes. Consequently, Halle's earlier abstract vs. concrete distinction has been largely abandoned. With all kinds of morphemes being inserted at the same level, reference to an identifying index Q becomes superfluous.

Harley & Noyer (1998a) propose an interesting alternative account. They suggest that morphemes are of two basic kinds: f-morphemes and l-morphemes which correspond approximately to the well-known division between functional and lexical categories, or closed- and open-class categories. F-morphemes are defined as morphemes for which there is no choice regarding Vocabulary insertion. The spell-out of these morphemes is deterministic in that their content suffices to determine a unique phonological expression. In contrast, an l-morpheme is defined as one for which the choice of Vocabulary item is not determined in advance. For example, the Vocabulary items *the*, *-d*, and *a* in (3-6a) and their German equivalents *die*, *-te*, and *ein* in (3-6b) are completely determined by the grammar, given a syntactic structure containing appropriate terminal nodes (f-nodes) with such features as [definite], [past], and [indefinite]. The choice of the Vocabulary items *cat* or *Frau* "woman", however, is not constrained in such a way; the speaker might as well have chosen the items *dog* or *Mann* "man" (in these examples, f-morphemes are in bold-face).

(3-6) *f-morphemes and l-morphemes*

a. **The** cat chase-**d a** mouse

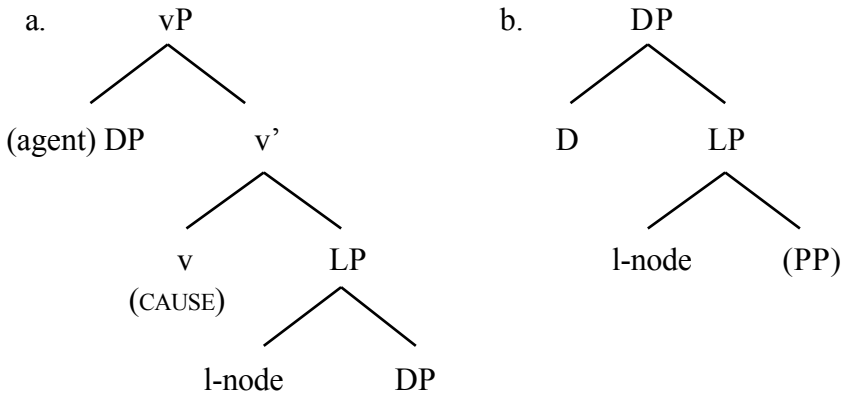
b. **Die** Frau hör-**te** **ein** Geräusch
the.f.NOM *woman* *hear-PAST* *a.n.ACC* *sound*
"The woman heard a sound."

The account sketched above is referred to as the L-Morpheme Hypothesis by Harley & Noyer (1999) (also cf. Marantz 1997, Harley & Noyer 1998a,b). This hypothesis contends that the traditional terms for sentence elements, such as noun, verb, and adjective, have no universal significance and are essentially derivative from more basic morpheme types; i.e. l-morphemes are acategorial in nature: there is only one type of l-node whose categorial status is defined by its context. Consequently, there is no such thing as a fundamentally nominal or verbal l-node. Rather, l-nodes appear in whatever syntactic context the derivation creates for them, and then a given l-morpheme is inserted whose subcategorization information specifies that it may appear in that context. If a Vocabulary item appears in an appropriate syntactic context, given its subcategorization requirements,

it is said to be licensed. For example, a noun or a nominalization is a root whose nearest c-commanding f-morpheme is a determiner, i.e. a root which is locally licensed by a determiner. In contrast to that, a verb is a root whose nearest c-commanding f-morphemes (or licensers) are v (the “light” verb), Aspect, or Tense.

In that respect, consider the following two examples:

(3-7) *Local licensing of l-nodes*



"Caesar destroyed the city" "the destruction (of the city)"

Since l-nodes lack a categorial specification, the phrase they project is labelled LP.[58] In (3-7a), the verbal status of the root "destroy" is created by inserting a Vocabulary item into a terminal l-node which is governed by v. The l-node will be combined with the CAUSE morpheme to yield the transitive verb in a sentence like "Caesar destroyed the city". In (3-7b), the nominalization of the same root is the result of inserting a Vocabulary item into an l-node which is governed by D.

The role of the light verb in the derivation can be neatly illustrated by the German verb pair *senken* "to lower" vs. *sinken* "to drop", the first one being transitive, the latter one intransitive, as illustrated by the examples in (3-8):

(3-8) *Combination of light verb and l-node*

a. Der Händler senkt die Preise
the dealer lowers the prices

b. Die Preise sinken
the prices drop

In (3-8a), as in (3-7a) above, the l-node is licensed by a CAUSE morpheme in the head of vP and a transitive verb is produced; the agentive argument *dealer* occupies the specifier

[58] In (3-7), a split-VP approach like the one assumed in e.g. Chomsky (1995) is adopted. In this approach, (agentive) external arguments are taken to be base-generated in the specifier of a light verb phrase (vP) which is projected separately from a lower basic VP. The light verbal head is a functional head with a very limited inventory of meanings. Harley (1995) e.g. maintains that v may only mean three different things, namely BE (stative), CAUSE, and BECOME.

position of vP.[59] A different relation between v and the l-node holds in the intransitive sentence in (3-8b). Here the light verb heading vP must be something like BECOME, with no agentive argument in SpecvP. The bracketed structures for the two examples are given below:

(3-8) *Combination of light verb and l-node*

a'. [$_{vP}$ [$_{DP}$ der Händler] [$_{v'}$ CAUSE [$_{LP}$ gesenkt [$_{DP}$ die Preise]]]

b'. [$_{vP}$ BECOME [$_{LP}$ gesenkt [$_{DP}$ die Preise]]]

In the transitive as well as in the intransitive case, the same l-node, designating the resultant state (*gesenkt* "lowered"), combines with the little v morpheme in order to produce the final verbal form. Thus, from a given numeration of initial bundles of features and l-nodes, the syntax creates legitimate structures, which then are filled with appropriate Vocabulary items. As we have seen, the same Vocabulary item may surface in different morphological categories depending on the syntactic context in which the item's l-morpheme (or root) appears, i.e. depending on the f-morpheme by which it is licensed.

3.2.2 *Morphological Operations*

Some agglutinating languages like e.g. Turkish come very close to the ideal of a one-to-one relation between terminal elements in the syntax and morphemes (i.e. suffixes) at PF, with the organization and bracketing of the morphemes directly reflecting the syntactic bracketing. Consequently, a language like Turkish can be said to be a particularly good proof of Baker's (1985) Mirror Principle which states that "morphological derivations must directly reflect syntactic derivations (and vice versa)" (Baker 1985:375). That is, in morphologically complex forms, the order of affixes is not randomly related to the sequence of operations needed to get from the syntax of the base form to that of the surface form. Rather, the order of affixes 'mirrors' that of the operations. This is true, for instance, for the complex Turkish verb in (3-9a) whose derivation is sketched in (3-9b). The arrows

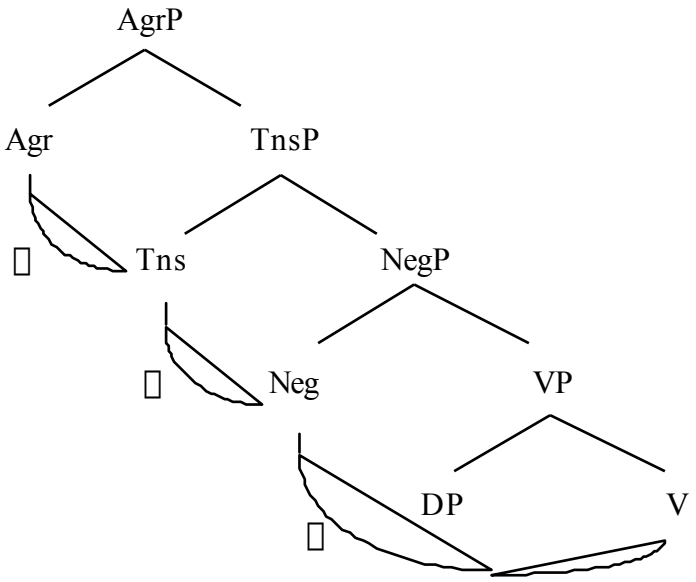
[59] A similar argument can be made for the verb *ärgern* ("to tease" or "to make angry") in the example sentence (3-10b) below. The verb *ärgern* is usually taken to be derived from the noun *Ärger* "trouble". In DM terms, a root is inserted into an l-node which is governed by the light verb CAUSE resulting in a combined form meaning something like "to cause trouble".

indicate that the verbal stem is raised and adjoined to various functional heads and once it is moved to Agr, the surface form of the verb is derived.

(3-9) *Affix order and the Mirror Principle in Turkish*

a. Cevab-~~ı~~ bil-mi-yor-um
answer-ACC know-NEG-PRES-1.SG
"I don't know the answer."

b.



If head-to-head movement and adjunction in fact were the only processes active in inflectional affixation, then Baker's principle would appear to be more or less accurate. But unfortunately this is not the case. It is a well-known fact that morphological structures in many of the world's languages do not fit neatly into the picture of a one-to-one relationship of form and function as sketched above. In numerous instances, we observe morphemes which are somewhat 'ill-behaving' in that they are not homogenous and indivisible atomic units of linguistic form (cf. Anderson 1992:51ff for a survey of problematic cases involving e.g. discontinuous, empty, and portmanteau morphemes).

Instead of abandoning the notion that affixes are morphemes (as e.g. Anderson (1992) does), DM analyzes the apparent mismatches between the organization of the morphosyntactic elements and the organization of the morphemes as the result of structure-changing processes which manipulate terminal elements at the level of Morphological Structure (as well as in the syntax), i.e. before Vocabulary insertion takes place. In this subsection, I am going to discuss some of these processes, all of which are sensitive to syntactic structure and obey strict locality conditions.

Throughout the remainder of this chapter, I will refer to the two examples in (3-10) in order to illustrate the mechanisms which are active at the levels of Morphological Structure and Phonological Form:

(3-10) *Two examples for illustrating MS and PF mechanisms*

a. John sold the sheep

b. Ärger-te-n die Kind-er ihre Väter ?
tease-PAST-PL *the.PL* *child-PL* *their.PL.ACC* *father.PL.ACC*
"Did the children tease their fathers?"

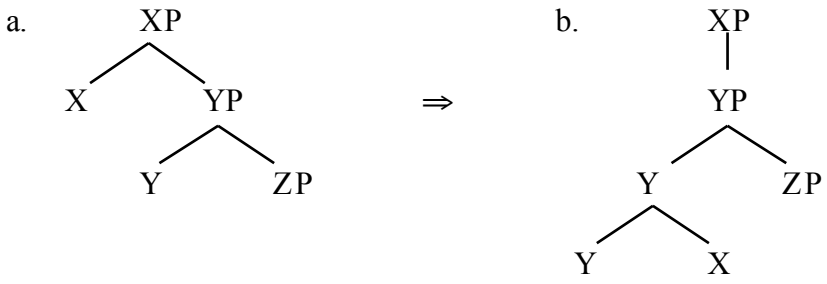
All of the mechanisms and phenomena that have to be referred to in order to adequately describe these examples (morphological merger, phonological readjustment, zero affixes, etc.) will turn out to be helpful - if not necessary - in the analysis of selected speech error data in chapter 4.

The first of the structure changing processes I want to discuss is morphological merger. Merger joins terminal nodes under the node of a head but maintains two independent terminal nodes under this node. Thus, like head-to-head movement, merger forms a new word from heads of independent phrases, but these independent heads remain separate morphemes within the new derived word. In Marantz (1988), merger was generalized in the following way:

> *Morphological Merger*
> "At any level of syntactic analysis (D-structure, S-structure, phonological structure), a relation between X and Y may be replaced by (expressed by) the affixation of the lexical head of X to the lexical head of Y." (Marantz 1988:261)

The structures in (3-11) illustrate the application of the operation:

(3-11) *Application of morphological merger*

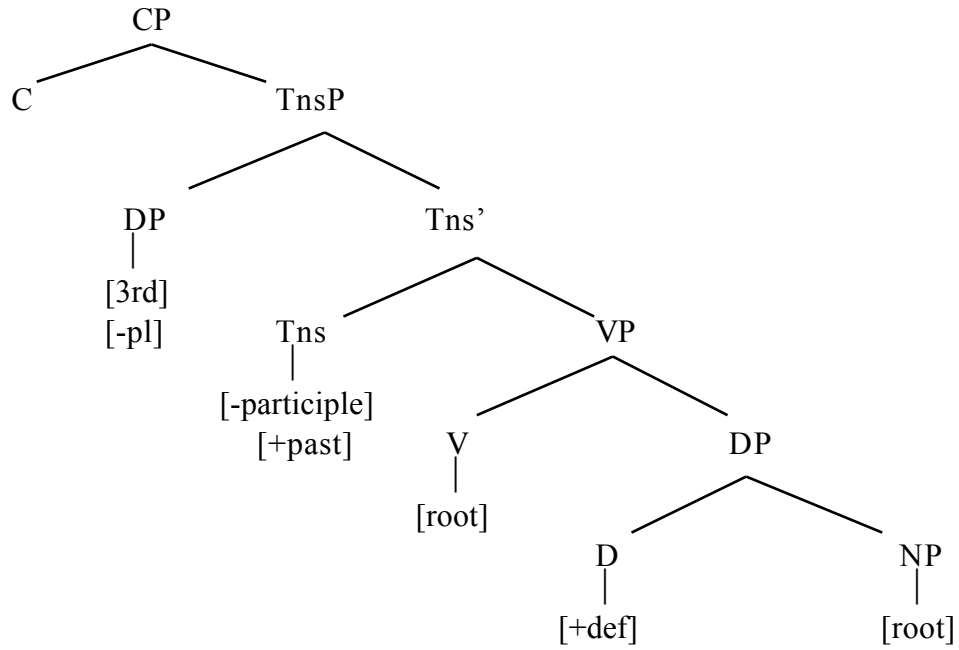


Merger exchanges a structural relation between two elements at one level of representation for a different structural relation at a subsequent level.

In order to further clarify the mechanism, let me come back to the example sentences given in (3-10) above. For the English example *John sold the sheep*, the structure which is

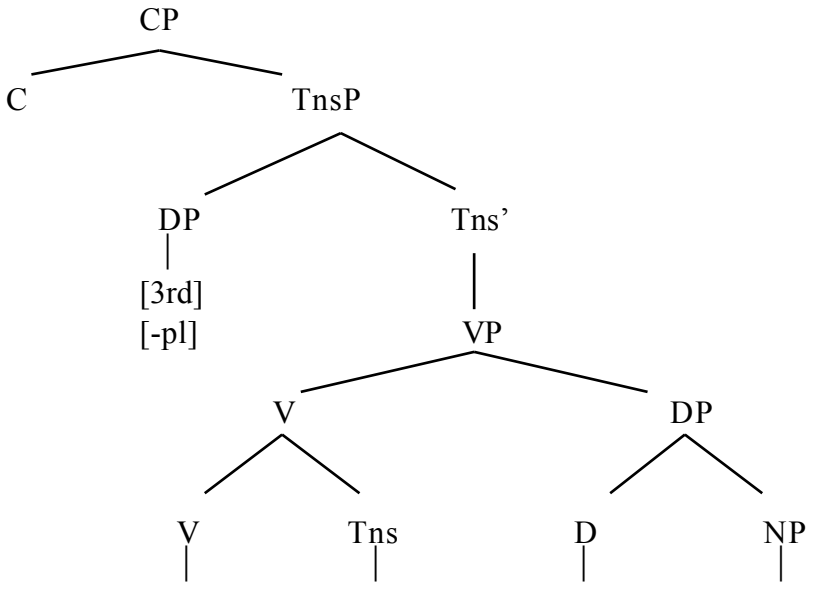
the output of the computational system looks like (3-12a) (at this time ignoring the light verb phrase and therefore disregarding movement of the external argument *John* from SpecvP to SpecTnsP).

(3-12) a. *Output of computational system for example (3-10a)*



For English, it has been claimed that main verbs do not overtly raise to Tns; still, Tns does appear on the verb in sentences like (3-10a). The joining of Tns with the main verb has sometimes been attributed to a lowering operation (Pollock 1989). However, it is argued in Halle & Marantz (1993) that this joining is in fact an example of merger under structural adjacency (also cf. Bobaljik 1994). The result of merger - Tns being affixed to the verb - is shown in (3-12b):

(3-12) b. *Merger of Tns and main verb in English*

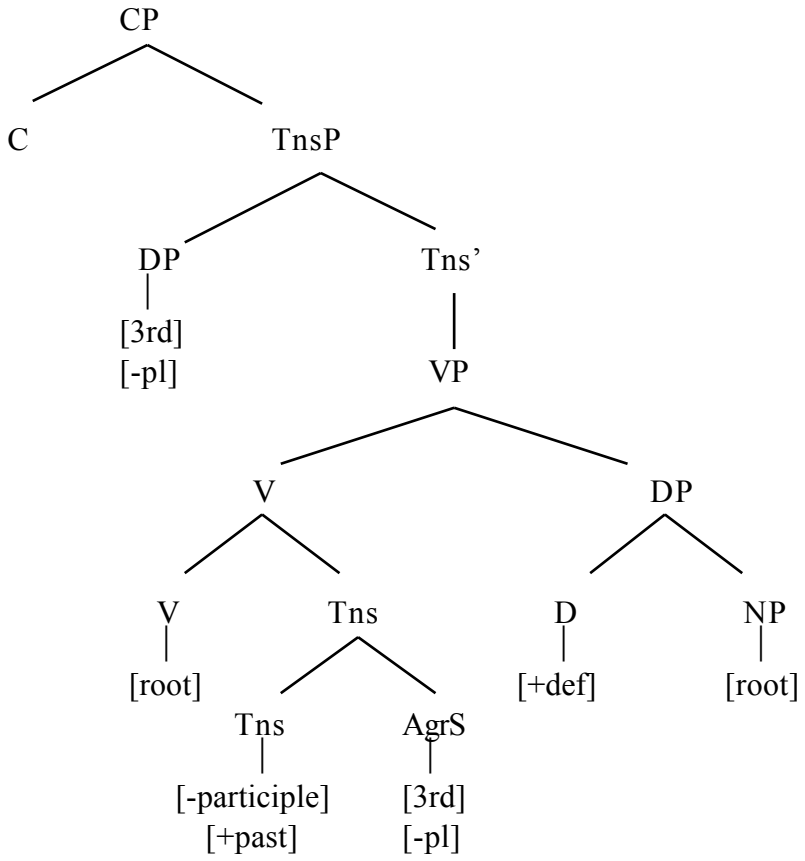


[root] [-participle] [+def] [root]
[+past]

Another source of the mentioned lack of isomorphism between Phonological Form and the syntax is the fact that additional morpheme nodes may be inserted at Morphological Structure. For instance, in DM it is assumed that subject-verb agreement is implemented in many languages by adjoining an Agr morpheme to the Tns node; subsequently features of the subject DP are copied onto this Agr node. In a similar fashion, case-number-gender concord within German DPs is implemented by supplying appropriate agreement suffixes to adjective and determiner nodes and by copying features associated with the nominal head of the DP onto them. By inserting these morphemes after syntax but before spell-out their lack of effect in the syntax is accounted for (cf. Marantz (1991) for the determination and realization of case features at MS).

The insertion of the AgrS morpheme onto which the appropriate features of the subject have been copied transforms the tree (3-12b) into the tree in (3-12c).

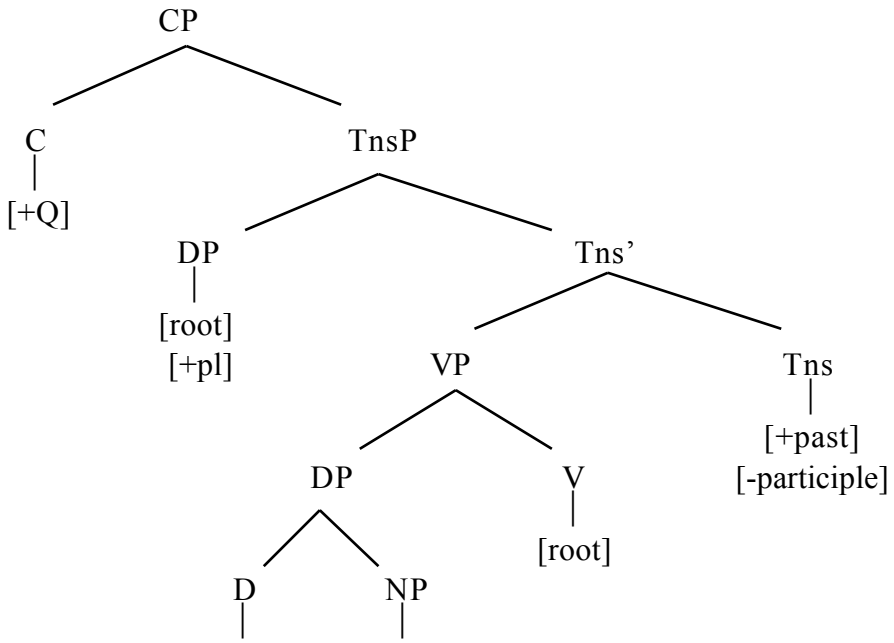
(3-12) c. *Insertion of AgrS morpheme*



At this stage of the derivation, a third structure-changing operation comes into play. This is the operation fusion which takes two terminal nodes that are sisters under a single category node and fuses them into a single terminal node. After fusion has applied, only one Vocabulary item may be inserted and this item must have a subset of the morphosyntactic features of the fused node (which includes features from both input terminal nodes). Unlike merger, fusion reduces the number of independent morphemes in a tree. In English e.g., Tns and Agr fuse into a single morpheme at MS, since there are no number/person distinctions in the past tenses.[60]

Given that English main verbs are incapable of raising to Tns, it is also impossible for them to further raise to C in yes/no-questions (e.g. **Sold John the sheep?*). In this case, the dummy element *do* will be inserted under Tns and will raise to a [+Q] marked complementizer (resulting in *Did John sell the sheep?*). Things are different in German, as exemplified by the sentence (3-10b) *Ärgerten die Kinder ihre Väter?*. The underlying structure for this sentence is given in (3-13a). Again, the role of the light verb phrase is not considered. Note that the [+def] feature in D is probably superfluous since possessive pronouns are definite by nature.

(3-13) a. *Underlying structure for example (3-10b)*

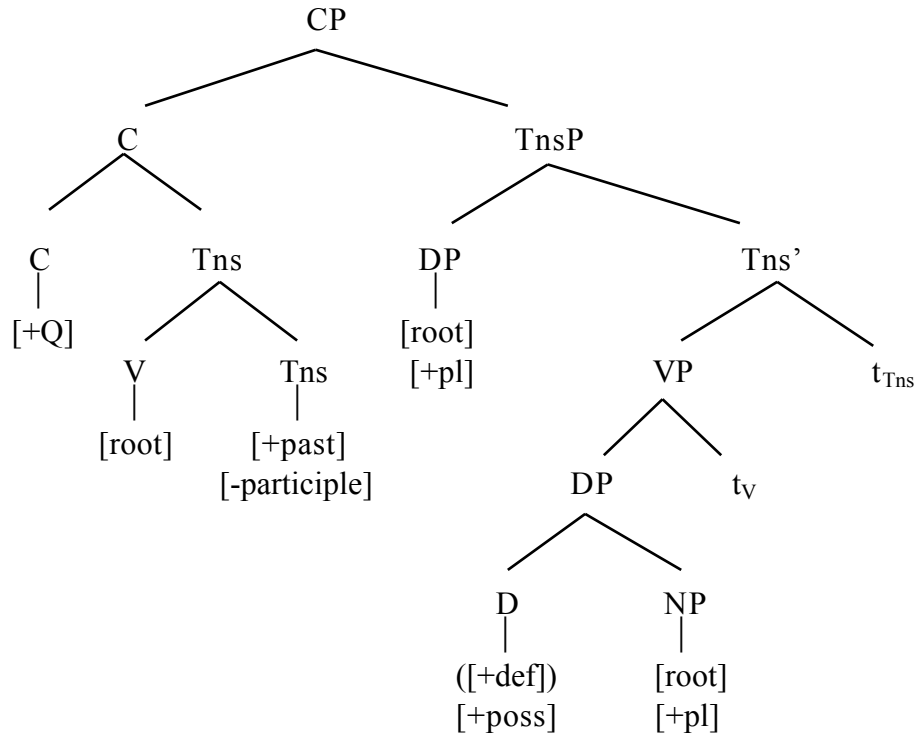


[60] Other mechanisms that contribute to the noted lack of isomorphism between the syntax and PF are impoverishment and morpheme fission. Impoverishment is an operation on the content of morphemes which involves the deletion of morphosyntactic features in certain contexts. Fission is capable of splitting a given node into two to account for situations in which a single morpheme may correspond to two separate Vocabulary items. Cf. Halle (1997) and Noyer (1998) for details.

([+def]) [root]
[+poss] [+pl]

Obviously, German main verbs may raise and adjoin to Tns and in a second step to C; the structure after verb movement is given in (3-13b).

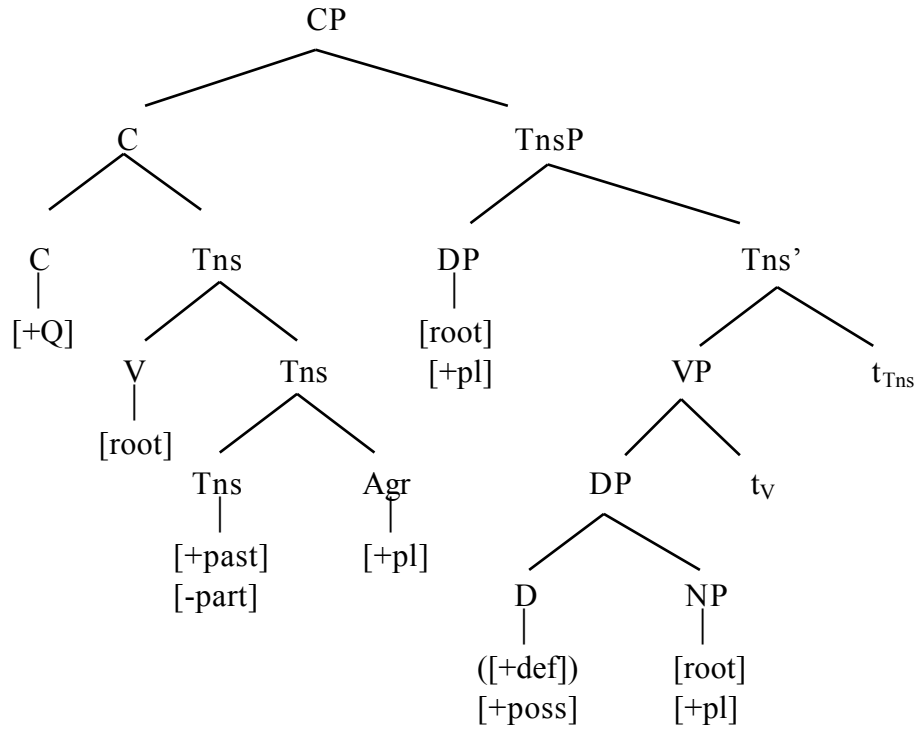
(3-13) b. *Structure after verb movement to Tns*



Being phonologically zero, C will probably fuse with Tns.[61] Moreover, at MS, AgrS will be implemented as a sister node of Tns and features of the subject DP will be copied onto the Agr morpheme. Insertion of the Agr node transforms tree (3-13b) into (3-13c). An important difference to the English example (3-10a) is that in German, Tns and AgrS will not fuse, since person/number distinctions are maintained in the past tense.

[61] Alternatively, we may assume that movement of the V/Tns-complex to C is a substitution process (in contrast to movement of the verb to Tns which is usually taken to involve adjunction of the verb to Tns).

(3-13) c. *Insertion of AgrS morpheme*



Above, an English and a German example were chosen in order to clarify the effects of some of the operations which apply at the level of Morphological Structure, namely morphological merger, fusion, and insertion of morphemes. Once these operations have applied, Vocabulary Insertion takes place. The insertion of Vocabulary items will be subject of the subsection to follow.

3.2.3 *Vocabulary Insertion*

A Vocabulary item is not merely a phonological string; rather, it also contains information about where that particular string may be inserted. At the level of MS, Vocabulary insertion (spell-out) inserts Vocabulary items into morphemes, i.e. into terminal nodes which are characterized by morphosyntactic features. In the unmarked case, the relation between Vocabulary items and morphemes is one-to-one. However, as discussed in subsection 3.2.2 above, several factors may disrupt this relation.

Regardless of the type of morpheme - l-morpheme or f-morpheme -, spell-out is taken to involve the association of phonological pieces with abstract morphemes. This

operation is usually understood as being cyclic, such that more deeply embedded morphemes are spelled out first.

In the case of f-morphemes, sets of Vocabulary items compete for insertion into a given node. For insertion to take place, only a subset of the features specified in the terminal node must be matched by features of the Vocabulary item. Insertion of phonological strings into abstract morphemes is governed by the Subset Principle.

> *Subset Principle*
> "The phonological exponent of a Vocabulary item is inserted into a morpheme in the terminal string if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the Vocabulary item contains features not present in the morpheme. Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen." (Halle 1997:428)

The Subset Principle determines in part the order of precedence among Vocabulary items which compete for insertion: items that match more features take precedence over items that match fewer features, i.e. the application of a given spell-out rule bleeds the application of all spell-out rules ordered below it.

With this in mind, we may now come back to our English example in (3-10a): *John sold the sheep*. The relevant morphosyntactic features in this example are [+past], [-participle], [+def], and [+pl]. In specific environments, i.e. with certain stems, [+past] is spelled out as zero, as indicated in (3-14a). In other specific contexts, other affixes may attach to the stem. However, in the remaining (or elsewhere) environments, the default affix /-d/ which does not require a specific context will be inserted (3-14b). Here, the insertion of the zero affix bleeds the insertion of /-d/, a property which accounts for the fact that in English doubly marked past tense forms are ungrammatical. Note that the Vocabulary items in (a) and (b) are underspecified with respect to the terminal node since they are not specified for the feature [-participle].

(3-14) *English Vocabulary items (f-morphemes)*

a. [+past] ←→ ∅ / X + ____
(where X = *drive*, *sing*, *beat* ...)

b. [+past] ←→ /-d/

c. [+def] ←→ /T´/

d. [+pl] ←→ ∅ / Y + ____
(where Y = *sheep*, *man*, *moose* ...)

e. [+pl] ←→ /-´z/

The insertion of the definite article (3-14c) is straightforward because in this case there is no competition amongst Vocabulary items. Finally, the insertion of the plural suffix is comparable to what we have observed with the past tense suffix: in a specific environment, e.g. with the noun *sheep*, a zero suffix will be inserted, in other environments other suffixes may be chosen (cf. (3-5) above), and in the remaining cases, the default suffix /-´z/ will be inserted.

In the German example (3-10b) *Ärgerten die Kinder ihre Väter?* "Did the children tease their fathers?", the morphosyntactic features which need to be spelled out by f-morphemes are [+pl] (on nouns and verbs), [+past], [-participle], and [+poss]. Remember that the plural feature on the nouns (*Kinder*, *Väter*) is chosen from List 1 while the plural feature on the verb is copied onto the AgrS morpheme at MS. For German nouns, too, there is a set of plural suffixes to choose from. In (3-15), I give the Vocabulary items for three of them: two items which require a specific environment in (3-15ab) and the one which many researchers (e.g. Janda 1990; Marcus et al. 1995; Wiese 1996) take to be the default plural marker in (3-15c).[62] As in English, for certain German verbs, the past tense suffix is zero (3-15d); the default past tense morpheme is given in (3-15e). Note that some of the suffixes given in (3-15) are accompanied by umlaut or ablaut formation within the stem to which they attach; such vowel changes will be discussed in the following subsection.

(3-15) <u>*German Vocabulary items (f-morphemes)*</u>

a. [+pl] ←→ ∅ / X + ____
(where X = *Vater*, *Mutter* "mother" ...)

b. [+pl] ←→ /-´r/ / Y + ____
(where Y = *Kind*, *Haus* "house" ...)

c. [+pl] ←→ /-z/

[62] Note that for German common nouns, *-s* is a very infrequent plural marker. It is suffixed to a few consonant-final nouns (e.g. *Park-s* "parks") and to a slightly larger group of nouns ending in a vowel (e.g. *Büro-s* "offices", *Kino-s* "cinemas"). Moreover, personal names (e.g. *Müller-s*, *Katharina-s*) and abbreviations (e.g. *CD-s*, *LKW-s* "trucks") take *-s* as the plural marker.

Wiese (1996) points out that the importance of this suffix lies precisely in the fact that it acts as a default suffix in spite of its low frequency. It is, for instance, overgeneralized in the acquisition of German plurals by children and it is also used by adults when asked to produce the plural of a nonsense word.

d. [+past] ⟷ ∅ / X + ____
(where X = *singen* “sing”, *geben* “give” ...)

e. [+past] ⟷ /-t´/

f. [+pl] ⟷ /-(´)n/ / Verb

g. [+poss] ⟷ /i:r´/
[+pl][ACC]

Plural information on verbs is expressed by exactly one suffix, which is underspecified for person features (in every tense); this is the one in (3-15f). For the possessive pronoun *ihre* “their” to be spelled out correctly, further operations must have taken place. Firstly, the number feature of the noun must have been copied onto D; secondly, a case (accusative) affix must be supplied. I will leave open the question if the pronoun is possibly underspecified for one of these features (as it is e.g. for the gender feature; cf. (3-15g)).

In contrast to the f-morphemes discussed above, for l-morphemes there is a choice regarding which Vocabulary item is inserted. In an appropriate local (licensing) relation to a determiner, a root morpheme might e.g. be filled by *cat*, *girl*, *table* or any other Vocabulary item which we would call a noun. These Vocabulary items are not in competition; rather, they may freely be inserted at the point of spell-out.

In his 1997 paper, Marantz discusses the interesting case of l-morphemes which undergo apparent allomorphy in different environments. He gives the *rise/raise* alternation as an example but the same point can be made with the German verbs *senken/sinken* discussed in (3-8) above. Presumably, *senken* is inserted in the context of a governing CAUSE head, while *sinken*, the intransitive variant, is the elsewhere case. Apparently, these morphemes are in competition for insertion into the l-node. However, Marantz argues that *senken* is only a morphophonological variant of the basic intransitive root. Consequently, this l-morpheme alternation is not determined by competition but rather should be seen as the product of post-insertion readjustment rules which will be discussed in the next subsection.

3.2.4 *Readjustment Rules*

In DM, two sorts of readjustment rules are distinguished. Morphosyntactic readjustment rules, on the one hand, are capable of manipulating morphosyntactic features in the context of other such features. As already mentioned in footnote 5, these rules are called impoverishment rules in case they delete a certain feature. It is clear that these rules have to apply prior to Vocabulary insertion, since the morphosyntactic features of Vocabulary items which are inserted are required to be nondistinct from those of the already readjusted terminal nodes. Phonological readjustment rules, on the other hand, change the phonological form of already inserted Vocabulary items and logically follow Vocabulary insertion. In this subsection, I will only be concerned with the latter sort of readjustment rules.

In many cases, the information contained in the Vocabulary entries is not sufficient to ensure that the correct phonological output will be generated. It is, for instance, not at all unusual for affixation to be accompanied by stem-internal modifications. As suggested in Halle (1990, 1994), the remaining part of the information concerning the phonological form of morphemes is provided by a set of phonological readjustment rules.

Consider, for instance, the by now well-known examples in (3-10). In the English sentence, the verb *sell* undergoes regular past tense suffixation (cf. (3-14b)). At the same time, however, a readjustment rule comes into play which causes ablaut within the stem. It might be noted that ablaut is also observed in some of the verbs which take a zero past tense suffix (e.g. *sing-sang*). The readjustment rule which alters the vowel quality of *sell* is given in (3-16a) (from Halle & Marantz 1993:128).

(3-16) <u>*Readjustment rules altering vowel quality*</u>

a. V → [+back] / W ____U [+past]
[+round] (where WVU = *sell*, *tell*)

b. $[V_1]_X$ → [-back] / X + [+pl]
(where X = *Vater*, *Mutter*, *Not* "need",
Land "country" ...)

Another readjustment rule affects the stem vowel of *Vater* in the context of a plural affix, resulting in umlaut formation (*Väter*). In this particular case, the readjustment rule is triggered by an empty affix. The other roots mentioned in (3-16b), however, indicate that

umlaut is not at all restricted to empty affixes: *Not* "need" e.g takes a /-´/-suffix in the plural (*Nöte*) while the plural of *Land* "country" is formed by suffixing /-´r/ (*Länder*).[63]

Last but not least, I want to present the readjustment rule that is active in the *sinken/senken* alternation. As mentioned earlier, there is only one common root for both verbs. In case this root is licensed by and combined with a CAUSE morpheme in the head of vP, the readjustment rule in (3-17) will apply and change the quality of the stem vowel:

(3-17) *Readjustment rule triggered by CAUSE morpheme*

V → [-high] / X + [CAUSE]
(where X = *sinken*, *trinken* "to drink")

Interestingly, a similar alternation is observed with the German verb *trinken* "to drink" which will become *tränken* in a [CAUSE] context (as e.g. in *Hans tränkt die Kühe* "Hans is watering the cows"). A few other German verbs are capable of causativization through umlaut formation, e.g. *fallen/fällen* "to fall/to fell" or *saugen/säugen* "to suck/to suckle". For those, the mechanism is exactly the same, only the relevant readjustment rule will look somewhat different.

To sum up, in this chapter, I have presented the major theoretical assumptions of Distributed Morphology. I have also provided some examples of how (and where) certain of its mechanisms are implemented and what they actually look like.

We have seen that in DM, roots (l-nodes) are assumed to pick up inflectional features, bundled in terminal nodes, through various operations that are either syntactic or rely on syntactic structure; for instance, head movement and adjunction, morphological merger under structural adjacency, fusion of sister nodes, and the addition of morphemes at MS. All these manipulations of structure operate on terminal nodes which are hierarchically organized and yield modified terminal nodes which are hierarchically organized. At PF, all terminal nodes - f-nodes and l-nodes, those present in the syntax and those added at MS - are subject to Vocabulary insertion in exactly the same way.

4 Speech Errors and Distributed Morphology

[63] In Pfau (2000), it is shown that in spoken as well as in signed languages, phonological readjustment rules may also affect prosodic features. In the Western Sudanic language Gã e.g., an empty Neg suffix triggers a tone change within the verbal stem while in German Sign Language an empty Neg suffix affects the nonmanual component of the verb sign.

Und das ist all mein Dichten und Trachten,
dass ich in Eins dichte und zusammentrage,
was Bruchstück ist und Rätsel
und grauser Zufall.*

(Nietzsche, Also sprach Zarathustra)

In this chapter, I will investigate how the spontaneous speech errors presented in chapter 2 can be accounted for within the Distributed Morphology framework. On the one hand, I am going to show which of the specific properties of this theory allow for a straightforward explanation of (some of) the error data. On the other hand, I will also consider if any of the DM assumptions possibly prove to be problematic in accounting for the data. To anticipate the main finding: the general picture that emerges from the detailed discussion of a wealth of speech errors below is that a considerable number of them is readily explained within the DM model of grammar. Not surprisingly, however, some problematic cases are also observed and these, too, shall not be concealed from the reader.

The exposition in the preceding chapter has made clear that DM endorses a strict separation of the mechanisms that produce a syntactically complex expression and the mechanisms which supply the corresponding phonological expressions. Within the computational system, only roots and abstract features are manipulated while phonologically specified Vocabulary items are supplied only at PF. It is that very property of the grammar model which suggests to relate it to psycholinguistic models of language production.

One particularly intriguing property of multi-level models of language production is that they also endorse a division of labour amongst several processing levels - no matter if the flow of information in a given model is assumed to be stricly feed forward or if feedback loops from one level back to a preceding level are allowed. In order to illustrate this division, I will sketch the basic architecture of a production model in section 4.1. Firstly, I am going to show how the postulated processing levels are derived from characteristics of certain speech errors. Secondly, the selection of lexical items in production will be considered. A brief description of the production model is important in order to be able to evaluate (in chapter 5) to what extent the psycholinguistic model can be mapped onto the model of grammar (or vice versa).

In section 4.2, I will be concerned with the manipulation of semantic features in language production. Remember that according to DM, semantic features do not play any role within the computational system. This assumption, however, is problematic in view of (at least) two types of errors that have not yet been presented, viz. meaning-based substitutions and semantic anticipations or perseverations. The characteristics of these errors will be discussed and a slight modification of the grammar model will be proposed. Furthermore, I will present some slips that involve the processing of compositional semantic features and of the Neg feature.

As is well-known, grammatical gender plays an important role in German. A noun's gender determines the surface form of other material within DP. Therefore, I will have a look at the representation and processing of the gender feature in section 4.3. In order to evaluate if gender features possibly remain unspecified within the computational system and/or the Vocabulary, I will be comparing meaning- and form-based substitutions in this context. A closer look at these slips suggests that the gender feature must be specified throughout. Moreover, I will be examining instances of gender accommodation (i.e. morphosyntactic accommodation; cf. subsection 2.4.2) and instances of feature mismatch following substitution errors (cf. data presented in subsection 2.2.2).

In section 4.4, I will be concerned with subject-verb agreement errors. As was pointed out in chapter 3, in DM, features of a subject DP are assumed to be copied onto the AgrS node at the level of MS. This copy process, however, may be defective, i.e. a wrong DP may be chosen for feature copy (cf. data presented in subsection 2.2.1). This erroneously targeted DP may either be closer to the verb than the correct DP ("local agreement") or it may be more distant from the verb than the subject DP ("long-distance agreement"); both options will be considered in turn. In the last part of this section, I will examine if and how movement operations interact with copy processes

One important assumption in multi-level models of language production concerns the categorial specification of lemmas drawn from the lexicon. In DM, however, category labels are abandoned, i.e. roots that are selected from List 1 are taken to be acategorial in nature. It is therefore worthwhile investigating what impact this conceptual change has on the speech error analysis. This will be done in section 4.5. Here, I will first point out how the assignment of Vocabulary items to appropriate slots is achieved. Secondly, I am going to present error data that receive a straightforward explanation following the idea that roots

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* "And my whole imagination and endeavour is this - to assemble and bring together that which is fragment and riddle and grisly accident." (transl. A. Tille).

have no category labels (relevant data were presented in subsections 2.4.1 and 2.4.2). Thirdly, however, we also need to account for the well-known categorial identity bias in word exchanges.

The manipulation of morphosyntactic features will be subject to further investigation in section 4.6. I will discuss various instances of errors in which a morphosyntactic feature is either left behind (stranded) in its original position (some relevant examples were presented in subsection 2.4.1) or in which a given feature is isolated and displaced, i.e. shifted, exchanged, anticipated, or perseverated (in this context, some new slips will be introduced). I am going to consider the features number, gender, tense, and case in turn.

In section 4.7, I will come back to the issue of accommodations. Firstly, I will reconsider the so-called context accommodations (see data presented in subsection 2.4.2). I am going to propose that these do not involve repair strategies of any kind. Rather, all the post-error mechanisms that give rise to a grammatical outcome - feature copy, readjustment, and morpheme insertion - apply anyway in the derivation of an utterance and must therefore not be considered an additional processing load. Secondly, I will have a look at error instances in which (grammatical) adaptation is not observed, namely feature conflicts and adaptation failures in stranding errors (see data presented in (sub)sections 2.2.2, 2.3, and 2.4.1). I am going to claim that these errors occur too late for adaptation to take place.

Finally, I will present detailed analyses for three particularly intricate slips in section 4.8. The discussion of these errors summarizes the operations and rules that may come to fruition in speech errors and illustrates how their interplay allows us to give an account even for these complex cases.

4.1 Multi-Level Models of Language Production

> Sprechen ist, wenn die Stille endlich still ist.*
>
> (Elfriede Jelinek, er nicht als er)

Before going into the details of language production models, I shall have a brief glance at early research on spontaneous speech error data. In his seminal work on error-prone

actions (remembering, speaking, and writing amongst others), Freud (1901/1954) claims that speech errors usually reveal our repressed thoughts and secret wishes. Amongst many others, he gives the following two examples:

(4-1) *Two slips from the collection of Sigmund Freud (Freud 1901/1954:56f,69)*

a. Beim weiblichen Genitale hat man trotz vieler **Versuchungen**,
in.case.of.the female genital has one in.spite.of many temptations,
pardon, Versuche ...
excuse.me, experiments ...

---

* "Speaking is when the silence is finally silent."

b. Ich bin so verschnupft, ich kann nicht durch die **Ase** **natmen**,
I am so bunged.up, I can not through the (error) (error),
Nase atmen
nose breathe

According to Freud, the noun substitution error in (4-1a) in which *Versuchungen* "temptations" is substituted for *Versuche* "experiments" clearly exemplifies an instance in which a hidden sexual desire of the speaker surfaces. However, not all Freudian slips need arise from repressed sexual thoughts. In order to understand the deeper meaning of the error in (4-1b), Freud argues, one must thoroughly consider the personal history of the speaker, one of his female patients. She claims to know what motivated the slip: That morning she entered the streetcar at a station called "Hasenauerstraße". While waiting for the streetcar to arrive, it occurred to her that if she were French, she would pronounce the name of that street without the /h/ in the onset. Upon further enquiry of the therapist, she remembers that as a 14 year old, she had played a French girl in a play, on that occasion speaking German with a French accent. According to Freud, the fact that a few days earlier, a French guest had arrived in her guest-house, evoked this hidden memory. Consequently, the phoneme exchange in (4-1b) has to be analyzed as the result of an inferring unconscious thought from a totally different context.

This causal chain is by far not the most complex one called in by Freud in order to explain a slip. Obviously, his analyses do not say anything about the actual processes and grammatical entities involved in language production.[64] All he is interested in is how the subconscious may influence various actions we perform. However, Freud was not the first one to study speech errors. A few years earlier, Meringer & Mayer (1895), a linguist and a psychiatrist from Austria, provided what is now considered to be a more traditional analysis. On the basis of their corpus of slips of the tongue, they arrived at the conviction:

> "dass man sich nicht regellos verspricht, sondern dass die häufigeren Arten sich zu versprechen auf gewisse Formeln gebracht werden können. Mit der Regelmäßigkeit der Sprechfehler [...] gewinnen dieselben an Bedeutung, sie müssen durch konstante psychische Kräfte bedingt sein, und so werden sie zu einem Untersuchungsgebiet für Naturforscher und Sprachforscher, die von ihnen Licht für den psychischen Sprechmechanismus erwarten dürfen." (Meringer & Mayer 1895:9)[65]

[64] Ellis (1980) is an attempt to reanalyze Freud's original collection of speech errors in terms of the more modern and process-oriented models of language production outlined below.
[65] "that one does not randomly produce slips, but that the more frequent kinds of errors can be reduced to certain formulas. With increasing frequency, speech errors gain in importance; they must be caused by

Our spontaneous speech is far from being perfect; rather it is interspersed with errors of various kinds. And fortunately so, one must say, since - due to their regular (i.e. non-random) character - speech errors are taken as valuable evidence for certain mental representations and processes. Fromkin (1971) was the first one to develop a performance model on the basis of slips of the tongue, giving the impetus to a new field of research within psycholinguistics. On the one hand, Fromkin's aim was to furnish proof of the psychological reality of theoretical linguistic entities (see subsection 1.2.1). On the other hand, however, she also wanted to show that the characteristic properties of certain error types can be related to certain planning mechanisms and processing stages.

The same approach is pursued by Merrill Garrett. In 1975, he presented a strictly serial model of language production which further developed Fromkin's ideas and which in the years to follow had a very important influence on research on language processing. In contrast to comprehension models, language production models must account for the real-time construction of an utterance based on the specific meaning that a speaker wishes to convey on a given occasion. Therefore, above all, language production models are driven by an interpretation of conceptual content that gives rise to the communicative intent of a speaker (Garrett 2000).

Garrett's work as well as that of many other researchers examining the properties of spontaneously occurring speech errors indicates that language production is in fact a multi-stage process. The process of speech production falls into three broad areas (cf. Levelt 1989; Levelt et al. 1999). At the highest level are the processes of conceptualisation that concern the speaker's intention which in turn determines the concepts that are to be expressed (sometimes called "message-level processes" or "conceptual stratum"). The subsequent processes of formulation involve translating this conceptual representation into a linguistic form (called "lemma stratum" and "form stratum" in Levelt et al. 1999). Finally, the process of articulation which involves detailed phonetic and articulatory planning is executed by the articulatory system (cf. Levelt (1989) for a review of motor control theories of speech production). In (4-2), you will find the basic structure of the language production system (a more detailed version will follow):

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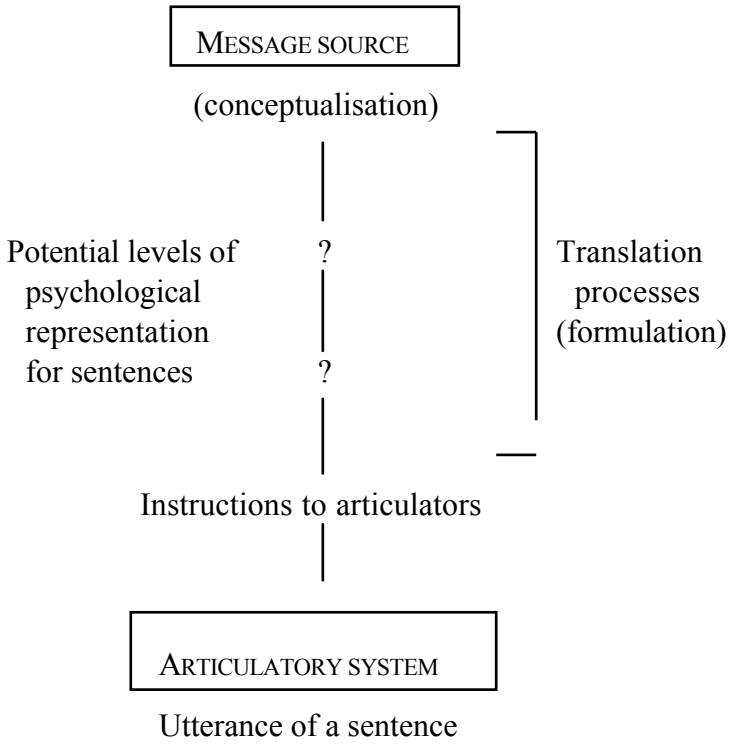
constant psychological forces and therefore, they become a field of investigation for natural scientists as well as linguists who may expect them to shed light on the psychological mechanism involved in speaking." (my translation).

(4-2) *The (rough) structure of the language production system (Garrett 1975)*



This sequence of processing stages (from intention to articulation) is probably intuitively plausible. However, in a series of papers, Garrett (1975ff) argues that the formulation (translation) process, too, involves a series of distinct levels of processing (the "potential levels of psychological representation" in (4-2)). Most importantly, processing in the model occurs in a fixed temporal order, i.e. the sequence of levels is fixed and the flow of information is strictly top-down. Moreover, the operations executed at each level cannot influence each other, i.e. there is no interaction between levels in the sense of an exchange of information. In particular, every level uses its own processing vocabulary and therefore is only capable of dealing with information which matches that vocabulary.

According to Garrett (1980a), the most important evidence for the distinction of separate processing levels comes from the investigation of exchange errors. On closer examination, it turns out that these errors show different characteristics depending on what kinds of elements are exchanged: Consider the examples given in (4-3):

(4-3) *Exchange errors as evidence for the distinction of processing levels*

a. eine **Theorie** ist eine **Grammatik** des Wissens
   a theory is a grammar of knowledge

← eine Grammatik ist eine Theorie des Wissens
← *a grammar is a theory of knowledge*

b. this **spring** has a **seat** in it ← this seat has a spring in it
(Garrett 1980a:188)

c. a **maniac** for **weekend**-s ← a weekend for maniac-s
(Fromkin 1973b:259)

d. das sind die wirklich **f**eltenen **S**älle ← seltenen Fälle
these are the really (error) (error) ← *rare cases*

e. he **c**aught **t**orses ← taught courses (Fromkin 1973b:245)

Word exchanges (as in (4-3abc)) and sound exchanges (as in (4-3de) are only superficially similar. Closer examination reveals two significant differences: While the elements involved in word exchanges come for the most part from different phrases but are of the same grammatical category, sound exchanges are typically phrase internal and involve segments from words of different grammatical categories. Garrett (1980a) notes that these two properties - phrasal membership and grammatical category - are clearly related to each other; the likelihood of correspondence of grammatical category is certainly affected by whether the error is phrase internal or not.

These distributional features of exchange errors suggest an interesting interpretation, namely that they arise at different processing levels. On the one hand, word exchanges must occur at a point at which the syntactic category of units is part of the processing vocabulary (see the discussion in 4.5.3 for a different account). The fact that the exchanged elements may appear at some distance from each other implies that the processing domain is the whole sentence. Garrett calls this stage in the processing of an utterance the "functional level". On the other hand, since sound exchanges are not subject to syntactic constraints, they must occur at a point at which the syntactic category of elements is not of any importance to the processor, i.e. is not part of the processing vocabulary. Rather, phonological (and morphological) properties of words are processed phrase by phrase. In Garrett's model, this processing level is called "positional level".

Further evidence for the division of separate levels within the translation process comes from exchange errors like the one in (4-3c). As a matter of fact, what is exchanged here are not really words but rather stem morphemes. Obviously, the morpheme *maniac* has been accessed independently of its plural affix, i.e. the plural information is stranded (cf. subsection 2.4.1). Furthermore, the plural morpheme was produced correctly for the

sentence as it was actually uttered, viz. as [z], not as it was planned, viz. as [s]. This accommodation (cf. subsection 2.4.2) to the new phonological environment suggests that the exchange takes place before the plural suffix is phonologically specified.

Another central property of the model concerns the lexical retrieval of items in production. The retrieval of lexical items is the process in speech production whereby we turn thoughts/concepts into sounds. In that context, two important questions must be considered: First, how many stages are involved in lexical retrieval? And second, are these stages independent, or do they interact with each other?

On the basis of characteristic properties of whole word substitutions, many psycholinguists have argued for a two-stage theory of lexical retrieval, where the first stage is semantically organized and the second one is phonologically organized (e.g. Fromkin 1971; Garrett 1975ff; Dell & Reich 1981; Butterworth 1989; Levelt 1989, 1992). The different types of noun substitutions - two each from German and English - are illustrated by the examples in (4-4).

(4-4) *Different types of noun substitutions*

a. Kartoffeln sollen auch nicht so viel **Alkohol** haben
potatoes shall also not so much alcohol have
← so viele Kalorien
← *so many calories*
"Potatoes are supposed to not have so many calories either."

b. he got hot under the **belt** ← under the collar (Fromkin 1973b:262)

c. dieses Plätzchen haben wir im **Urwald** entdeckt ← im Urlaub
this spot have we in.the jungle discovered ← in.the holiday

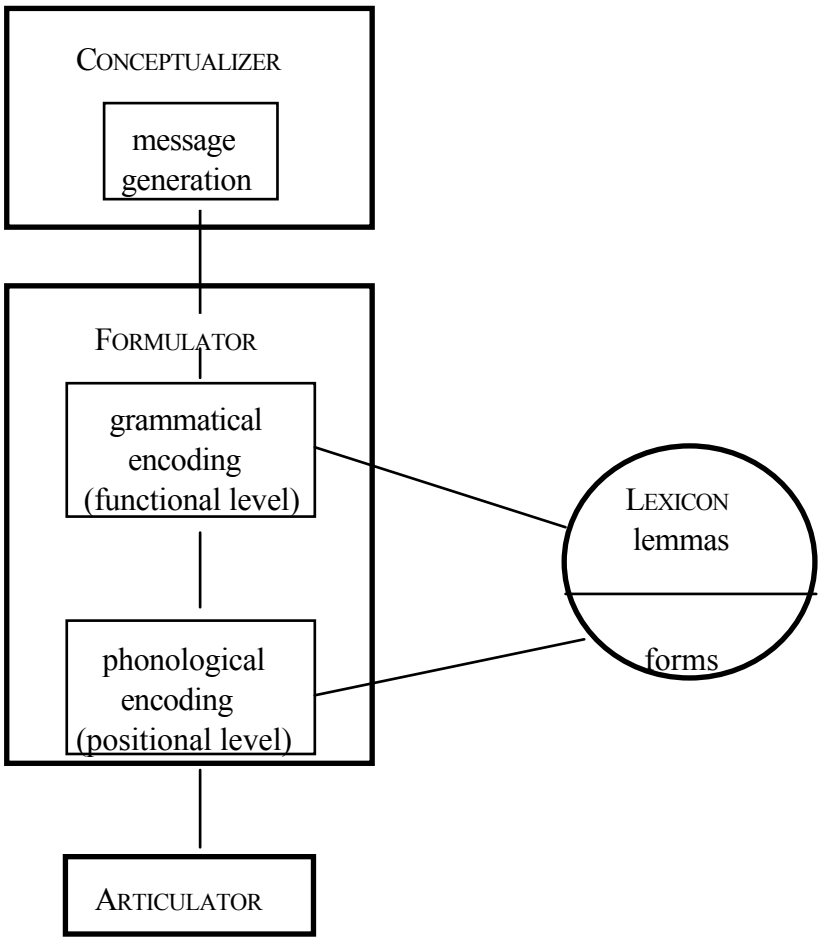
d. I've got an **apartment** now ← an appointment (Garrett 1980a:207)

While in (4-4ab), the intended and the error noun are semantically related, in (4-4cd), they share phonological (word onset, number of syllables) and possibly morphological properties.

According to the two-stage hypothesis, processing proceeds from the semantic level to an intermediate level where individual words are represented in an abstract form. At this level, lexical selection does not retrieve word forms but rather lemmas, i.e. units which are only semantically and syntactically specified. Only after lemma selection is accomplished, the phonological form of words (the lexeme) is retrieved at a subsequent processing level.

In Garrett's model, the first stage of lexical access (lemma selection) is taken to occur at the functional level, while the second stage (retrieval of phonological form) is taken to occur at the positional level. A more detailed version of the language production model in (4-2) which takes into account the results sketched above is given in (4-5); this is a simplified version of the Levelt model (Levelt 1989:9) which is enriched with some of Garrett's terminology:

(4-5) *The structure of the language production system*



With the help of the "double retrieval theory", the different kinds of word substitutions are readily explained: meaning-based errors arise in lemma selection while form-based errors arise in lexeme selection.[66] However, the assumption of a strict division of tasks has not remained unchallenged. Remember that Garrett assumes a strict separation of processing levels, i.e. that phonological specification (at the positional level) only begins after lemma retrieval (at the functional level) has been completed. Therefore, in his model, phonological processes can not have any influence upon lemma selection and consequently, semantic and phonological processes should not overlap in lexical retrieval. That is, we expect to find meaning-based substitutions and form-based substitutions but not mixed errors in which the intruder is both semantically and phonologically related to the target. However, Dell &

[66] Moreover, the tip-of-the-tongue phenomenon can be interpreted as success of the first stage of lexical retrieval but failure of the second (Brown & McNeill 1966).

Reich (1981), Butterworth (1982), and Harley (1984) show that far more mixed errors are found than chance would predict; possible examples are given in (4-6):[67]

(4-6) *Two examples for meaning+form-based substitutions*

a. am nächsten **Monat**, äh, Montag
on.the next month, er, monday

b. we're playing the art of the **flute** ← of the fugue (Fromkin 1973b:262)

Another argument in favour of weakening the independent level hypothesis is brought forward by Dell & Reich (1981). They show that "lexical bias" is observed in phonological errors, i.e. that these errors tend to result in existing words more often than is expected by chance (e.g. the existing word *reel* in the sound exchange *reel feally bad* ← *feel really bad*).

The authors therefore conclude that the processing levels cannot be completely independent of each other and that the independent level hypothesis has to be rejected. The simplest solution, they claim, is to allow interaction between the levels. Feedback between the phonological and lemma level explains the tendency of a mixed influence on substitution errors as well as the lexical bias in sound errors. Production models which endorse feedback between the processing levels are called "interactive activation" or "spreading activation" models (Stemberger 1985; Dell 1986, 1988; Berg 1988).

Interactive activation models, too, discriminate different processing levels, but the hierarchy of these levels is undermined by ubiquitous feedback. Still, the flow of activation in these models is not completely unconstrained, i.e. there is no absolute but only relative interactivity. Rather, the planning process is organized in a weakly heterarchical fashion. The flow of information may very well proceed in both directions but the flow towards the articulator naturally has the greatest share in speech production (Schade 1992).[68]

---

[67] An analysis of meaning-based noun substitutions from the Frankfurt corpus with respect to phonological similarity of target and intruder is presented in Wiegand (1994). She concludes that semantic substitutions do not display phonological facilitation.

[68] In a 'truly' connectionist (or parallel distributed processing (PDP)) model of language production, this restriction does not hold. Like the spreading activation models, the PDP approach makes use of spreading activation in a network. But it adds the important concepts of distributed representations and learning (Rumelhart & McClelland 1986). The PDP and the spreading activation approach differ from each other with respect to the question of the representation of linguistic rules. In the spreading activation model (as in the serial and modular model), the rules that specifiy acceptable sequences at the phonological and syntactic levels, are kept distinct from the words and sounds present in the mental lexicon, i.e. there is a distinction between linguistic structure and linguistic content. In the PDP approach, it is assumed that there is no such distinction; rather, linguistic structure arises out of the massed effects of the stored vocabulary (cf. Dell & Juliano (1991) for a PDP model of word production).

In the present thesis, I shall not try to argue for or against one or the other type of model, since the question of strictly serial versus interactive processing is not at issue here. What I take to be particularly important about the modular as well as the spreading activation architectures in the present context is the fact that both endorse processing at several levels with different information being available at each level.

What is at issue here, is the question of how a particular formal grammar can be mapped onto a processing model. Garrett (1980) notes that the terms which find use in his psycholinguistic framework (i.e. functional level and positional level) "are studiously neutral with respect to their correspondence to levels of description in a formal grammar" (p.190). Still, if we take the idea of a psychologically real grammar seriously, then it is of course desirable to have at one's disposal a model of grammar which (more or less) corresponds to the psycholinguistic model.

At that point, remember that Distributed Morphology, too, supports a separationistic view in that it assumes that the mechanisms which are responsible for producing the form of syntactic expressions are distinct from the mechanisms which produce the form of the corresponding phonological expressions. For that very reason, I take an attempt to match the psycholinguistic theory of multi-stage sentence processing with a multi-level theory of grammar to be very promising.

4.2 Semantic Features in Language Production

> La parole serait donc aux choses de l'esprit
> leur état de rigueur, leur façon de se tenir
> d'aplomb hors de leur contenant.*
>
> (Francis Ponge, De la modification
> des choses par la parole)

I am going to start with what I take to be a particularly intricate issue, namely the question of how semantic features are accounted for in the DM model.

In chapter 3, I have shown that (noncompositional) semantic features do not play any role within the computational system, i.e. they need not be present within that system. Alternatively, a lexical entry might contain all sorts of information, including

* "Therefore, the word would be for the things of the mind their inevitable state of firmness, their way to keep the balance outside of what they are contained in."

phonological, compositional syntactic and semantic, and noncompositional semantic properties. But then much of that information would be carried along through the derivation to the PF and LF interface levels like "excess baggage" (Marantz 1995) without doing any work.

Consequently, the structure of grammar as implied by DM clearly distinguishes between the computational system of the grammar proper and the operation of semantic interpretation, i.e. the operation which determines the meaning of a sentence. The syntactic and compositional semantic features that condition the insertion of particular Vocabulary items at Phonological Form are present in the computational system while the idiosyncratic properties of lexical items are not. The latter are available only at the conceptual interface and are retrieved from the Encyclopedia (List 3), i.e. only here may derived constituents be paired with noncompositional meanings. Harley & Noyer (1999) assume that the PF level is also linked to the conceptual interface (and therefore indirectly linked to the Encyclopedia) but this link can only be established after Vocabulary insertion has taken place.

It is clear that, as far as language processing is concerned, the postulated non-availability of semantic features is problematic. In subsection 4.2.2 below, I am going to discuss a number of speech errors that clearly contradict this assumption. Before doing so, however, I am going to show that there are also aspects internal to the model which require that semantic features are present before Vocabulary insertion is executed (subsection 4.2.1). In subsection 4.2.3, I am going to have a brief look at the availability and processing of compositional semantic features. Finally, in subsection 4.2.4, a feature which may play different roles in a derivation will be subject to discussion, viz. the Neg feature.

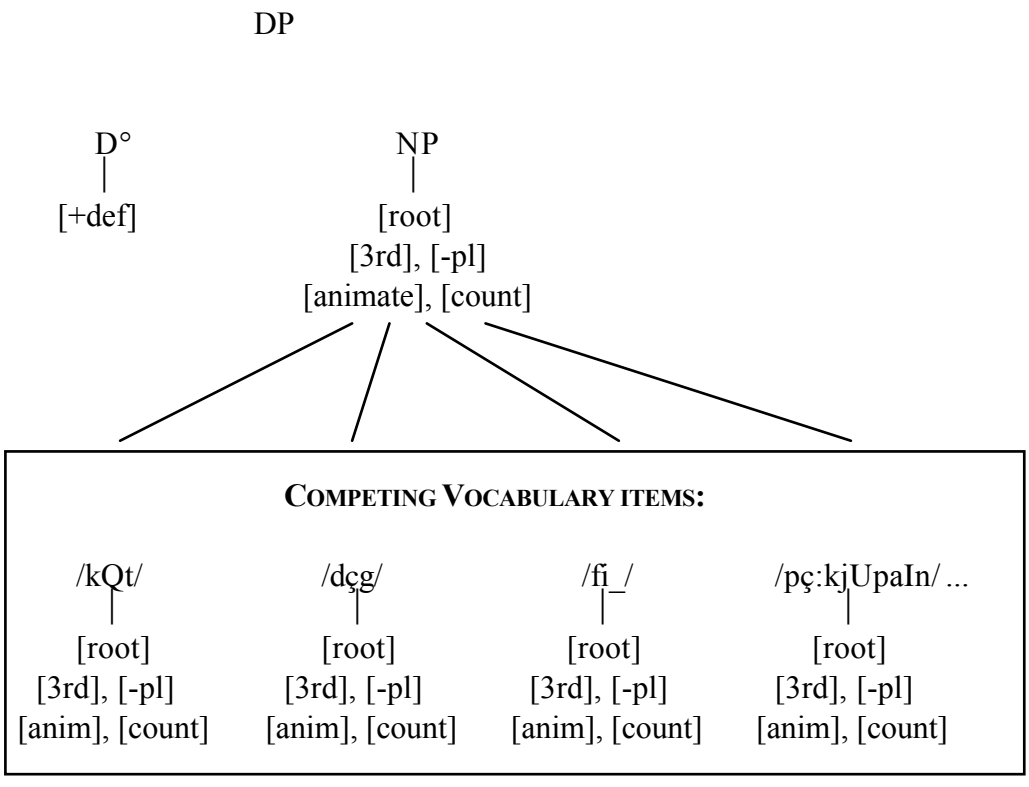
4.2.1 *Non-Random Insertion: Distinguishing Cats from Dogs*

As mentioned above, in DM, the Vocabulary presumably does not contain any items in which category information (i.e. syntactic information), noncompositional semantic information, and phonological features are different aspects of a single entity. Rather, Vocabulary items link phonological features to (possibly underspecified) sets of syntactic and semantic category features which occupy terminal nodes in the syntax (Marantz 1995). Still, as Marantz (1997) notes, it is an important and open question how much information about roots is present in what he calls the "narrow lexicon" (List 1). In particular, it is not

at all clear if the narrow lexicon contains sufficient information to precisely identify roots or if it only contains information about classes of roots.

According to Marantz, only compositional semantic features, i.e. features like [count noun] and [animate], are present in the syntax; other semantic features that play no role in the computational system are excluded as lexical features (for instance, the semantic difference between "dog" and "cat" feeds no syntactic principle, rule, or constraint). But a full feature description of a Vocabulary item in terms of general syntactic and compositional semantic features does not suffice to unambiguously individuate it. For instance, in a sentence like "The cat is sleeping", the slot of "cat" might as well be taken by e.g. "dog", "fish", or "porcupine", since at the moment of Vocabulary insertion, there is no distinction whatsoever between these items with respect to the features which determine the insertion of one or the other item. This dilemma is illustrated by the figure in (4-7):

(4-7) *Selection of appropriate Vocabulary item*



In the DM framework, the distinction between the competing items is made only on the basis of semantic features in the Encyclopedia. But how can the appropriate Vocabulary item be inserted when all information the terminal node contains at MS are features like [root], [-pl], [animate], etc.? Looking up further information in the Encyclopedia does not

seem to help because from the features of the terminal node alone it is not even clear where to look. Even if distinguishing semantic features (like e.g. [miaouws] or [furry]) are linked to the concept CAT in the Encyclopedia, then how do I know that it is that very concept I am looking for in the first place? Certainly not on the basis of the features present in the computational system. Moreover, at the point at which the Encyclopedia is consulted, it is simply too late to make a decision about the insertion of a particular Vocabulary item.

Consistently, Marantz acknowledges that

> "[f]or an N node that has the features, "count noun" and "animate" (among perhaps others), presumably the Vocabulary entries for "cat" and "dog" would be equally specified with the relevant syntactic and compositional semantic features and either might be inserted at that node." (Marantz 1995:401)

Since the difference between "cat" and "dog" is a matter of encyclopedic knowledge, the use of the Encyclopedia to interpret sentence elements must involve knowledge of Vocabulary insertion at PF. But once again, we are caught in the same trap. Note that Encyclopedia entries connect *the output* of the grammar to noncompositional meanings. That is, the correct interpretation of a sentence in which /kQt/ has been inserted in the phonology (at a node at which /dçg/ could just as well have been inserted) is guaranteed. But still, the particular choice of one item over the other in the course of the derivation is in principle a random one.

I therefore claim that - at least from a processing point of view - we need to assume that semantic/conceptual features are available at a very early point in the derivation in order to guide the choice of a particular root from List 1. Further evidence for that assumption comes from the analysis of speech error data which will be subject to discussion in the following subsection.

4.2.2 *Semantic Features in Speech Errors*

The two types of slips involving semantic features I am going to consider in this subsection are meaning-based substitutions and anticipations/perseverations of semantic features.

Consider first the examples given in (4-8) which serve to illustrate some of the possible semantic relations that may hold between a target word and an intruding word in a noun substitution:

(4-8) *Different types of meaning-based substitutions*

a. hast du einen **Radiergummi** da ← einen Spitzer
have you an eraser there ← a pencil.sharpener

b. in welcher **Höhe**, äh, Tiefe haben sie gegraben
in what height, er, depth have they dug

c. damit kommst du auf keinen grünen **Baum** ← grünen Zweig
with.that come you on no green tree ← green branch
"With that you'll never get anywhere."

d. ich habe keine **Tafel** mehr ← keine Kreide
I have no blackboard more ← no chalk

The nouns involved in the slip in (4-8a) - *Radiergummi* "eraser" and *Spitzer* "pencil sharpener" - are cohyponyms; they are both members of the class of writing implements. In example (b), the intruder *Höhe* "height" is the opposite of the target noun *Tiefe* "depth". The error in (c) exemplifies a case where target and intruder stand in a part-whole relationship: a branch (*Zweig*) is part of a tree (*Baum*). Finally, in (d), the involved nouns *Tafel* "blackboard" and *Kreide* "chalk" have a somewhat more loose associative connection with each other.[69]

In all of the above examples, an intended word has activated a semantically related item which for some reason happens to replace the target word in the utterance. This phenomenon is not readily explained in DM terms, since DM endorses late (post-syntactic) semantic interpretation of lexical items but not early selection of items on semantic grounds.

As mentioned above, in the Garrett model, meaning-based substitutions are assumed to occur at the functional level when the lexicon is accessed for the first time, at that time retrieving a lemma, i.e. an item which is only syntactically and semantically (but not phonologically) specified. By definition, meaning-related items are 'close' to each other

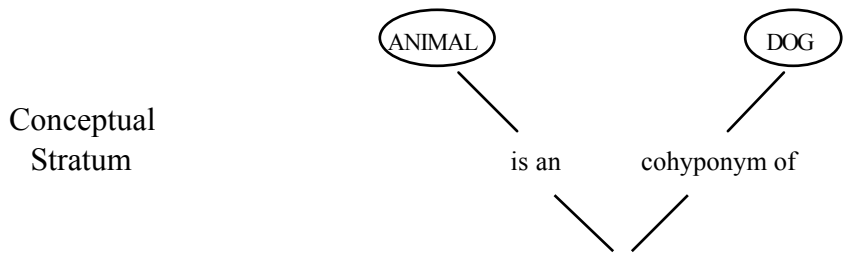
[69] Hotopf (1980) claims that words are never replaced by synonyms or sub- and superordinate expressions, respectively. However, this observation is probably an artifact, since such substitutions would for the most part go unnoticed. Imagine e.g. the substitution of *town* for *city* or of *dog* for *poodle*.

- that, is, activation spreads from one to the other - and therefore, a wrong item may be picked.

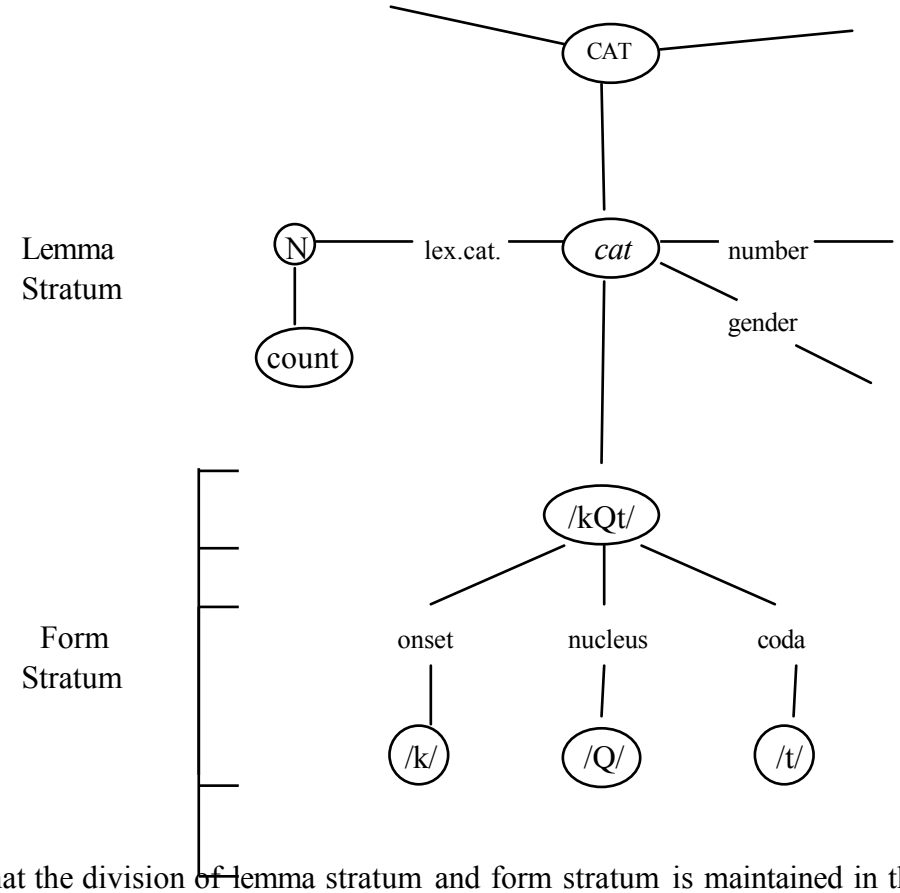
However, a somewhat different view is taken by Levelt et al. (1999). The authors also conceive language production as a staged and strictly feed-forward process, leading from a preverbal message to the initiation of articulation. But in contrast to Garrett (and others), they assign greater importance to the stage of conceptual preparation (i.e. the "conceptualizer" in figure (4-5) above).[70] Conceptual preparation is the process which leads to the activation of lexical concepts, the "terminal vocabulary of the speaker's message construction" (Levelt et al. 1999:8); it is triggered by a speaker's communicative intention. Apart from possible pragmatic causes of lexical concept activation, the theory emphasizes semantic causes of activation. Within a conceptual network, concept nodes may be linked to other concept nodes, and the links are labelled in order to express the character of the connection (e.g. "X is a Y", "X is the opposite of Y", "X is part of Y", and so on). In that sense, the concept CAT which stands for the meaning of the word "cat" will be linked to other concepts such as TOMCAT, DOG, ANIMAL, and MIAOW, and it will spread activation via the links to the semantically related concepts.

Moreover, lexical concepts which are active in the conceptual stratum spread activation to corresponding lemma nodes at the lemma stratum. Levelt et al. (1999) assume that lemma selection is a statistical mechanism which favors the selection of the highest activated lemma. Most importantly, in that conception of speech production, lemma nodes are not semantically but only syntactically specified; their selection, however, is triggered by semantic factors. The figure in (4-9) illustrates the lexical network underlying lexical access:

(4-9) *The lexical network (adapted from Levelt et al. (1999:4))*



[70] Levelt et al. (1999) do not base their theory on speech error evidence. Rather, they have developed and tested their model almost exclusively by means of reaction time experiments. They argue that the ultimate test for models of speech production cannot lie in how they account for infrequent derailments of the process but rather must lie in how they account for the normal process. Still, their theory is not neutral with respect to speech errors. Ultimately, it should be able to account for error patterns as well as for the results from the reaction time experiments.



Note that the division of lemma stratum and form stratum is maintained in this model, i.e. the phonological form of a given lemma is accessed only at a later stage of the derivation. Consequently, in the model, a lexical entry is not a unique entity but rather consists of a lexical concept, a lemma, and a corresponding phonological form (including morpho-logical, segmental, and metrical structure).

It is that very property of the model, viz. the separation of semantic, syntactic, and phonological properties of a given word, which brings us very close to the assumptions made in the DM framework. Remember that DM does not assume the existence of a lexicon in the familiar sense. Rather, there are distributed lists which take over the jobs assigned to the lexicon component in earlier theories, i.e. List 1 (the lexicon) which contains those (morpho)syntactic features which are relevant to the principles of syntax, List 2 (the Vocabulary) which contains phonologically specified Vocabulary items, and List 3 (the Encyclopedia) which connects the output of the grammar to noncompositional meanings.

My claim is that in this respect, the processing model and the grammar theory can be mapped onto each other. On the one hand, we may think of List 1 as being the lemma stratum in the processing model, containing only roots and (morpho)syntactic features drawn from a universal set. On the other hand, List 2 can be seen as the form stratum

containing phonologically specified elements which are to be inserted into terminal nodes according to their featural specification.[71]

From a processing point of view, however, an important alteration - or rather an important enrichment - of the DM conception concerns the selection of items from List 1. DM does not mention on what grounds items are selected from this list. Implicitly, it must be assumed that items are retrieved on the basis of what message a speaker wishes to convey. In a processing model, we need to make that assumption explicit. That is, in conceptual preparation, lexical concepts are activated according to a preverbal message intention. Activation spreads through the conceptual network and is fed into List 1, the lemma stratum, where the most highly activated lemma node is selected and enters the computational system. The elements drawn from List 1 are roots as well as syntactic features (e.g. [noun]; but cf. section 4.5 below) and morphosyntactic features (e.g. [+pl] if a concept node MULTIPLE(X) is active at the conceptual level).

In contrast to DM, I propose that the roots which are selected bear indices according to what lexical concept they refer to, a fact which, of course, makes List 1 much more extensive. Therefore, what is retrieved from List 1 is not simply [root] but rather e.g. [$root_{(cat)}$]. I wish to emphasize that this does not at all imply that roots have any semantic features. With DM, I assume that such features do not play any role within the computational system and therefore do not enter that system.[72]

I will now turn to the second error type involving semantic features, the discussion of which I announced at the beginning of this subsection, viz. anticipations and perseverations involving semantic competitors. Here, target and intruder do not compete for the same slot but rather a target activates a meaning-related concept whose corresponding lemma then

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[71] Of course, the Vocabulary is not an unstructured list either. Like the conceptual stratum, it is a multi-linked network where activation flows from target items to phonological neighbors. Form-based substitutions arise whenever a phonological competitor happens to receive more activation than the target element.

[72] Alternatively, we may conceive the computational system and the semantics as working in parallel (Heidi Harley, p.c.). That is, you form e.g. the intention to communicate the message "The cat is sleeping". This intention talks to two separate modules: (1) It instructs the computational system to construct an intransitive frame for a state verb, also indicating what (morpho)syntactic features and what number of root morphemes it will need. (2) At the same time, it consults the Encyclopedia, inquiring what the roots are that it needs to talk about the concept CAT and the concept SLEEP, and the Encyclopedia will make available the roots "cat" and "sleep". When the frame has been constructed, the roots that the Encyclopedia has selected are slotted into the appropriate place, and the whole thing is sent off to PF for Vocabulary insertion.

The advantage of the parallel conception is that we do not need to enrich List 1. A serious disadvantage, however, is that we allow semantics to enter the computational system, since the roots drawn from the Encyclopedia are available for semantic interpretation. Moreover, it is not clear how insertion of roots into the appropriate slots is guaranteed.

takes another slot in the sentence, a fact which indicates that indeed the slots themselves are not semantically specified. Possible instances of such errors need to be carefully analyzed. What may look like a semantic anticipation/perseveration at first glance, might e.g. also be a blend. This ambiguity is illustrated by the examples in (4-10).

(4-10) *Semantic anticipation/perseveration or blend?*

a. die müssen die Toten auch in die **Leichen** tun ← in die Särge
they must the dead also into the corpses put ← into the coffins

b. ich habe die **Wäsche**, äh, die Woche so viel zu bügeln
I have this laundry, er, this week so much to iron

c. beim **Reden** sprechen wir nicht ← beim Laufen
at.the talking speak we not ← at.the running
"When we run, we don't speak."

In example (4-10a), the two nouns *Toten* "dead" and *Leichen* "corpses" are obviously semantically related. Still, the appearance of *Leichen* in the slot of *Särge* "coffins" does not necessarily constitute the perseveration of a semantic competitor. Rather, we may also speculate that the two sentence frames ... *die Toten auch in die Särge tun* and ... *die Leichen auch in die Särge tun* were activated in parallel. This, however, did not give rise to a word blend like *die Teichen* "the dorpses" but to a substitution of *Leichen* for *Särge*. Similar analyses are conceivable for (4-10b) and (c). In (b), the competing frames might have been ... *die Woche so viel zu bügeln* 'this week so much to iron' *and* ... *diese Woche so viel Wäsche zu machen* 'this week so much laundry to do', and in (c), *beim Laufen sprechen* ... 'at.the running speak' and *beim Laufen reden* ... 'at.the running talk'.

A competing frame analysis is not available for the following examples, since it is hard if not impossible to conceive of a competing frame containing the anticipated or perseverated elements. In (4-11a), for instance, the appearance of *bellen* "to bark" is definitely due to activation of the concept BELLEN by the semantically related concept HUND "dog" within the conceptual stratum.

(4-11) *Unambiguous cases of semantic anticipations/perseverations*

a. ich wollte den Hund **anbellen** ← anbinden
I wanted the dog bark.at ← tie.up

b. ich hätte meine **Bohne** mit Karotten und Erbsen mitbringen
I have.COND my bean with carots and peas bring
können ← meine Dose
can ← my can
"I could have brought my can with carots and peas."

c. they even **fly** on the wing ← sleep on the wing (Harley 1984:201)

d. a branch falling on the **tree** ← on the roof (Fromkin 1973b:262)

The same line of reasoning is applicable to the other three slips in (4-11). In (b), BOHNE "bean" receives activation from KAROTTE "carot" as well as from ERBSE "pea", in (c), the anticipation of *fly* is obviously due to its semantic relation to *wing*, and finally, in (d), a part-whole relation holds between *branch* and *tree*, i.e. BRANCH sends activation to the lexical concept TREE.

In this subsection, I have investigated the possibility of bringing into accord the theory of lexical access in speech production with the idea of a distributed lexicon as assumed in the DM framework. My claim is that the psycholinguistic and the grammatical conception are very well compatible with each other when we supplement the DM model with a pre-syntactic conceptual level, this level determining the activation and selection of items from List 1. Without the inclusion of lexical concepts and labelled roots, it is neither warranted that the appropriate Vocabulary item will be inserted in a given terminal node ("random insertion"; cf. figure (4-7) above) nor can speech errors involving semantic features be accounted for in a straightforward way.

4.2.3 *A Short Note on Compositional Semantics*

Above, we have already seen that lemma nodes are directly connected not only to a set of syntactic properties (including the grammatical category of the word and possibly the grammatical functions it can take) but also to certain (morpho)syntactic features; the latter are called "diacritic parameters" by Levelt (1989). Diacritic parameters are of two kinds. They can either be selected on the basis of the speaker's intention - as is true e.g. for the number feature - or they can be lexically specified - as is true for the gender feature in many languages (cf. section 4.3). Another lexically specified diacritic parameter is the count/mass distinction. The lemma for "cat" e.g. will specify that this word is a count noun; therefore,

it can either be combined with a singular or with a plural number feature. In contrast, the lemma for "water" will specify that this is a mass noun and may therefore not be pluralized.

In Distributed Morphology, gender as well as count/mass are assumed to be features drawn from List 1, the former being a morphosyntactic, the latter a compositional semantic feature (like e.g. animacy which presumably is not an active feature in English or German).[73] Consequently, both features are available at an early stage of the derivation and play a role within the computational system.[74]

Convincing evidence for this assumption comes from tip-of-the-tongue experiments conducted by Vigliocco et al. (1999). They show that participants who are not able to retrieve the phonological form of a word are still able to retrieve information on the count vs. mass status of that word (target words e.g. *mysogynist* (count noun) vs. *asparagus* (mass noun)). This was tested by asking the participants in which of the following contexts they would use the word (where the first one is appropriate for mass nouns and the second one for count nouns): (a) "There is ____/There is a ____"; (b) "There won't be much ____/There won't be many ____"; (c) "There is some ____/There are a few ____". Therefore, the experimental results constitute evidence for the early availability of compositional semantic features which - according to DM assumptions - are drawn from List 1.

Unfortunately, there is no convincing further evidence for that assumption from spontaneous speech errors. Noun substitutions involving mass and count nouns might be a touchstone for the processing of a count/mass feature in production. Depending on where that feature is specified and processed, we expect the interacting nouns to match with respect to that feature. We must, however, take into account that count nouns are much more frequent in German (as well as in English). Consequently, we hardly find any errors involving mass nouns in the Frankfurt corpus (only 12 out of 554 noun substitutions). Four examples are given below:

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[73] In the present context, the term "compositionality" is not used in its Fregean sense. According to Frege's Principle of Compositionality, the meaning of a sentence is computed on the basis of the meaning of its well-formed parts and the syntactic relations of these parts to each other. For the (non-syntactic) compositional semantics of concepts cf. Katz (1972).

[74] Results from recent experiments suggest that these features are selected only when actually needed in the local syntactic environment of the noun. That is, they are selected only when the speaker has to produce a phrase but not when he has to produce a bare noun (Schriefers 1993; van Berkum 1997). Roelofs et al. (1998) distinguish between the activation and the selection of a feature. For example, the gender of a noun is selected when needed to choose the correct definite determiner, but in producing a bare noun, the gender information will only be activated but not selected.

(4-12) *Noun substitutions involving mass nouns*

a. Thermoskanne mit **Kaffee**, Thermoskanne mit Milch
vacuum.flask with coffee, vacuum.flask with milk

b. ich will heute die **Wäsche** abziehen ← das Bett
I want today the linen strip.off ← the bed

c. ich bin froh, dass ich keinen **Spinat** kann ← keinen Spagat
I am happy that I no spinach(m.) can ← no splits(m.)

d. Soll ich schon die **Brötchen** aufsetzen ← den Kaffee
Shall I already the rolls put.on ← the coffee

In the meaning-based substitution in (4-12a), the mass noun *Kaffee* "coffee" is substituted for the mass noun *Milch* "milk", while in (b), the mass noun *Wäsche* "linen" replaces the count noun *Bett* "bed" (note that *Wäsche* may also mean "laundry"; therefore, the error could also be analyzed as a blend of "to do the laundry" and "to strip off the bed"). In the form-based substitution in (c), too, a mass noun (*Spinat* "spinach") is substituted for a count noun (*Spagat* "splits"). In (4-12d), it is the other way round: the count noun *Brötchen* "roll" appears in the position of the mass noun *Kaffee* "coffee".

Possibly, the error in (4-12d) is somewhat more informative than the other ones. Interestingly, the noun *Brötchen* appears in its plural form (as is indicated by the plural article *die*). However, the slot in which it intrudes is either marked for [-pl] or not marked for number at all (since presumably mass nouns are unspecified for number).[75] So, where does the plural feature come from? We may speculate that the mass feature of *Kaffee* which is incompatible with the featural specification of the intruder, the count noun *Brötchen*, is responsible for the appearance of the [+pl] feature.

In my corpus, there are two exchange errors which show a similar property; these are given in (4-13a) and (b). *Obst* "fruit" and *Post* "mail" are both mass nouns implying the presence of a set of items (viz. different kinds of fruit and some letters or cards, respectively). In both examples, the mass noun changes place with a singular count noun which subsequently surfaces in its plural form.[76] Again, it seems reasonable to assume that the mass feature is to be held responsible for the appearance of the plural forms of the count nouns (suppressing the expected strings *Obst aus Saft* "fruit from juice" and *viel*

[75] As a matter of fact, the noun substitution in (4-12d) is the only one in the Frankfurt corpus in which a plural noun is substituted for a singular noun.

Briefkasten in meiner Post "a lot of mailbox in my mail"). Admittedly, however, these two cases as well as the one given in (4-12d) may very well be seen as artifacts, although there is no explanation then for the appearance of the plural forms.

[76] Note that in (4-13b), there are also various accommodation processes at work: the quantifier *viel* "a lot of" accommodates to the plural of *Briefkästen* "mailboxes", the possessive pronoun "my" accommodates to the feminine gender of *Post* "mail", and the verb appears in the required plural form.

(4-13) *Errors (possibly) involving compositional semantic features*

a. **Obst** aus **Säften** schmeckt oft besser als Obst selbst,
fruit from juices tastes often better than fruit proper,
äh, Saft aus Obst
er, juice from fruit

b. es waren total viele **Briefkästen** in meiner **Post**, quatsch,
there were really a.lot.of mailboxes in my mail, nonsense,
total viel Post in meinem Briefkasten
really a.lot.of mail in my mailbox

c. es war wie bei **ihrer** Mutter ← seiner Mutter
it was like with her mother ← his mother

d. la **femme** de son **père** ← la mère de son mari
the wife of her father ← the mother of her husband
(Cutler 1980b:692)

Now, consider the examples in (4-13cd). Both errors involve nouns indicating different kinds of relations within a family. For all of these nouns, gender is assigned on semantic grounds (this kind of gender assignment being the exception in German and French; cf. subsection 4.3.1 below). In (4-13c), the possessive pronoun *seiner* "his" agrees with the noun *Mutter* "mother" with respect to grammatical gender in the intended utterance. It is only the (compositional) semantic feature [female] which turns *seiner* into *ihrer* "her", i.e. grammatical gender is not capable of triggering that change since *seiner* already is of feminine grammatical gender.

I assume that the French exchange error in (4-13d) also involves semantic gender features. We may think of *mère* "mother" as being a combination of a concept PARENT plus a semantic gender feature [female]; similarly, *mari* "husband" may be a combination of SPOUSE and [male]. The concepts will activate the corresponding lemmas at the lemma level. For English, in case, there is no semantic gender specification, the Vocabulary items /spaUs/ and /pQr´nt/, respectively, will be inserted at PF. However, in case such semantic features are present, the more specified items /m√D´^{r}/and /h√zb´nd/ will be chosen from the Vocabulary. Consequently, the slip in (4-13d) may be analyzed as an exchange of two concepts and stranding of semantic gender features. The concept SPOUSE is combined with

[female] and the matching Vocabulary item /fam/ is inserted, and the concept PARENT combines with [male] giving rise to the insertion of /pɛ:r/.[77]

Interesting as these data may be, it is still clear that the very small number of relevant errors and the somewhat speculative character of their interpretation do not allow for any safe conclusions about the processing of compositional semantic features. Moreover, I wish to point out that an analysis like the one sketched for (4-13cd) above is not available in the processing model suggested by Levelt et al. (1999), since a basic trait of their theory is its nondecompositional character. They claim that lexical concepts are not represented by sets of semantic features because that would create a number of counterintuitive problems for a theory of word production (also cf. Roelofs (1997)).

The question whether conceptual vocabulary is a set of lexical concepts or, rather, the set of primitive conceptual features that make up these lexical concepts is of course a classical and controversial issue (Fodor et al. 1980). Still, there is one particular feature whose presence in speech errors suggests that at least sometimes conceptual vocabulary must contain separable primitive features; this is the Neg feature which will be considered in some detail in the next subsection.

4.2.4 *A Special Case: The NEG Feature*

Levelt et al. (1999) give an interesting example in order to illustrate that a lexical concept is usually activated as part of a larger message that captures the speaker's communicative intention. If a speaker of English wishes to talk about a female horse, he may effectively do so by producing the word "mare". Alternatively, he might also use the words "female" and "horse". However, when the intended referent is a female elephant, no such choice is available. The speaker will have to resort to a phrase because no unitary lexical concept exists for a female elephant. The problem of mapping the notions to be expressed onto messages consisting of lexical concepts is called the "verbalization problem" (Bierwisch & Schreuder 1992).

The verbalization problem is also apparent with negation. For instance, if one wants to convey the message that something is not clear, one may either decide to use the

[77] A similar analysis may be applied to the German slip *die Ehefrau, der Ehemann der Olympiasiegerin* "the wife, the husband of the Olympic winner(FEM)". The feature [female] (which triggers the selection of the suffix *-in*) is anticipated and combines with the concept SPOUSE. However, this error may, of course, also be analyzed as a meaning-based substitution.

morphologically complex word “unclear” or one may choose the phrase “not clear”. Still, speech error data suggest that there is no unitary concept UNCLEAR but rather that “unclear” is a combination of CLEAR and a semantic feature [+neg] which may be morphologically or syntactically realized. The four slips in (4-14) constitute good evidence for the claim that the Neg feature is in fact separable from a lexical concept (the Neg elements are in bold-face).

(4-14) *Errors involving shift of the Neg feature*

a. er hat **nicht** gesagt, dass es möglich ist, ich meine, er hat gesagt,
he has not said that it possible is, I mean, he has said
dass es **un**möglich ist
that it impossible is

b. I **dis**regard this as precise ← I regard this as **im**precise (Fromkin 1973a:32)

c. I tell you he's **not** crazy, I mean, he's **in**sane (Fromkin 1973b:268)

d. wer es vermeiden kann, die Autobahn **nicht** zu benutzen, der
who it avoid can the highway not to use that.one
sollte es tun ← vermeiden kann, die Autobahn zu benutzen
should it do ← avoid can the highway to use
"Whoever can avoid to use the highway, should do so."

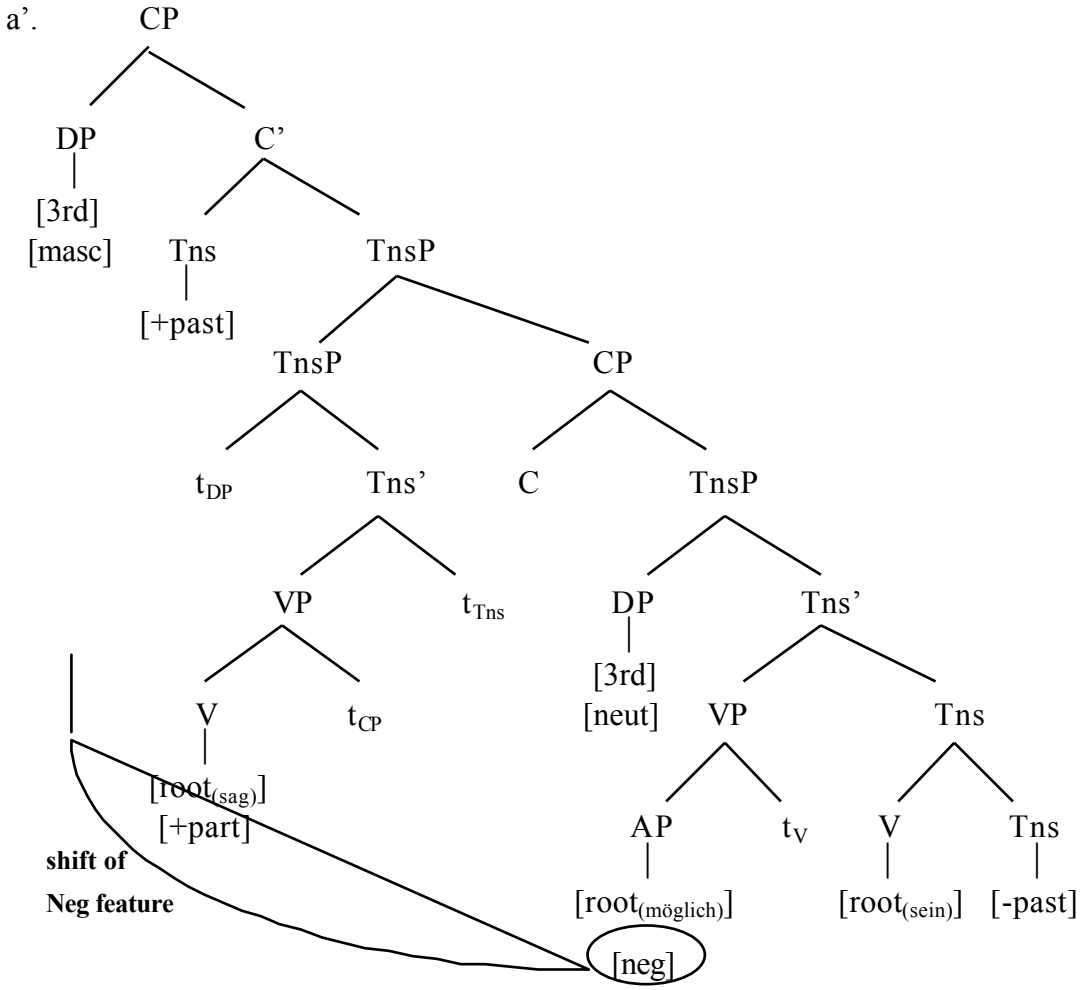
In (4-14a), the adjectival root in the embedded sentence is associated with a Neg feature. In the error, this feature is accessed and shifted leftwards. In the matrix clause, it is not combined with any other root but rather enriches the hierarchical structure. The English slip in (4-14b) is somewhat different in that in the error, the Neg feature which originates from an adjectival slot combines with a verb stem resulting in the complex negative verb *disregard*. Note that the shift might also have given rise to the sequence *I don't regard this as precise*, with the Neg feature extending the syntactic structure in the same way as in (4-14a). In (4-14a), however, there is no way of combining the shifted Neg feature with another terminal node, since in German there is no negative counterpart of the verb *sagen* "to say".

Fromkin (1973) does not give an analysis for the error in (4-14c), but I suppose that we are dealing with a blend here. Semantically, *crazy* and *insane* are very close to each other; the former is a root only, while the latter is a combination of a root with a Neg feature. In the error, [$root_{(crazy)}$] takes the place of [$root_{(sane)}$]. Consequently, the terminal node contains [$root_{(crazy)}$] as well as [+neg]. There is, however, no Vocabulary item to match this feature combination (i.e. there is no Vocabulary item like *uncrazy*), and therefore Vocabulary insertion must resort to a syntactically complex paraphrase.

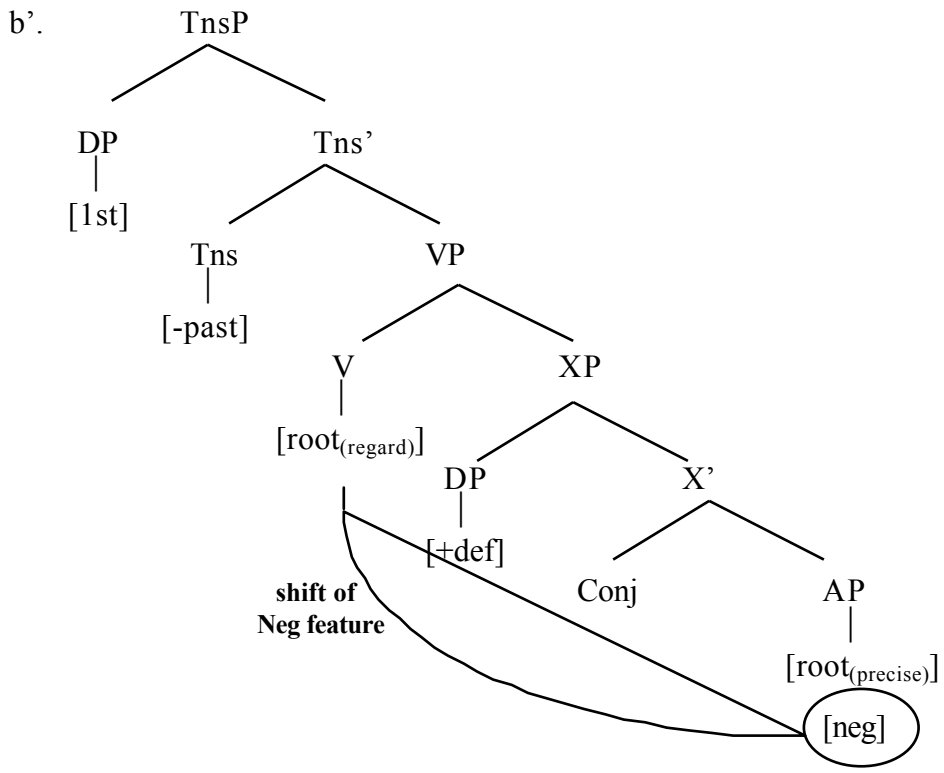
Another particularly interesting German slip is cited in (4-14d). The verb *vermeiden* "to avoid" possesses an inherent Neg feature which, however, is not realized by a separate morpheme. In the error, this inherent feature is perseverated and enriches the syntactic structure of the infinitival complement by adding the negative element *nicht* (also c.f. Fodor et al. (1975)).

Below, I give syntactic structures for the errors in (4-14ab). Note that the embedded CP in (4-14a') is extraposed and adjoins to TnsP. In the present context, I leave open the question if in (4-14a'), Neg adjoins to an XP - be it VP or TnsP - or if it projects a phrase of its own, a NegP. The resulting erroneous sentence is *er hat nicht gesagt, dass es möglich ist* 'he has not said that it possible is'. In (4-14b'), the sequence *this as imprecise* probably constitutes a small clause. Since the analysis of small clauses is a matter of debate, I have labelled that constituent XP, its exact status being irrelevant in the present context.[78]

(4-14) *Simplified structures for errors involving shift of the Neg feature*



[78] Chomsky, (1981), for instance, assigns sentential status to small clauses. Williams (1983), however, argues against such an analysis and points out obvious inconsistencies with X-bar theory.



Remember that English main verbs do not raise to Tns. Rather, Tns merges with V resulting in the structure [$_V$ [V] [Tns]]. As far as the error (4-14b) (*I disregard this as precise*) is concerned, it is impossible to decide if the shift has occurred before or after merger of Tns with the main verb.

The Vocabulary items to be inserted in the respective terminal nodes which were supplemented by the shifted Neg feature are given in (4-15). For the German error in (4-14a), that terminal node contains the Neg feature only (cf. (4-15a)); for the English one in (4-14b), it contains a combination of a verbal root and the Neg feature (cf. (4-15b)).

(4-15) *Vocabulary items to be inserted after Neg shift*

a. [neg] ←→ /nIçt/ (German)

b. [root$_{(regard)}$] ←→ /dIsrIga:d/ (English)
[neg]

Another option concerning the structure of the relevant terminal node in (4-14b') is to assume that V has a branching structure with [neg] being the sister node of [root], i.e. [neg] being a verbal prefix. The relevant Vocabulary item for [neg] would then be /dIs-/. For this item, of course, it would be necessary to specify possible contexts for insertion, one such context being [root$_{(regard)}$].

To complete the picture, I cite two more examples involving Neg shift in (4-16). These examples are different from the ones discussed above in that the Neg element does not change its form after the shift. Neither before nor after the shift does the Neg feature combine with a root, i.e. the Neg element retains its status as an independent particle. In the German example (4-16a), the feature is shifted from the matrix into the embedded clause, for the English example (4-16b) the opposite is true.

(4-16) *More errors involving shift of the Neg feature*

a. mir gelingt es, ihn **nicht** zu erreichen
me succeed it, him not to reach
← mir gelingt es **nicht**, ihn zu erreichen
← *me succeed it not, him to reach*
"I don't succeed in getting in touch with him."

b. the bonsai **didn't** die because I watered it
← the bonsai died because I **didn't** water it (Fromkin 1973b:268)

I take the English slip in (4-16b) to be particularly illuminating because after the shift has occurred, the presence of the Neg feature triggers *do*-insertion in the matrix clause. This insertion is due to the fact that Neg prevents merger of Tns and the main verb; therefore, the dummy element *do* is inserted in order to pick up the Tns feature [+past]. Consequently, this particular error suggests that the Neg shift has taken place before merger of Tns and V has occurred, since otherwise *do*-insertion would not have been triggered in the matrix clause and the ungrammatical utterance **the bonsai not died because I did water it* would have surfaced.

In this section, I have investigated the role of semantic features in language production. I have argued that due to conceptual problems (how can the choice of the appropriate items from the Vocabulary be guaranteed?) as well as due to psycholinguistic evidence (the existence of meaning-based substitutions), we must assume that the selection of abstract roots from List 1 is determined by the activation of lexical concepts at a preceding conceptual level which connect to the roots in List 1. This, however, does not imply that the roots which enter the computational system carry any semantic features.

In the theory of Levelt et al. (1999), lexical concepts are taken to be noncompositional in nature, i.e. they are not represented by sets of semantic features. Above, I presented a few speech errors which seem to involve the isolation of semantic

features such as SPOUSE or PARENT, but the scarcity of these errors does not allow for any safe conclusions. In tip-of-the-tongue experiments, compositional semantic features like [mass] and [count] have been shown to be available at an early processing stage. Still, these features do not figure prominently in speech errors either.

Things are different concerning the Neg feature: Obviously, in speech errors, that feature is separable from concepts like UNCLEAR and IMPRECISE; it may shift and attach to other roots. We may therefore conclude that such concepts are in fact combinations of a more basic concept and a Neg feature, by that allowing at least some decomposition at the conceptual stratum.

4.3 Processing of Grammatical Gender

der bauch / die tür / the chair / l'amour
le tür / d'amour / der chair / the bauch
le chair / der tür / die bauch / th'amour
(Ernst Jandl, Chanson)

In this section, I will be concerned with the representation and processing of one morphosyntactic feature, viz. grammatical gender, in language production. In languages which make use of a gender system, gender agreement relations are frequently established. On the basis of a corpus analysis, van Berkum (1997) estimates that a native speaker of Dutch must retrieve a noun's gender approximately every ten seconds in spontaneous speech. And Dutch, one must say, is a language with a relatively poor degree of gender marking limited to singular nouns; many languages have a much more extensive gender system (Corbett 1991).

In their overview article, Schriefers & Jescheniak (1999) point out several considerations which motivate the psycholinguist's interest in the investigation of grammatical gender. Two of these are of major importance in the present context: Firstly, grammatical gender is a lexical, i.e. an inherent, property of words (nouns). Since theories of language production as well as the morphosyntactic theory of Distributed Morphology make clear predictions about the storage and retrieval of such properties, we may investigate whether they converge with respect to gender processing. Secondly, grammatical gender is also a paradigmatic case for studying the actual use of

morphosyntactic information in grammatical encoding. Consequently, speech errors may give us clues about the establishment of agreement relations.

In the present context, a first question concerns the storage versus computation of gender. We need to ask if grammatical gender in German is simply stored as a syntactic property of nouns or if rather, it is computed on the basis of certain semantic, morphological, and phonological characteristics of a given noun. This question will be dealt with in subsection 4.3.1. If it turns out that gender in German is in fact stored information, then a second question emerges, namely where and how it is stored. In particular, since DM allows for the underspecification of certain features (or feature values), we also need to consider that possibility; this will be done in subsection 4.3.2. Finally, the course of the syntactic derivation assumed in the DM framework makes clear predictions about the possibility of gender accommodations. These predictions will be subject to investigation in subsection 4.3.3. Again, I am going to show how the morphosyntactic theory can be matched to the assumptions made in psycholinguistic models of language production.

4.3.1 *Definition and Assignment of Gender*

Following Matthews (1997:248), grammatical gender may be defined as a system in which the class to which a noun is assigned is reflected in the forms that are taken by other elements syntactically related to that noun. In German, for instance, the masculine nouns *Mann* "man" and *Löffel* "spoon" require the masculine form *der* of the definite article in the nominative case, while the feminine nouns *Frau* "woman" and *Gabel* "fork" require the feminine form *die*, and neuter nouns like *Kind* "child" and *Messer* "knife" require the neuter form *das*. Thus, agreement in gender between a noun and other related items is crucial to the concept of grammatical gender.

It is important to carefully distinguish grammatical gender from the related concept of natural gender, or sex. Although gender systems exist in which grammatical gender is closely correlated with sex, in many others, we observe mismatches between gender and sex. In his brilliant essay on "The awful German language" (1878), Mark Twain gives some particularly dramatic examples for such mismatches in German:

> "Every noun has a gender, and there is no sense or system in the distribution; so the gender of each must be learned separately and by heart. [...] In German, a young lady has no sex, while a turnip has. Think what

> overwrought reverence that shows for the turnip, and what callous disrespect for the girl. [...] In the German it is true that by some oversight of the inventor of the language, a Woman is a female; but a Wife (*Weib*) is not, - which is unfortunate." (Twain 2000:24ff)

Obviously, in German, gender as a grammatical category must be kept distinct from sex as a semantic, or perhaps conceptual, category.

As far as the assignment of nouns to genders is concerned, there are two major principles involved, namely semantic principles and formal principles (Corbett 1991). By a semantic principle, nouns are assigned to a gender according to their meaning. In Avar, a Northeastern Caucasian language spoken in the Caucasus, e.g., the assignment of gender is straightforward: male human denotation implies masculine gender, female human denotation feminine gender, all other nouns are neuter (Comrie 1999). English has a very similar system. As is well known, gender plays only a small part in the grammar of English, but nonetheless the third person singular pronouns require the distinction between masculine *he*, feminine *she*, and neuter *it* (in contrast to e.g. Turkish, where, in the total absence of a gender system, only one third person singular pronoun is used). As in Avar, nouns denoting male humans are masculine, nouns denoting female humans are feminine, and other nouns are neuter.

Moreover, in some languages, there is an important correlation between the phonological form of a noun and its grammatical gender, i.e. nouns may also be assigned to gender according to a formal principle. In Italian and Spanish, for instance, most nouns ending in *-o* are masculine, while most nouns ending in *-a* are feminine. However, there are many exceptions to this pattern (e.g. Spanish *drama* "drama" is masculine, while *radio* "radio" is feminine). In German, certain derivational suffixes make a noun's gender predictable. For example, nouns derived by the diminutive suffixes *-chen* and *-lein* are neuter (irrespective of the gender of the base noun) while nouns bearing the noun forming suffix *-ung* are always of feminine gender.

However, in German, the gender of only a very small percentage of the nouns can be predicted on the basis of semantic and phonological properties of the noun. As Mark Twain notes, "there is no sense or system in the distribution", i.e. the German gender system is largely arbitrary. With the exclusion of the relatively few cases in which gender is a semantic feature of the concept (e.g. *die Mutter* "the.f mother", *der Onkel* "the.m uncle", *die Kuh* "the.f cow"), there is no obvious semantic basis for the gender taken by a noun. In

addition to that, the gender of a noun may vary across languages: “flower” and “flute” e.g. are masculine in Italian but feminine in French and in German.[79]

4.3.2 *Underspecification of Grammatical Gender*

The above discussion suggests that grammatical gender in German is not computed on the basis of a noun’s semantic, morphological, or phonological properties each time it is needed anew. Rather, a word’s gender is autonomously specified with respect to its semantic features and its phonological form, i.e. grammatical gender is stored as a syntactic property of nouns.

If grammatical gender is in fact stored information, then, of course, the question emerges of how and where it is stored. In Levelt’s model of language production (Levelt 1989; Levelt et al. 1999; cf. section 4.1), all nouns of a given grammatical gender are taken

[79] The assumption of an essentially arbitrary relation between a German noun and its grammatical gender has not remained unchallenged. Complex rule systems have been proposed that may guide the assignment of a noun’s gender once certain phonological, morphological, and semantic information about that noun are taken into account (cf. Zubin & Köpcke 1986; MacWhinney et al. 1989; Konishi 1993). However, in some cases the principles that are adduced are of such complexity that it is questionable whether they are valid.

to be linked to one gender node specifiying this grammatical gender. That is, instead of specifying each noun's grammatical gender separately in the corresponding lexical entry, there is only one abstract node for each grammatical gender. To be more precise, it is not the noun which is linked to the gender node but rather the noun's lemma, i.e. an abstract entry which is not specified for phonological features but only connects to nodes representing the word's syntactic properties (syntactic category and morphosyntactic features). The phonological form of a target word becomes activated only after the lemma of the target word was selected.

This conception of language production, however, does not facilitate any predictions about the precise nature of the connection between the lemma node and its gender feature. It is simply assumed that a language-specific number of gender nodes exists and that lemmas are always linked to a gender node. As mentioned above, within the theoretical framework I adopt, we need to investigate the possibility that there are gaps with respect to these links.

In chapter 3, I have already pointed out that Vocabulary items which are inserted at the postsyntactic level of Morphological Structure may be underspecified for the morphosyntactic feature complexes that they realize. One possible candidate for underspecification is the gender feature. However, in the following, I am going to argue that a closer examination of speech error data in which the gender feature plays a role (i.e. noun substitutions and gender accommodations) strongly suggests that actually this feature must be present, i.e. specified, throughout.

In principle, there are two options for the underspecification of certain features, both of which will be subject to investigation below. First, a feature may be underspecified within the computational system, i.e. it is not among those features which are relevant to that system and consequently, it is not drawn from the universal feature set (List 1). Consequently, such a feature can neither have any function within the computational system nor is it capable of influencing the insertion of a Vocabulary item. Gender is a potential candidate for that kind of underspecification because it does not figure prominently within the computational system (it does, for instance, not trigger movement operations). Therefore, we may hypothesize that it need not be present in this system.

Underspecification of Vocabulary items with respect to a feature constitutes a second possibility. For instance, as noted by Halle & Marantz (1993), the English past participle ending /-d/ in a sentence like *I had played tennis all day* will correspond only to the feature [+past] in its Vocabulary entry although in that example, it is inserted at a node with the

feature [+participle] in addition to the feature [+past]. In case a Vocabulary item is underspecified for gender, it may be inserted at a terminal node no matter what gender specification that node has (remember that it is only important for the Vocabulary item not to conflict with any of the features contained in the terminal node).

I will first consider the option that the gender feature is not amongst the universal features contained in List 1 and does therefore not play any role in the derivation of a sentence before Vocabulary insertion takes place at the level of Morphological Structure. This option is easily ruled out by the fact that gender specifications do, of course, influence this derivation. Before Vocabulary insertion applies, the gender feature of a given noun must be copied onto the other elements within the DP, such as the article and adjectives, and onto pronouns which refer to that noun. Otherwise, the correct insertion of Vocabular items is not guaranteed. Consider, for instance, the following three slips of the tongue, all of which involve accommodation of certain elements with respect to gender (the accommodated elements are in bold-face):

(4-17) *Accommodation of grammatical gender*

a. irgendwie habe ich heute **eine** Zunge **im** Knoten
somehow have I today a.f tongue(f.) in.the.m knot(m.)
← einen Knoten in der Zunge
← *a.m knot(m.) in the.f tongue*

b. der Unterschied von Fragesatz und **normaler** Frage
the difference of interrogative.clause and normal.f question(f.)
← von Fragesatz und normalem Satz
← *of interrogative.clause and normal.m sentence(m.)*

c. ob dein Irrtum genauso ausfällt wie **meiner**
if your error(m.) exactly turn.out as mine.m
← ob dein Urteil genauso ausfällt wie meines
← *if your judgement(n) exactly turn.out as mine.n*

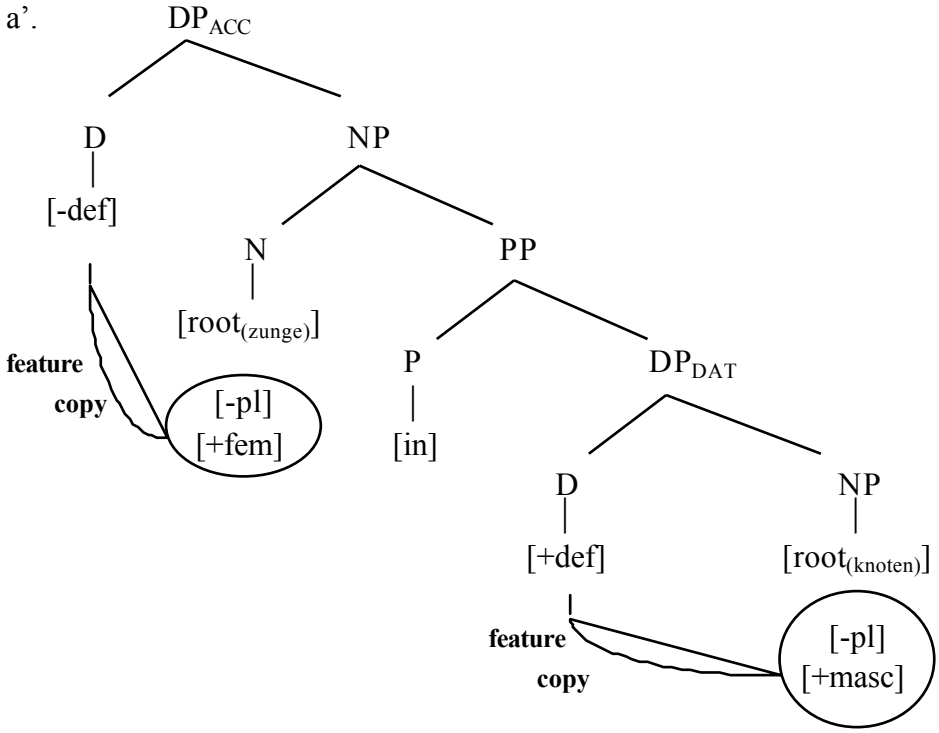
In the error in (4-17a), two nouns with different gender specifications have been exchanged. In both positions, the material in D, one definite and one indefinite article, accommodates to the gender feature of the new noun (moreover, in the erroneous utterance, the definite masculine dative article *dem* cliticizes to the preposition *in*). Consequently, the ungrammatical utterance **einen Zunge in der Knoten* is suppressed. In (4-17b), the non-head element *Frage* "question" of the compound *Fragesatz* "interrogative clause" is perseverated and the adjective *normal* is spelled out according to the gender feature of the

intruder. The slip in (c) exemplifies an instance of a meaning-based substitution: the masculine noun *Irrtum* "error" replaces *Urteil* "judgement" which is of neuter gender. Subsequently, the possessive pronoun in the elliptic comparative phrase is adjusted according to the masculine feature of the noun it refers to.

Below, I supply an exemplary syntactic structure for the object DP in the error (4-17a). Note that the case feature - which according to DM assumptions is implemented at MS - also plays a crucial role: accusative case is assigned to the DP *eine Zunge* 'a.f tongue(f.)' by the verb *haben* "to have" while dative case is assigned to the DP *dem Knoten* 'the.m knot(m.)' by the preposition *in*; both case specifications influence the surface forms of the respective articles.[80]

(4-17) *Copying of agreement features within DP in example (4-17a)*

a'.



(4-18) *Vocabulary items to be inserted in D°*

a. [-def] [ACC] [+fem] ←→ /ain´/

b. [+def] [DAT] ←→ /de:m/
[-pl] [+masc]

[80] As is well-known, the status of prepositions is a matter of debate. In the present context, I shall therefore leave open the question if P constitutes an l-node or an f-node, or, to put it differently, if P is occupied by a root or by some feature (or feature combination).

The tree in (4-17a') represents the structure of the relevant part of the utterance after the root exchange has taken place. At MS, the morphosyntactic features of the roots will be copied onto the respective determiners. In (4-18), the Vocabulary items to be inserted into the D°-positions are given. If the roots were not specified for gender, then correct insertion of determiners would not be guaranteed. For example, a determiner position which is characterized only by the features [+def], [DAT], and [-pl] might as well be taken by the

definite article *der*.[81]

Note that within the DM framework, we may not assume that the gender feature is copied from the noun - the respective Vocabulary items being specified for that feature - onto D° after the noun has been inserted. This is due to the fact that all operations which alter the arrangement and content of terminal nodes (e.g. merger, fusion, feature copy, and morphosyntactic readjustment) are taken to apply before Vocabulary insertion is performed.

Besides the fact that the gender feature must be available before Vocabulary insertion takes place in order to facilitate insertion of the correct Vocabulary item, there is another good reason for assuming that the gender feature must be specified within the computational system. At PF, a terminal node without a gender specification could in principle be taken with equal probability by every Vocabulary item irrespective of its gender feature. We would therefore predict that in noun substitutions, the gender of the intruding noun should not have any influence on the probability of its insertion.

However, researchers studying noun substitution errors in languages with grammatical gender systems have reported that intended and intruding noun are of the same grammatical gender more often than one would expect by chance. This phenomenon is called the "identical gender effect". Berg (1992) reports that in his corpus of German slips of the tongue, in 118 out of 175 noncontextual word substitutions, the involved nouns are of the same grammatical gender (30 meaning-based errors, 79 form-based errors, and 9 situation-based errors). The identical gender effect is also observed by Marx (1999): In her collection of German errors, 206 out of 260 noun substitutions obey the identical gender constraint (135 meaning-based errors and 71 form-based errors). Similar tendencies of the role of grammatical gender in noun substitution errors have been reported for Spanish and Italian by Vigliocco et al. (1999). They give figures from a corpus of Spanish speech errors collected by Del Viso, Igoa & Garcia-Albea. In that corpus, 171 out of 180 noun substitutions obey the identical gender constraint.

In order to further evaluate this effect, I checked the noun substitutions from the Frankfurt corpus with respect to gender features. In that corpus, there are 728 noun substitutions. For a fair number of these substitutions, however, it turned out that the

[81] Note that the Vocabulary item for the indefinite article need not be specified for number. I also wish to emphasize that Vocabulary items are most probably not specified for the number value [-pl] and that insertion of the appropriate determiner is guided by the Elsewhere Principle (cf. subsection 4.4.1 for discussion).

analysis was not unambiguous; they could e.g. as well have been analyzed as sound errors or blends. These ambiguous cases, as well as errors involving proper names, were crossed out from the list. After that, 554 errors remained.

In order to get a non-biased picture, further errors were removed from the list. First of all, all errors involving plural nouns were put onto a different list. This decision is due to the fact that in the plural, all nouns appear with the same article, namely the article *die* which is isomorphous to the feminine singular article (e.g. *die Männer* "the men(m.)", *die Frauen* "the women(f.)", and *die Kinder* "the children(n.))". Consequently, it cannot be decided if the language processor treats a basically masculine noun as such even if it is used in the plural. Rather, it is very well conceivable that plural nouns are not specified for gender at all. I will, however, come back to the errors involving plural nouns below. For illustration, two meaning-based noun substitutions which involve nouns of different gender are given in (4-19); in (4-19a), the plural masculine noun *Monate* "months" is substituted for the plural feminine noun *Wochen* "weeks", while in (4-19b), the singular masculine noun *Magen* "stomach" takes the slot of the plural neuter noun *Augen* "eyes".

(4-19) *Gender mismatch in substitutions involving plural noun(s)*

a. er hatte schon fünf **Monate** Urlaub, nee, fünf Wochen
he had already five months(m.) vacation, no, five weeks(f.)

b. aus dem **Magen**, aus dem Sinn← aus den Augen
out.of the.m stomach(m.), out.of the.m mind(m.) ← out.of the.n eyes(n.)
"Out of sight, out of mind."

The second group of errors which was not taken into consideration includes noun substitutions involving compounds for which it could not be decided if the whole compound was substituted for or rather the first element of the compound only. In case the whole compound was replaced, the gender of target and intruder is necessarily identical since the gender of the compound is determined by the gender specification of its head. The following two examples illustrate the procedure:

(4-19) *Noun substitutions involving compounds*

c. Dosenmilch ← Sonnenmilch
canned.milk(f.) ← *sun.milk(f.)*
"suntan lotion"

d. **Material**wasser, äh, Mineralwasser

material(n.).water, er, mineral(n.).water

Since *Dosenmilch* "canned milk" is an existing German compound, in (4-19c), it is quite likely that the whole compound was substituted for and not only its non-head part *Sonne* "sun" (*Dose* "can" as well as *Sonne* are feminine). The same line of reasoning does, however, not hold for the error in (4-19d). Here, the resulting compound *Materialwasser* "material.water" is not an existing one and therefore we have to assume that only the first element *Mineral* "mineral" of the target word was replaced on phonological grounds (*Mineral* as well as *Material* are neuter). Consequently, the former error was not taken into consideration but the latter was.

For the same reason, a third group of slips, namely those involving derived nouns, was removed from the list of substitutions. Derivational suffixes, too, determine the gender of the derived noun. For instance, all nouns ending in *-ion* are [+feminine] (cf. (4-19e)) while nouns carrying the suffix *-mus* are always [+masculine] (cf. (4-19f)).[82]

(4-19) <u>*Noun substitutions involving derived nouns*</u>

e. ich gehe zur **Rezension** ← Rezeption
I go to.the.f review(f.) ← *reception(f.)*

f. das ist ein Dörfchen, über das der **Terrorismus** manchmal hereinbricht ← der Tourismus
this is a small.village upon which the.m terrorism(m.) sometimes descends ← *the.m tourism(m.)*

In the Frankfurt corpus, there are 114 noun substitutions in which target and/or intruding noun are plural, 35 ambiguous compound errors, and 54 slips involving derived nouns. Consequently, 203 noun substitutions were removed from the list. The 351 errors which remained after applying that procedure show the following distribution with respect to the gender features involved:

[82] Berg (1992) did not exclude derived nouns from his count. In his corpus, he observes an unusually high rate of form-based errors in which both interactants are of feminine gender (49 instances in contrast to only 8 instances of meaning-based f ← f substitutions). He states that while many rules of gender assignment based on the formal characteristics of nouns are of a probabilistic nature, some extremely frequent derivational suffixes like e.g. *-ion* and *-ung* are invariably found with feminine nouns and this fact may help to explain the high rate of form-based f ← f substitutions.

GENDER	NOUN SUBSTITUTIONS (SINGULAR) semantic	form-based	total
fem ← fem	45	52	97
masc ← masc	48	48	96
neut ← neut	25	37	62
fem ← masc	10	9	19
fem ← neut	6	7	13
masc ← fem	7	6	13
masc ← neut	8	8	16
neut ← fem	8	3	11
neut ← masc	10	14	24
total	**167**	**184**	**351**

Table 6: *Grammatical gender in singular noun substitutions (N=351)*

Apparently, the identical gender effect is observed in the Frankfurt corpus, too. For 255 out of 351 noun substitutions, i.e. for 72,6% of the data, it is true that the intended word and the intruding word have the same gender feature.[83] For the purpose of illustration, in (4-20), I give two examples each for errors involving identical and for errors involving different gender specification of the target noun and the intruder.

(4-20) <u>*Gender (mis)match in meaning- and form-based substitutions*</u>

a. das **Brett**, äh, das **Tablett**, äh, das Blech ist sowieso voll
the.n board(n.) ,er, the.n tray(n.), er, the.n baking.tray(n.) is anyway full

b. ich bin froh, dass ich keinen **Spinat** kann ← keinen Spagat
I am happy that I no.m spinach(m.) can ← no.m splits(m.)

[83] In Berg's (1992) corpus, the identical gender effect is observed in 67,4 % of the noun substitutions, and in Marx's (1999) collection in 79,2 %. Interestingly, while Berg reports a higher percentage of form-based and Marx a higher percentage of meaning-based substitutions within the set of identical gender errors, in my set, the difference between meaning- and form-based errors is quite small (118 meaning-based and 137 form-based substitutions).

c.	ich	erfrier	fast	vor	**Hunger**	←	vor	Kälte
	I	*freeze.to.death*	*almost*	*of*	*hunger(m.)*	←	*of*	*cold(f.)*

d. die Wahl zwischen **Pech** und Cholera
the choice between bad.luck(n.) and cholera
← Pest und Cholera
← *pestilence(f.) and cholera*

All three nouns participating in the meaning-based substitution (a conduite d'approche) in (4-20a) are of neuter gender. In the form-based error in (b), target noun and intruder share the gender feature [+masculine]. In example (c), the semantically related nouns *Hunger* "hunger" and *Kälte* "cold" are masculine and feminine, respectively, while in the form-based slip in (d), the intruder *Pech* "bad luck" is neuter and the target *Pest* "pestilence" is feminine.

Now, what does the above distribution of noun substitutions tell us about the specification of the gender feature? Obviously, the terminal nodes in which the Vocabulary items are inserted must be specified for gender. Otherwise, the identical gender effect can not be accounted for. As mentioned before, a terminal node without a gender specification could in principle be taken with equal probability by every Vocabulary item irrespective of its gender feature. Therefore, gender mismatch between target and intruder (as in (4-20c) and (d)) would be expected to be more likely.[84]

The same line of reasoning of course excludes the second option for underspecification, viz. underspecification of Vocabulary items with respect to the gender feature. It is this kind of underspecification that has been claimed by Lumsden (1992) to be the case in e.g. Old English and Romanian, both of which also have a three-way distinction of gender.

> "A more coherent account of the distribution of these forms [i.e. Old English personal pronouns] would say that the positions where the affixes are inserted are fully specified (at S-Structure). The affixes themselves, however, are underspecified. [...] The morphological signal is always nondistinct from the specification of the underlying position, but it does not always express every distinction that is specified in that position." (Lumsden 1992:473)

[84] Further evidence for the early availability of gender features comes from the so-called tip-of-the-tongue (TOT) phenomenon. In TOT states, speakers have the feeling of knowing a word but are unable to retrieve the (complete) phonological form of that word (cf. Brown (1991) for an overview). Still, as various studies have recently attested, speakers in a TOT state can provide correct information about the gender of a noun whose phonological form they are unable to access (Caramazza & Miozzo 1997; Miozzo & Caramazza 1997; Vigliocco et al. 1997). There is, however, an ongoing controversy whether wordform access occurs only upon successful gender retrieval or not (cf. Caramazza & Miozzo 1997; Roelofs et al. 1998; Caramazza & Miozzo 1998).

With the help of his underspecification analysis, Lumsden accounts for certain gender disagreement facts in Romanian. In Romanian, adjectives agree in number and gender with

the nouns they modify and demonstrative pronouns agree in number and gender with their antecedent. In case a demonstrative pronoun refers to an event, it appears in its feminine form (cf. (4-21a)). However, when a demonstrative pronoun referring to an event appears in a construction with a predicate adjective, the pronoun behaves as though it had a feminine antecedent, whereas the adjective behaves as though it had a masculine or neuter antecedent. In other words, although a subject DP usually agrees in gender with a predicative adjective, in (4-21b) this is not the case (Lumsden (1992:474f) cites examples from Farkas (1990)). According to Lumsden, this instance of gender disagreement is due to the fact that the inserted elements are underspecified with respect to certain gender features.

(4-21) *Gender mismatch in Romanian (Lumsden 1992)*

a. Petru e acasa, dar **asta** nu o stie decît Maria
Peter is home but this.SG.f not CL knows only Maria
"Peter is home, but this is known only to Mary."

b. Petru e acasa. **Asta** e **uluitor**
Peter is home. This.SG.f is amazing.SG.m/n
"Peter is home. This is amazing."

As far as the German speech errors are concerned, full underspecification of the Vocabulary items with respect to gender is definitely not an option. Again, insertion of underspecified Vocabulary items into gender-marked terminal nodes could proceed at random, since no choice of Vocabulary item would ever result in a feature mismatch. Therefore, no identical gender effect should be observed.

Lumsden (1992) does not assume full underspecification of positions and morphological signals. He claims that positions (i.e. terminal nodes) become fully specified with respect to the binary features [±feminine] and [±neuter] by means of redundancy rules. The morphological signals (i.e. the Vocabulary items), however, are underspecified with respect to certain feature values. For example, the masculine and neuter singular are specified as [-feminine] only while the feminine singular is completely unspecified.

I shall not consider the different possibilities of single feature value underspecification in detail here. Just a few comments are in place: Whatever feature value (if any) happens to be the unspecified one, a Vocabulary item which lacks that value should be more likely to be inserted into a fully specified slot, since no feature clash is caused by its insertion. For instance, if neuter as well as masculine Vocabulary items were

marked as [-feminine] only (as assumed by Lumsden (1992)), then both could be freely inserted into slots marked by the feature [-feminine], no matter if the respective slot also has the feature [+neuter] or [-neuter]. Such an analysis, however, cannot be inferred from the distribution of (singular) noun substitutions given in table 6 above. The number of neuter/masculine-interactions (N = 16+24) may be slightly higher than that of e.g. feminine/masculine-interactions (N = 19+13) but the total number of mixed gender substitutions is too small to allow for safe conclusions.[85] Therefore, I will leave that question open.

I will now come back to substitutions involving plural nouns. Above, I left them out of consideration, since plural forms do not trigger gender agreement on accompanying determiners, adjectives, and pronouns. For instance, the only plural article is the one also used for the feminine singular nouns. Consequently, it is quite possible that plural nouns are not specified for gender at all and that the specification [+plural] alone is sufficient for selecting the appropriate determiner.

Within the DM framework, however, underspecification of plural nouns is not easily accounted for. Presumably, when a noun root is selected from List 1 (containing the morphosyntactic features), it brings along a certain gender feature which is an inherent feature of that noun. This means that gender information becomes available only by means of the noun itself, a fact that makes it unnecessary to find a correlate for gender at the conceptual level. But this is not true for the plural feature which has no inherent relation to the noun root, its presence being determined by the speaker's intention only. There is no such thing as a plural root; rather, the plural feature is drawn separately from List 1. Therefore, a particular noun root is either always or never specified for gender. Above, I have argued that the former is true. In DM, the only possibility for gender underspecification on plural nouns is to postulate an impoverishment rule like the one in (4-22) which deletes the gender feature in the context of [+plural] prior to Vocabulary insertion (this is a simplified version, of course; the exact rule format, however, need not concern us here):

(4-22) *An impoverishment rule deleting gender features*

[gender feature] → Ø / [+plural]

[85] This bias towards neuter/masculine interactions is also observed in Berg's (1992) corpus. In Marx's (1999) error sample, however, feminine/masculine interactions make up the highest percentage.

If such an impoverishment rule was in fact active at MS, then two predictions could be made concerning the identical gender effect for plural nouns. First, there should be less instances of form-based same gender substitutions, since at the point of Vocabulary insertion, the gender feature would no longer be present and should therefore not have any influence on the selection of plural nouns. Secondly, for the same reason, there also should be more instances of form-based substitutions in which target and intruding noun are of

different gender.

The table below illustrates that only the first prediction is borne out; that is, the number of form-based plural noun substitutions is smaller throughout. In view of the available data, we may therefore not conclude that an impoverishment rule like the one in (4-22) alters the featural content of terminal nodes at MS in German.

GENDER	NOUN SUBSTITUTIONS (PLURAL)		
	semantic	form-based	total
fem ← fem	21	14	35
masc ← masc	16	9	25
neut ← neut	6	2	8
fem ← masc	4	0	4
fem ← neut	6	2	8
masc ← fem	7	2	9
masc ← neut	1	0	1
neut ← fem	5	0	5
neut ← masc	11	0	11
total	**77**	**29**	**106**

Table 7: *Grammatical gender in plural noun substitutions (N=106)*

Admittedly, the numbers for plural noun substitutions are not as clear as the ones for singular noun substitutions presented in table 6. But still, there is a strong tendency for same gender interactions (at least with nouns of feminine and masculine gender) and I therefore assume that German plural nouns, too, are specified for their gender feature.

On the basis of spontaneous speech error data, I have argued in the above subsection that German singular as well as plural nouns are specified for their gender feature throughout, i.e. in the computational system as well as in the Vocabulary. In the subsection to follow, I

will have a closer look at what predictions the DM model of grammar makes concerning gender accommodations.

4.3.3 *Gender Accommodation*

The fact that not only meaning-based but also form-based noun substitutions show an identical gender effect is somewhat problematic for language production models which postulate a strict division between the lemma level (syntactic stratum) and the word form (phonological) level (e.g. Garrett 1975ff, Level 1989, Levelt et al. 1999). Remember that in these models, it is assumed that only lemma nodes connect to a word's syntactic and morphosyntactic properties and that the flow of activation from lemma to phonological form is unidirectional. Therefore, once the processing of a sentence has reached the word form level, information about (morpho)syntactic features of a word should be no longer available.

On the other hand, production models which allow for feedback between processing levels (e.g. Dell & Reich 1981, Dell 1986, Berg 1988, Dell & O'Seaghdha 1992) can account for the identical gender effect in form-based substitutions in a straightforward way, since these models take morphosyntactic information to be still available at the word form level. Berg (1992), for instance, claims that formal similarity need not stop short of phonological criteria but might also encompass morphosyntactic criteria. However, Marx (1999) who favours a modular two-step retrieval model states that these models, too, are capable of explaining the behavior of form-based errors. In a line with Berg, she claims that gender is also a formal property of nouns in German and that one may assume that nouns of the same gender are lexical neighbors not only on the lemma level but also on the lexeme level. Still, she stresses that at the latter level, gender is just an organizational criterion; it is neither activated nor processed at that level.

A similar assumption can be made within the Distributed Morphology framework. In that theory, Vocabulary items (i.e. word forms) are selected from the Vocabulary along with certain morphosyntactic features. Since these features are checked against the featural content of terminal nodes, they are essential for selecting the appropriate Vocabulary item for a given node. Therefore, in DM, it is quite natural to assume that gender has an influence on form-based substitutions, too.

Still, there is one important difference between meaning- and form-based noun substitutions. This difference concerns the establishment of agreement relations in the course of language production. Presumably, semantic substitutions take place when roots are selected from List 1, i.e. before the level of MS. In contrast, form-based substitutions occur when Vocabulary items are inserted into terminal nodes, i.e. after the level of MS. According to DM assumptions, implementation of agreement nodes and copying of agreement features takes place at MS. We therefore predict that preceding articles (as well as other material within DP and pronouns) can accommodate to the gender of the erroneous noun only after meaning-based noun substitutions. Following form-based substitutions, accommodation should not be observed, since at this point of the derivation, copying of agreement features is no longer possible. An erroneous form-related noun may be inserted but it cannot pass on its gender feature onto other elements.

From table 6 above, we can infer that there are 49 meaning-based and 47 form-based singular noun substitutions in which target and intruding noun happen to have different gender features, i.e. 96 instances in which accommodation could in principle be observed. However, a number of these substitution errors is not informative in the present context, since there either is an ambiguous gender cue in the environment, no gender cue at all or the error occurs within a compound. The slips given in (4-23) illustrate these phenomena:

(4-23) <u>*Noun substitutions with ambiguous or without gender cue*</u>

a. sie ist nicht ohne **Wunder** bekannter ← ohne Zufall
she is not without miracle(n.) more.known ← without chance(m.)

b. überall gibt's **Erotik** ← Aerobic
everywhere is'there eroticism(f.) ← *aerobic(n.)*
"There's aerobic everywhere."

c. aufgrund von Verzögerungen der **Stadt**planung
because of delays of.the.f city(f.).planning
← der Satzplanung
← *of.the sentence(m.).planning*

d. eher geht ein **Kanal**, äh, ein Kamel durchs Nadelöhr
more.likely goes a.m canal(m.), er, a.n camel(n.) through.the eye.of.a.needle

In the meaning-based substitution in (4-23a) as well as in the form-based substitution in (4-23b), there is no agreeing material whatsoever, i.e. the gender features from the erroneous nouns *Wunder* "miracle" and *Erotik* "eroticism", respectively, need not be copied onto any

other material (the same is true for the errors cited in (4-20cd) above). In (4-23c), a compound is involved in the error. Even if we assume that only the specifier of the compound is affected by the substitution (cf. the discussion of the compound errors in (4-19cd)), it is clear that the genitive article need not be accommodated since the gender determining head of the compound is the same. In German, the indefinite articles for masculine and neuter nouns happen to be the same in the nominative, genitive, and dative case. Consequently, in (4-23d) where the masculine noun *Kanal* "canal" is substituted for the neuter noun *Kamel* "camel" in a nominative slot, we can not decide if feature copy onto the determiner has in fact taken place.

Let us now consider the clear cases of accommodation and non-accommodation after substitutions. In the meaning-based substitution in (4-24a) as well as in the form based substitution in (b), the definite articles accommodate to the gender feature of the intruding nouns. The slip (4-24c), on the other hand, exemplifies an instance of a form-based substitution without subsequent accommodation.

(4-24) *(Non-)accommodation following meaning- and form based substitutions*

a. aber du musst **die** Tür dann festhalten, Quatsch, das Fenster
but you must the.f door(f.) then hold, rubbish, the.n window(n.)

b. wo sie über **den** Kalender guckt ← über das Geländer
where she over the.m calendar(m.) looks ← over the.n railing(n.)

c. oh, **ein** **neuer** Luft, äh, Duft
oh, a.m new.m air(f.), er, fragrance(m.)

Interestingly, in the Frankfurt corpus, there is not a single slip in which a meaning-based substitution is not followed by an accommodation.[86] Moreover, the error in (4-24b) is the only clear instance of a form-based substitution that triggers accommodation.[87] On the other hand, accommodation is observed in 21 meaning-based substitutions while 11 form-

[86] There is, however, one such error in my corpus which - as mentioned earlier - contains some slips which are not (yet) part of the Frankfurt corpus, viz. *als er bei **der** Bruder, äh, bei der Schwester von R. in London war* 'when he with the.f brother(m.), er, with the.f sister(f.) of R. in London was'. Obviously, the nouns *Bruder* "brother" and *Schwester* "sister" are semantically related. Still, accommodation of the definite (dative) article does not take place.

[87] Moreover, there is the following unclear case: ***gekochter** Kompost ← gekochtes Kompott* 'cooked.m compost(m.) ← cooked.n compote(n.)'. Note that in Standard German, the intruder *Kompost* is masculine while the form-related target noun *Kompott* is neuter (as indicated in the error). In some German dialects, however, *Kompott* is of masculine gender. Since it is unclear whether the speaker used the Standard German or the dialect variant, we can not decide with certainty whether we are in fact dealing with a gender accommodation in this error.

based ones result in an ungrammatical utterance. Table 8 provides you with an overview of the distribution of the relevant errors in the Frankfurt corpus:

NOUN SUBSTITUTION	ACCOMMODATION? yes	no
meaning-based	21	0
form-based	1	11

Table 8: *Distribution of accommodations after noun substitutions*

The prediction made above is therefore confirmed: Only meaning-based substitutions are capable of triggering accommodatory processes because only these substitutions occur before the level of Morphological Structure, i.e. at a stage of the derivation at which agreement relations have not yet been established. When Vocabulary items are inserted, all operations of feature copying have been executed and agreement relations are definitely established. Consequently, form-based substitutions can not be followed by accommodations, since feature copy is a necessary prerequisite for accommodation to take place.[88]

Note that within the DM framework, one can not assume that whole DPs are replaced. If, for instance, we analyzed example (4-24a) as a DP-substitution - i.e. the DP *das Fenster* "the window" was substituted for by the DP *die Tür* "the door" - then no accommodatory process would have to be assumed. In DM, however, this kind of replacement is not an option. Remember that Vocabulary insertion targets terminal nodes. Of course, there neither is a terminal node nor a Vocabulary item with the relevant features corresponding to a constituent like e.g. [$_{DP}$ die Tür].

Still, there are some very few exceptions; however, all of them involve idiomatic expressions. Consider, for instance, the examples given in (4-25). In (a), *rote Bete* "beetroot", the name of a vegetable (*Bete* alone is not attested), is substituted for *Grüne*

[88] The same observation is made by Marx (1999). The data from her corpus show that both types of substitutions behave unambiguously complementarily: Whereas accommodation never occurs in the case of form-related noun substitutions, it always takes place after meaning-related noun substitutions (with one single exception).

Sauce "green sauce", the name of a typical dish from Frankfurt.[89] Therefore, we may safely assume that the internal structure of these DPs is not computed in on-line language production.

(4-25) *Substitution of idiomatic DPs*

a. rote Bete ← grüne Soße
red beet ← green sauce

b. so kommst Du doch auf keinen **grünen Punkt**
so come you really on no green point
← auf keinen grünen Zweig
← *on no green branch*
"This will really get you nowhere!"

c. in our academic **ivy league** ← academic ivory tower (Fromkin 1973b:262)

The same is true for the slip in (4-25b). The two nouns *Punkt* "point" and *Zweig* "branch" have neither a semantic nor a form-based relation. The error is definitely due to the fact that both are parts of idiomatic expressions involving the adjective *grün* "green". A *grüner Punkt* need not be green at all; it simply is a little sign on packagings indicating the possibility of recycling. And the internal structure of the idiom *auf keinen grünen Zeig kommen* "to get nowhere" is computed just as little as that of an English expression like e.g. "to kick the bucket". I assume that the same is true for the English slip in (4-25c) in which the DP *ivy league* is substituted for *ivory tower*; again, both DPs are fixed constructions. Therefore, the slips in (4-25) do not constitute counterexamples to the generalization that only words but not phrases are subject to substitution errors.

4.4 Copying Agreement Features

Wenn man es nur versucht, so geht's,
das heißt mitunter, doch nicht stets.*
(Wilhelm Busch, Aphorismen)

[89] The greenish color of this delicious dish comes from several herbs (borage, cress, parsley, sorrel, chives, and chervil) which are combined with egg yolks, oil, sour cream, and possibly mayonnaise (cf. Scherenberg & Stier 1990:18). Interestingly, there are two slips in the corpus involving the replacement of *Grüne Soße*. But after all, it is a Frankfurt corpus, isn't it?

* "If one just tries, it works, that is, sometimes but not always."

In this section, I shall be concerned with processes of feature copying. As mentioned before, in DM, it is assumed that within the computational system, terminal nodes consist only of bundles of abstract features. Before Vocabulary insertion takes place, some features must be passed on to other, not necessarily adjacent, nodes. According to DM, this feature transmission involves a copy mechanism. In German e.g., features of an NP such as number and gender must be copied onto D°, the head of DP, and features of a subject DP such as person and number must be copied onto the verb. Both kinds of copy mechanisms may be defective, giving rise to instances of anti-agreement within DP or TnsP, respectively.

In the following, however, I will concentrate on subject-verb agreement (SVA) errors only. This limitation is due to the fact that for the most part, agreement errors within DP arise when a noun happens to appear in an erroneous slot (due to an anticipation, perseveration, exchange or blend) and subsequent accommodation of the material in D° does not take place. That is, after the error has occurred, feature copy does not take place.[90] In SVA-errors, on the other hand, the feature copy process itself causes the error. An item - here: the verb - which must be specified for some morphosyntactic feature receives that very feature from a wrong source.[91]

In the present context, it is particularly interesting to investigate the structural position of the source with respect to the verb. There are two options which I will consider in turn. First, it is possible that the error source is linearly closer to the verb than the 'real' subject; this possibility, which I will refer to as "local agreement", is subject to discussion in subsection 4.4.1. The second option is that the error source is more distant from the verb than the subject of the sentence; this option, which I will consider in subsection 4.4.2, is termed "long-distance agreement". Finally, in subsection 4.4.3, I will consider if and how syntactic transformations interact with processes of feature copy. Transformations might have an impact on the establishment of agreement, since a DP which is a distant one at surface structure may well be a local one at deep structure.

---

[90] There are a few exceptions to that generalization. Consider e.g. the following slip: *ihr Bus ist uns **zum Heimat** geworden ← zur Heimat* 'their.m bus(m.) has for.us to.the.m home(f.) become ← to.the.f home(f.)' ("their bus has become home for us") where the gender feature of *Bus* is perseverated, i.e. it is copied onto the non-local determiner of *Heimat* "home" (which subsequently cliticizes to the preposition *zu* "to").

[91] Blends are an exception. In an error like e.g. *weil **man** das Kind nicht fragen **könn-en** ← weil man … nicht fragen kann // weil wir ... nicht fragen könn-en* 'because one the child not ask can-2.PL ← because one ... not ask can.3.SG // because we ... not ask can-2.PL', an element from a competing planning frame intrudes but accommodation does not take place. That is, in this example, just as in the DP agreement errors, feature copy does not play any role.

4.4.1 *Taking the Short Way: Local Agreement*

As is well known, number/person marking on a verb (or on other constituents within a sentence) is an essential part of encoding grammatical relations in sentences; it is used to signal that linguistic constituents which are specified for the same number/person features are linked regardless of whether they appear adjacent or apart in an utterance. Bock et al. (1999:330) illustrate the effect of such marking by the different interpretations of sentences (4-26) and (b):

(4-26) *Linking of constituents by means of agreement marking*

a. Descriptions of the massacre that **were** discovered yesterday ...
b. Descriptions of the massacre that **was** discovered yesterday ...

Obviously, the two sentences mean different things: While example (a) mentions the discovery of descriptions, example (b) is concerned with the discovery of a massacre. This contrast in interpretation is due to the distinct number specification of the verb in the relative clause.

Crosslinguistically, agreement features such as number, person, grammatical gender and others are used in order to signal which of the individual words of an utterance are related to each other. In German, person and number features are determined by the message intention of a speaker. These features have important consequences for the syntax

of an utterance (i.e. for establishing subject-verb agreement).[92]

According to an inflectional account of agreement, agreement is the product of implicit matching operations between the features of linguistic units, which take place during the generation of an utterance. Subject-verb agreement, for instance, is the product of an operation which evaluates the person and number of the subject and sets person and number on the verb to the same values. Within their computational model of language production, Kempen & Hoenkamp (1987) propose that agreement involves a feature copy mechanism whereby the features of one constituent in a syntactic tree are copied onto another constituent. In the case of subject-verb agreement, the features person and number are copied from the subject DP onto the verb. This, of course, is an assumption which is familiar from generative treatments of agreement (Chomsky 1981) in which the feature copying transformations are sometimes replaced by a coindexing relation between the nominal source and Agr.

In chapter 3 above, we already saw that feature copy operations are also assumed in the Distributed Morphology framework. However, there is an important difference: while in other generative theories, agreement is taken to consist of a feature-transmission from a noun onto Agr and subsequent movement of the verb to Agr (or affix hopping, respectively, in earlier transformational analyses), verb movement to Agr is impossible in DM, since Agr nodes are not assumed to be present in the syntax. Rather, Agr is inserted at the level of Morphological Structure (AgrS, for example, is implemented as sister of the Tns node) and features from the noun will be copied onto this newly inserted node.

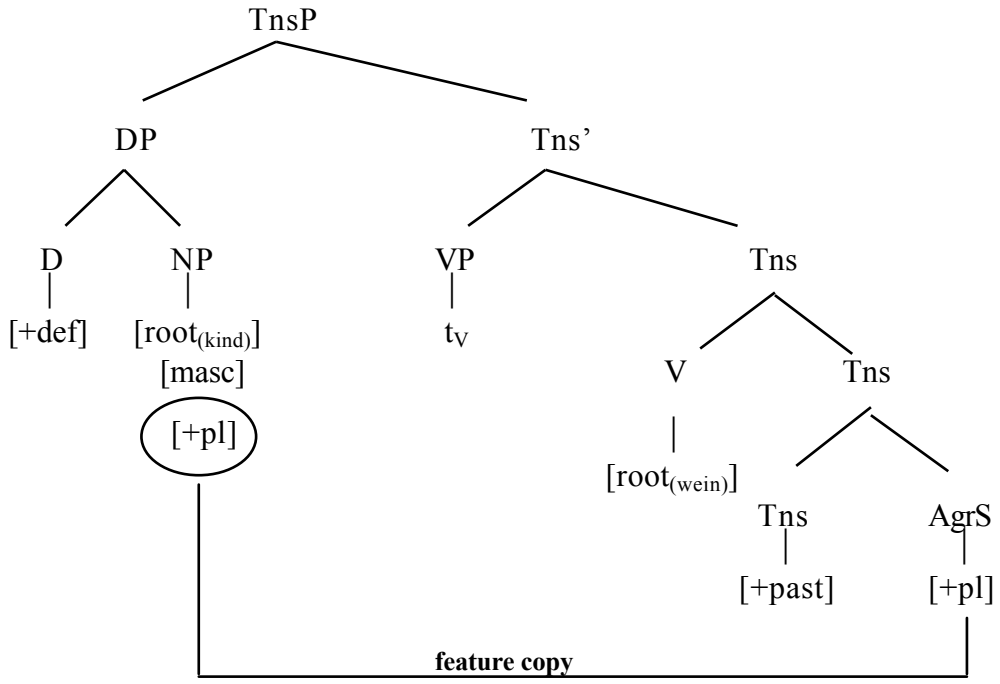
Consider the following structure which represents a part of the embedded clause *(weil) die Kinder weinten* "(because) the children cried":

---

[92] A series of experimental studies was conducted in order to investigate if and how the conceptual (notional) number of a noun is capable of influencing verb agreement (cf. Bock & Cutting (1992), Bock et al. (1999), and Eberhard (1999) for English, Berg (1998) for a comparison of English and German, Vigliocco et al. (1995) for Italian, Vigliocco et al. (1996a) for Spanish, and Vigliocco et al. (1996b) for French and Dutch). Most of these studies employ the same sentence completion task (a singular head noun followed by a PP ending in a plural local noun) as introduced by Bock & Miller (1991). A representative pair of sentence preambles (complex subject DPs) used in these experiments is *the jury for the trials* versus *the judge for the trials*, where *jury* is a grammatically singular but notionally plural collective noun.

One particularly interesting study which investigated how speakers create number agreement for collective nouns is the one by Bock et al. (1999). In their experiments, the agreement targets were verbs and pronouns, produced in a sentence-completion task. Interestingly, verbs and pronouns behaved differently: while verbs tended to reflect the morphological number of the collective controller, the pronouns were more likely to reflect the notional number (in a sentence like e.g. *The cast in the soap opera rehearsed, didn't **they**?* where *cast* is a collective noun; the tag question was to be supplied by the speaker). Since collective nouns do not figure prominently in my speech error corpus, I do not wish to go into that matter any further (but see the short discussion of count vs. mass nouns in subsection 4.2.3).

(4-27) *Copying of number feature onto AgrS*



Once again, this is a simplified structure. In the syntax, the verb is moved and adjoins to Tns. At Morphological Structure, AgrS will be inserted as sister of the Tns node and the relevant features of the subject DP will subsequently be copied onto AgrS. In this case, the only relevant feature is the number feature since, except for the 2nd person, German plural DPs are not specified for person.

The discussion in subsection 2.2.1 has already made clear that this feature copy mechanism may be defective. We have seen that now and then a wrong source for feature copy is chosen. For the most part, that source is a local plural noun, as is illustrated by the spontaneous speech errors cited in (4-28):

(4-28) *Verbs agreeing with local plural nouns in English and German*

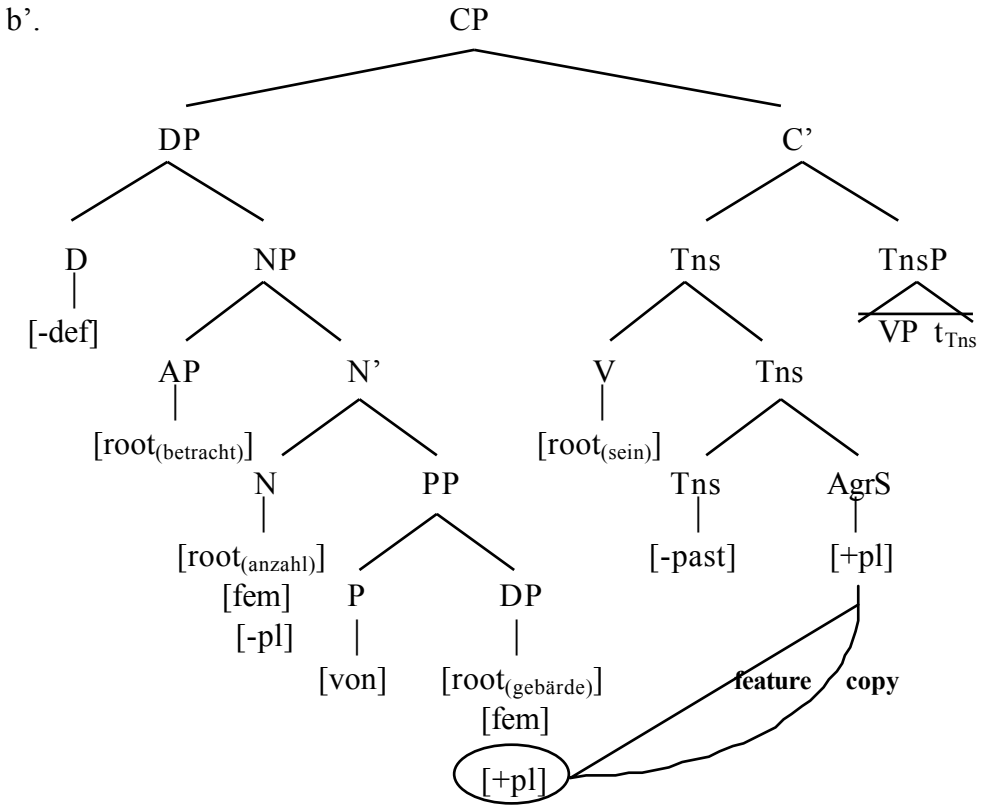
a. [**the full impact** of the cuts] **haven't** hit hard as yet
   ← the full impact ... hasn't hit (Francis 1986:318)

b. [**eine beträchtliche Anzahl** von Gebärden] **sind** lexikalisch markiert
   a considerable number of signs are lexically marked
   ← eine beträchtliche Anzahl ... ist lexikalisch markiert
   ← *a considerable number ... is lexically marked*

In both of the above slips, a plural feature is erronously copied from a DP (*the cuts* and *Gebärden* "signs", respectively) which is part of a PP within a complex subject DP. The

structure below illustrates the defective copy process for the German example (4-28b); instead of the [-plural]-feature of *Anzahl* "number", the [+plural]-feature of the local DP *Gebärden* is copied onto AgrS.

(4-28) *Wrong feature copy in example (4-28b)*



In fact, for the English slips, this kind of erroneous feature copying is the most widespread pattern; for your convenience, I will repeat the numbers here: In all of the 25 spontaneous English SVA-errors I found in the literature, the wrong DP is part of a complex subject DP. Moreover, in all 25 cases, the verb agrees with a local DP which in 21 of the cases is specified for plural.

The reader will remember that things are somewhat different for the German errors: In my corpus, the verb happens to agree with a wrong DP within the subject DP in only 17 out of 82 SVA errors; in 14 out of these 17 cases, the wrong DP is plural. In all but one of the errors, the wrong DP is more local to the verb than the nominal head of the subject DP. The only exception is given in (4-29a). In that slip, the verb precedes the subject DP due to verb second and therefore, the agreement triggering plural DP *Wörtern* "words" is not local to the verb. In three other slips, we observe agreement of the verb with a semi-local DP, i.e. another DP intervenes between the erroneous source of agreement and the verb. In (4-29b)

e.g., the verb agrees with the plural DP *Knoten* “nodes” which, however, is followed by a PP which contains the singular DP *Schwellenwert* “threshold”.

(4-29) *Other types of German SVA-errors*

a. für jedes geäußerte Wort **müsst-en** dann [**eine Mehrzahl** an
for every uttered word must.COND-PL then a multitude of
Wört-ern] aktiviert werden
word-PL activated get
← müsst-e dann eine Mehrzahl an Wört-ern aktiviert werden
← *must.COND-SG then a multitude of word-PL activated get*

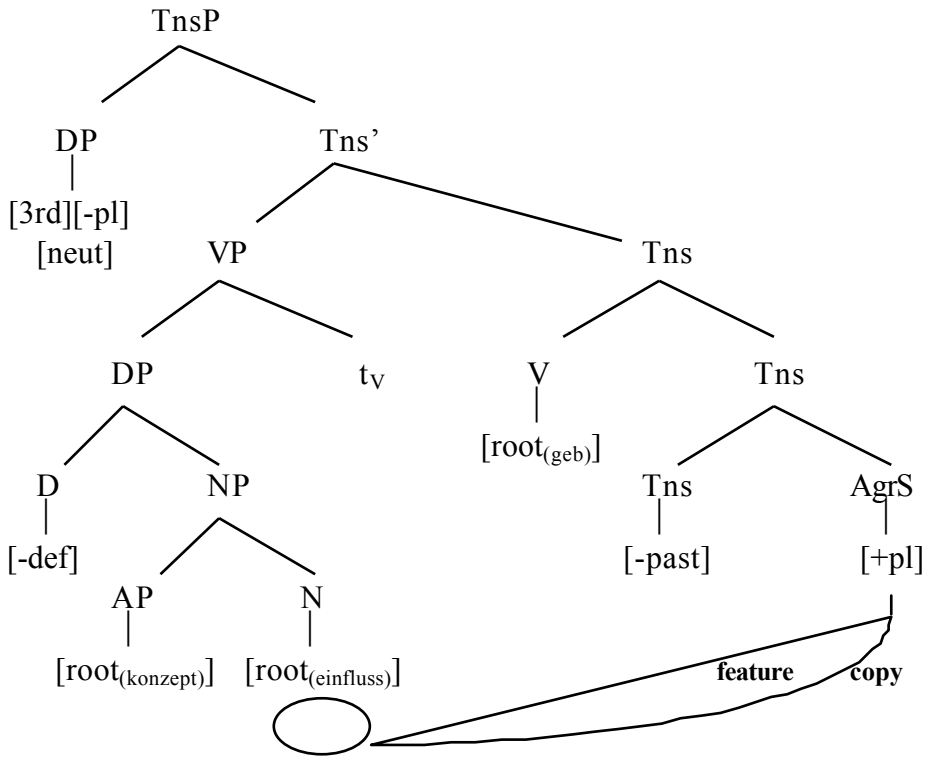
b. was passiert, wenn [**die Aktivierung** aller Knoten] unter
what happens if the activation of.all nodes under
den Schwellenwert **sink-en**
the threshold sink-PL
← wenn die Aktivierung aller Knoten ... sink-t
← *if the activation of.all nodes ... sink-3.SG*

c. dass **es** hier konzeptuelle Einflüsse **geb-en** ← dass es ... gib-t
that it here conceptual influences give-PL ← that it ... give-3.SG

In 28 errors from my collection, the verb does not agree with a DP which is part of a complex subject phrase but rather with an object DP or a DP which is part of an adjunct PP. One such case is given in (4-29c) where the verb agrees with the direct plural object *Einflüsse* "influences". The tree structure for the slip in (4-29c) is given below:

(4-29) *Feature copy from the object DP in example (4-29c)*

c'.



[+pl]

Object agreement, of course, is the rule in many spoken languages. We may therefore say that in errors such as (4-29c), the speaker relies on an agreement strategy which may not be part of the grammar of his/her language but which is very well attested in a number of natural languages.

It is, however, worth noting that from a structural point of view neither the error source in (4-28b') nor the error source in (4-29c') is in fact local to the verb. If we assume - as e.g. Nicol (1995) and Vigliocco & Nicol (1998) do - that agreement features percolate from a noun to the verb and that the above errors are due to the plural feature percolating too far, then the path the plural feature in (4-28b') and (4-29c') has to take is obviously longer than the path the respective feature from the (nominal head of the) subject DP would have to take for percolation.

It is only from a strictly linear point of view that the error sources are closer to the agreement target. Since the linear order of constituents is assumed to be crucial for many syntactic and morphosyntactic operations in the DM framework (e.g. adjacency; cf. Bobalijk (1994)), we may assume that the linear proximity of two constituents is sometimes capable of cancelling the structural prerequisites (Spec-head relation) for the establishment of agreement.

One aspect of the SVA-errors we still need to consider is the question why, for the most part, it is the plural feature of a local noun which triggers erroneous agreement. Spontaneous slips in which the verb agrees with a local singular DP - be it part of a complex subject DP or part of an object XP - are only rarely observed. In fact, there are only eight such cases in my corpus and four such cases amongst the 25 English slips. Two examples are given in (4-30). In (4-30a), the verb agrees with the DP *jemand jüngerem* "someone younger" which is part of a PP modifying the subject[93], and in (4-30b), the agreement source *problem* is part of a reduced relative clause within the subject DP.

(4-30) <u>*Agreement of the verb with a local singular DP*</u>

a. wenn es [**Texte** von jemand jüngerem] **ist** ← wenn es Texte ... sind
   if it texts of someone younger is ← *if it texts ... are*

b. [**the educational systems** needed to correct the problem] **is** lacking

[93] Alternatively, this error might be analyzed as agreement of the verb with the (non-local) expletive *es* "it".

← the educational systems ... are lacking (Bock & Cutting 1992:102)

Bock & Eberhard (1993), Nicol (1995), and Eberhard (1997) claim that the observed bias receives a straightworward explanation by assuming that there is an asymmetry in the grammatical representation underlying singular and plural count nouns. The authors

propose that the asymmetry is due to plural nouns possessing a grammatical feature for number that singular nouns lack. Thus, verb agreement is implemented by a mechanism which checks whether the head noun of the subject phrase possesses a number feature. If there is no such feature (as in the case of singular nouns), the mechanism interprets the head noun as singular by default and a singular verb is retrieved. However, if there is an activated number feature (as in the case of plural nouns), this information overrides the default assignment and a plural verb will be retrieved.

On this account, local plural nouns (as in (4-28ab) and (4-29bc)) may occasionally disrupt the agreement process because the mechanism mistakenly detects the plural feature on the local noun and retrieves a plural verb. In contrast, singular local nouns (as in (4-30ab)) do not as easily disrupt the agreement process, since they do not possess a number feature which might interfere in the agreement process.[94]

In DM terms, this means that singular nouns are not specified for number, i.e. there is no morphosyntactic feature [-plural] in List 1. Consequently, there is no such feature to be copied onto AgrS. In case AgrS is void of features when Vocabulary insertion takes place, the default item /-t/ (representing 3rd person singular) will be chosen from the Vocabulary. The Vocabulary items which compete for insertion under the AgrS node in German are listed in (4-31):

(4-31) *Vocabulary items to be inserted under AgrS in German*

a. ∅	←→	/-t/
b. [1st]	←→	/-´/
c. [2nd]	←→	/-st/
d. [+pl]	←→	/-´n/
e. [2nd][+pl]	←→	/-t/

For the SVA-errors, the line of reasoning is the same as sketched above: An intervening plural DP makes available a number feature (which may be copied onto AgrS by mistake)

[94] In her investigation, Eberhard (1997) somewhat refined Bock & Miller's original experimental setting. For instance, she compared sentence preambles like the ones in (i) and (ii):

(i) The key to the cabinets ...
(ii) **One** key to the cabinets ...

Consistent with Bock & Miller's investigation, her results showed that plural local nouns elicited more agreement errors. The new result, however, was that plural nouns were less likely to elicit erroneous agreement when the subject noun was explicitly marked as singular by a quantifier (as in (ii)) in comparison to when it remained unmarked by the determiner *the* (as in (i)). Eberhard claims that this finding supports

while an intervening singular DP has no such feature to offer. In the rare instances in which a verb happens to erroneously agree with a singular noun, we must assume that we are dealing with the unlikely case of a copy failure, i.e. no number feature whatsoever is transmitted to the AgrS node and consequently, the default value will be selected for insertion.[95]

In subsection 2.2.1, I have already pointed out that the results obtained in various experimental studies dealing with SVA in English are consistent with the pattern observed in the English spontaneous data, that is, in most of the elicited errors, the verb agrees with a local plural noun. Note that in these experiments, the only relevant morphosyntactic feature was the number feature. However, in a subsequent study, Vigliocco & Franck (1999) used a similar error induction procedure in order to investigate the computation of gender agreement between a noun and a gender marked predicative adjective in French and Italian.

In this experiment, the participants first saw an adjective in its feminine and masculine form (e.g. *rosso/rossa* "red.m/red.f"). Then a sentence preamble with a masculine or feminine noun was presented in which this noun was always followed by a local noun of different gender. Two Italian sentence preambles used in the experiment are given in (4-32):

(4-32) <u>*Sentence preambles used in the experiment by Vigliocco & Franck (1999)*</u>

a.	il	cero	in	ciesa	(e	rosso)	
	the.m	*candle(m.)*	*in*	*church(f.)*	*(is*	*red.m)*	
b.	la	macchina	nel	parcheggio	(e	rossa)	
	the.f	*car(f.)*	*in.the.m*	*parking.lot(m.)*	*(is*	*red.f)*	

---

the hypothesis that the absence of number marking for singular count nouns is a contributing factor in the asymmetry in agreement errors.

[95] Henry (1995) reports very interesting defective agreement patterns from Belfast English which can be accounted for along the same lines. In Belfast English, plural subjects may optionally occur with singular verbs, but the opposite pattern, i.e. singular subjects occurring with plural verbs, is ungrammatical. Therefore, sentences (i) and (ii) are grammatical while (iii) is not (Henry 1995:16f):

(i) The students was late.
(ii) The eggs is cracked.
(iii) *The egg are cracked.

If the insertion of singular verbs required the presence of a feature [-plural], sentences (i) and (ii) could not be explained. Obviously, it is possible in Belfast English not to copy a [+plural] feature onto Agr. Whenever this happens, the default singular form of the verb will be inserted. In contrast, example (iii) is ungrammatical since here the subject DP has no number feature to offer, but insertion of a plural verb requires the presence of a plural feature (see Mohammad (1990) for similar patterns of partial agreement in Arabic). I am indebted to Eric Fuß for bringing these data to my attention.

The participants were asked to repeat the sentence preamble and to make a complete sentence out of it using the specified adjective. As in the experiments dealing with number mismatch, it turned out that errors were induced by the local noun's grammatical gender, i.e. the subjects tended to produce errors like e.g. *il cero in ciesa e* ***rossa*** in which the adjective agrees in gender with the local noun *ciesa* "church". All the nouns used in the experiments were singular. Therefore, the only feature that was available for copy was the gender feature.[96]

A similar study which investigated the production of gender-marked pronouns in Dutch was conducted by Meyer & Bock (1999). Dutch has only two grammatical genders, one neuter (comprising those nouns that take the definite determiner *het*) and the other common (comprising those nouns that take the definitive determiner *de*). The corresponding gender-marked singular demonstrative pronouns are *dat* (neuter) and *die* (common). In the experiments, participants heard a preamble sentence like the one given in (4-33):

(4-33) *Sentence preamble used in the experiment by Meyer & Bock (1999)*

Kijk,	daar	ligt	een	aardappel	bij	een	badpak
Look	*there*	*lies*	*a*	*potato(c.)*	*next.to*	*a*	*swimsuit(n.)*

After hearing the preamble, an adjective appeared on the computer screen which was chosen such that it could only refer to one of the two nouns (e.g. *gaar* "cooked" which could only be applied to "potato"). In one experiment, the participants were asked to produce a second sentence using a demonstrative pronoun and the adjective. Consequently, for the example in (4-33), the appropriate response would be *Die is gaar* 'it.c is cooked'. The main questions were whether participants would use a pronoun whose gender is appropriate for the intended antecedent (the common noun *aardappel*) and whether the choice of pronoun would be influenced by the gender specification of an interfering (nonantecedent) noun phrase (the neuter noun *badpak*).

The results showed that gender errors on the demonstrative pronoun were more likely whenever the two nouns of the preamble had different grammatical gender. This

[96] Vigliocco & Franck's results also show that errors of gender agreement were significantly more frequent when the head noun had only grammatical gender than when it had matching grammatical and conceptual gender (like e.g. *lo sposo* 'the.m groom(m.)' where gender reflects the sex of the referent).

The role of conceptual information was further assessed in a study by Vigliocco & Zilli (1999) who conducted experiments not only with unimpaired speakers of Italian but also with two Broca's aphasics.

effect was particularly strong when the demonstrative pronoun referred to the first noun in the preamble. That is, following a preamble like the one in (4-33), subjects showed a tendency to respond with the odd sequence *Dat is gaar* 'it.n is cooked', implying that it is the swimsuit which was cooked. So, once again, we are dealing with a case of local agreement, viz. between-sentence agreement of a demonstrative pronoun with a DP which is part of an object PP.

Interestingly, there are three slips in my corpus which are comparable to the errors elicited by Meyer & Bock (1999), i.e. errors in which a demonstrative pronoun agrees in gender with a local DP. Two of these slips are given in (4-34).

(4-34) *Agreement of demonstrative pronoun with local DP in German*

a. [**das** **Dilemma** bei der ganzen Sache] ist **die**,
the.n *dilemma(n.)* *about* *the.f* *whole* *matter(f.)* *is* *that.f*
dass man überhaupt nicht weiß ...
that *one* *at.all* *not* *knows ...*
← das Dilemma ... ist das, dass ...
← *the.n* *dilemma(n.) ...* *is* *that.n* *that ...*

b. [**die** **Farbe** des Rocks] ist genau **der,** **den**
the.f *colour(f.)* *of.the.m* *skirt(m.)* *is* *exactly* *the.one.m* *which.m*
ich suche, äh, ist genau die, die ich suche
I *look.for,* *er,* *is* *exactly* *the.one.f* *which.f* *I* *look.for*

In (4-34a), the demonstrative pronoun *die* agrees in gender with the feminine local noun *Sache* "matter", while in (4-34b), the demonstrative pronoun *der* as well as the accusative relative pronoun *den* agree in gender with the local masculine noun *Rock* "skirt". In both cases, the local nouns are part of a complex subject DP, viz. a PP and a genitive complement, respectively.

In this subsection, I have considered different instances of local agreement in German and English slips of the tongue. In the German examples I discussed, the verb either agrees with a DP which is part of a complex subject DP (i.e. a genitive or PP complement modifying the head), with a direct object DP, or with a DP which is part of a PP adjunct. Interestingly, for all three types of errors, we observe a striking tendency of agreement with a plural noun. Within DM, this tendency is accounted for by assuming that singular

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Moreover, Vigliocco & Zilli investigated if morphophonological regularities of gender marking have an influence on the occurrence of agreement errors.

nouns are not specified for a number feature. Therefore, they are not as likely to interfere with the agreement process. Moreover, I have reported data from experimental studies which verify that local agreement is also observed concerning the gender feature in languages such as French and Italian (gender agreeing adjectives) as well as Dutch (gender agreeing pronouns).

4.4.2 *Taking the Long Way: Long-Distance Agreement*

While defective agreement of a verb with a local noun is probably the more expected case, there is also a number of errors in my collection in which the verb happens to agree with a noun that is more distant to the verb than the actual subject of the sentence. One such case was given in (4-29a) above in which - due to a topicalized object PP - the verb is not local to the agreement source.

However, in all the errors discussed in subsection 4.4.1, the verb erronously agrees with a DP which is not assigned nominative case. The slips which I am going to discuss in this subsection are different in that the agreement feature is copied onto AgrS from a nominative DP; that is, a wrong subject is selected for copy of the agreement feature. In my corpus, there are 22 such cases. In 18 of these, the verb agrees with a non-local subject, i.e. either with the subject of a matrix clause, the subject of an embedded clause, or with the subject of the second conjunct in a coordination structure.

One of the four exceptions is given in (4-35). In that error, the verb *sein* "to be" is inflected for 2nd person singular. Obviously, these features have been transmitted from the pronoun *du* "you" which is part of a comparative construction within an adverbial phrase. In that construction, the pronoun receives nominative case.

(4-35) *Agreement of verb with wrong but local nominative DP*

das	gab's	noch	nie,	dass	**ich**	später	als	du	aufgestanden	**bist**
that	*gave.it*	*yet*	*never*	*that*	*I*	*later*	*than*	*you*	*got.up*	*be.2.SG*
←	dass	ich	später	als	du	aufgestanden	bin			
←	*that*	*I*	*later*	*than*	*you*	*got.up*	*am*			

"That never happened before, that I got up later than you did."

In the other 18 slips, however, the wrong nominative DP the verb agrees with is not local to the verb; in the following, I will refer to these instances as "long-distance agreement".

The first cases I wish to discuss are those in which either a matrix verb agrees with the subject of an embedded clause or the verb of an embedded clause agrees with a matrix subject. Long-distance agreement is exemplified by the four slips in (4-36).

In (4-36a), the verb *angehen* "to start" of the topicalized conditional sentence agrees with the matrix subject. Note that this example might also be analyzed as a phonological anticipation; such an analysis, however, is not available for the other three errors in (4-36). In (b), the verb *sein* "to be" of the embedded sentence receives its [+plural]-feature from the subject pronoun of the matrix clause, while in example (c), the verb of the relative clause anticipates the agreement features of the matrix subject *ich* "I". In the anticipation in (d), the situation is just the other way round: Here, the verb of the matrix clause (*wissen* "to know") agrees with the subject of the embedded clause.

(4-36) *Long-distance agreement in speech errors*

a. wenn das Auto nicht angeh-**st**,
when the car not start-2.SG
wenn das Auto nicht angeh-t, schieb-st du
when the car not start-3.SG push-2.SG you

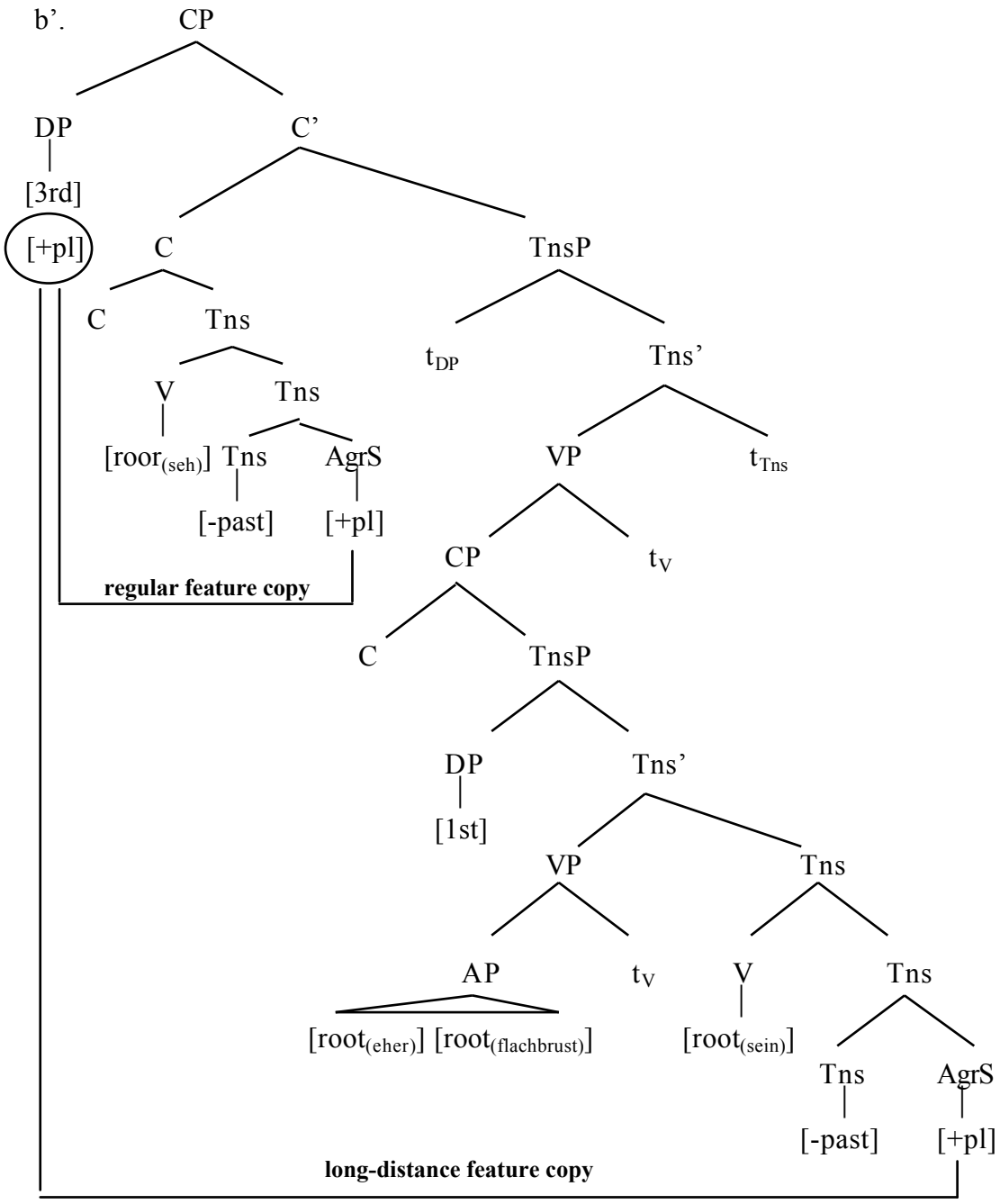
b. sie seh-en, dass **ich** selbst eher flachbrüstig **sind**
they see-PL that I myself more flat-chested be-PL
← dass ich selbst eher flachbrüstig bin
← *that I myself more flat-breasted be-1.SG*

c. für das ganze Tohuwabohu, **das** in unser Leben gekommen **bin**,
for the whole chaos that in our life come be-1.SG
dank-e ich ihm eigentlich
thank-1.SG I him actually
← das ganze Tohuwabohu, das in unser Leben gekommen ist
← *the whole chaos that in our life come be-3.SG*
"I actually thank him for all the chaos that has come into our life."

d. **ich wiss-t**, dass ihr nicht Recht hab-t ← ich weiß, dass
I know-2.PL that you.PL not right have-2.PL ← I know.1.SG, that

Below, you will find a syntactic structure for the error (4-36b). Since the matrix as well as the embedded verb happen to agree with the matrix subject, we must assume that the agreement features of the matrix subject are copied twice. The same is, of course, true for the other three examples in (4-36); in all of them two verbs agree with one subject DP, be it the one of the matrix or the one of the embedded clause.

(4-36) *Agreement copy in example (4-36b)*



It is worth pointing out that long-distance agreement phenomena, as unusual as they may seem, are not unattested in spoken languages. Below, I will present some informative data from Godoberi and Tsez, two Daghestanian languages spoken in the northeastern part of the Caucasus which - according to Haspelmath (1999) - are not closely related to each other.

In Godoberi, matrix verbs may agree in gender and number with the absolutive (direct object) argument of a complement clause. Haspelmath (1999) refers to these constructions as "long-distance agreement", pointing out that he uses the term in a pretheoretical sense, referring to a phenomenon that involves an unusually great distance between the agreement controller (i.e. the source of agreement) and the agreement target. He also points out that only two kinds of sentential complements, viz. converbal (used with the complement-taking verbs "begin" and "finish") and infinitival complements, ever show long-distance agreement. Two examples involving infinitival complements are given in (4-37). As you can see, in both examples, the matrix verb *e?uc‡* "to forget" is gender/number-marked for the absolutive neuter argument *gyazeti* "newspaper" of the embedded clause (CONT = contessive case).

(4-37) *Long-distance agreement in Godoberi (Haspelmath 1999:131)*

a. ¿ali-c‡'u gyazeti b-ax-i **b**-e?uc‡-a
Ali-CONT [paper.ABS n-take-INF] n-forget-AOR
"Ali forgot to buy a newspaper."

b. ¿ali-c‡'u gyazeta-be r-ax-i **r**-e?uc‡-a
Ali-CONT [paper-PL.ABS PL.n-take-INF] PL.n-forget-AOR
"Ali forgot to buy newspapers."

A similar phenomenon is observed in Tsez (Polinsky & Comrie 1999). Tsez has four noun classes. Noun class (as gender in German) is a covert category which, however, shows itself in agreement prefixes on verbs, modifiers and demonstrative pronouns. An important restriction is that verbal agreement can only be triggered by a DP with absolutive case. In those cases where the absolutive argument of a verb is expressed by a sentential complement, Tsez offers two possibilities for agreement: either the matrix verb agrees with the sentential complement as a single complex NP, thus assigning it class 4, or the matrix verb agrees with the absolutive nominal inside the complement clause, as illustrated by (4-38a). In this example, class 3 agreement on the matrix verb can only be triggered by the absolutive DP *magalu* "bread" within the sentential complement (note that in Tsez, most proposition-attitude verbs (such as "to know") take the experiencer argument in the dative). Example (4-38b) shows that Tsez also permits long-distance agreement out of

infinitival constructions: class 2 agreement on the predicative adjective *igu* "good" is triggered by the embedded absolutive argument *kaγat* "letter".[97]

[97] Similar cases of long-distance agreement (sometimes also termed "agreement climbing") have been reported for Hunzib, another Daghestanian language (Van den Berg 1995), for Hindi-Urdu (Wunderlich 1994), and Chukchee (Spencer 1991).

(4-38) *Long-distance agreement in Tsez (Polinsky & Comrie 1999:117,121)*

a. eni-r uz‡-a magalu b-ac'-ru-λi **b**-iy-xo
mother-DAT [boy-ERG bread.ABS.3 CL3-eat-PSTPRT-NMLZ] CL3-know-PRES
"The mother knows that the boy ate the bread."

b. z‡a kaγat cax-a **y**-igu zow-si
[this letter.ABS.2 write-INF] CL2-good be-PAST
"It was good to write that letter."

I should stress that by citing the examples in (4-37) and (4-38), I do not wish to claim that the erroneous copy process in the German speech errors and regular long-distance agreement in Godoberi and Tsez are the same thing. In fact, they are definitely not. First of all, long-distance agreement in the two Daghestanian languages is restricted to certain syntactic constructions (in Tsez, for instance it is impossible if the embedded clause has an overt complementizer or if it contains a wh-word). Secondly, regular long-distance agreement is always agreement of a matrix verb with an embedded DP. This, however, is not true for the slips of the tongue, as is exemplified by the examples in (4-36).

Still, I take the Daghestanian examples to be illuminating in that they illustrate that verbal agreement in natural languages is not necessarily confined to a single clause. Rather, agreement features may be transferred across clause boundaries, and it is exactly this kind of transfer which also manifests in the speech error data.

The same restriction also holds for the second type of erroneous long-distance agreement I want to discuss. In this type of error, two clauses are conjoined in a coordination structure and the verb of the first conjunct mistakenly agrees with the subject of the second conjunct. That is, we are not dealing with a relation between a matrix and an embedded clause here; rather, the two clauses involved are of the same kind. I am referring to this special case of long-distance agreement as "anticipatory agreement". There are only four such errors in my collection, two of which are given in (4-39). In (4-39a), two TnsPs are coordinated while in (b) two CPs are involved in the error.

(4-39) *Anticipatory agreement in speech errors*

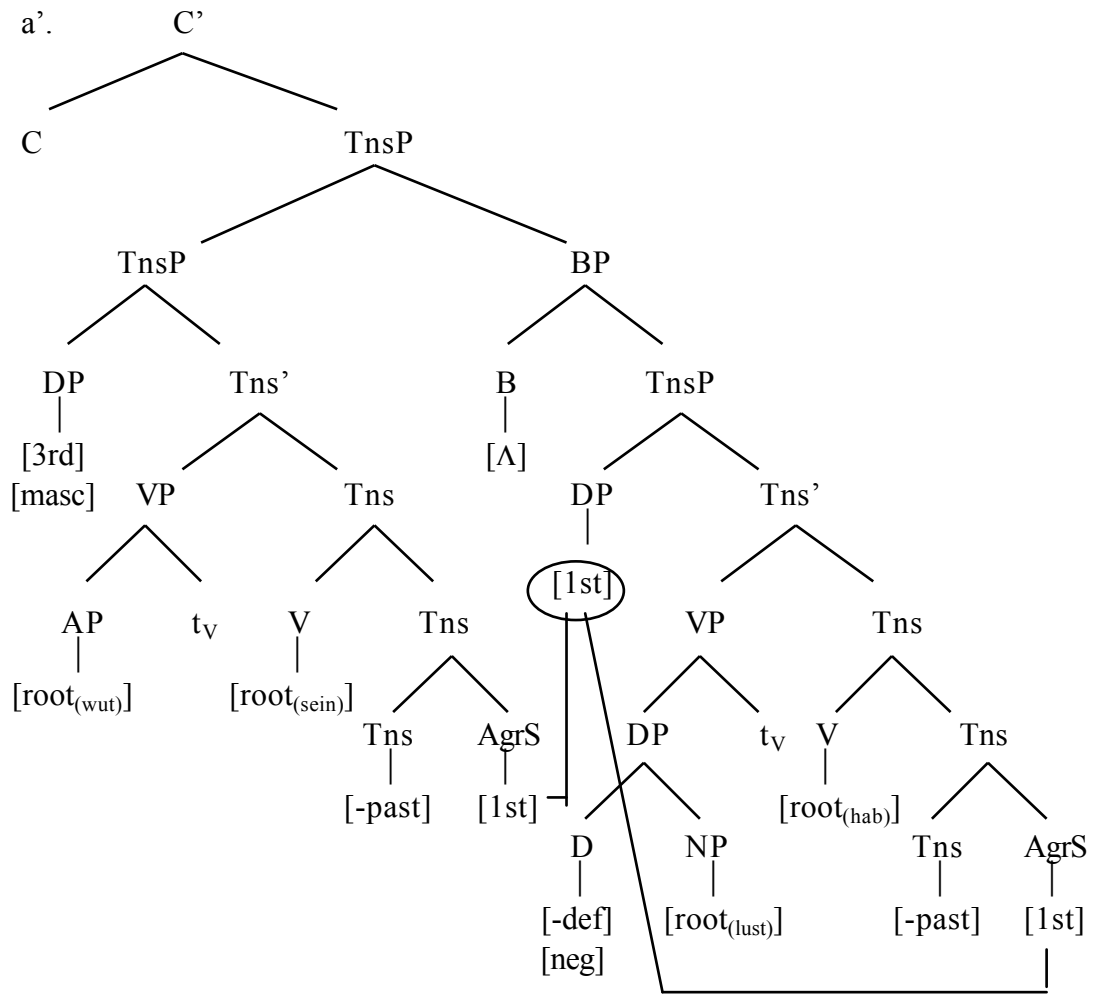
a. weil **er** wütend **bin** und ich keine Lust hab'
because he angry be-1.SG and I no inclination have-1.SG
← weil er wütend ist
← *because he angry be-3.SG*

b. wir schuft-**est** und du vergnüg-st dich ← wir schuft-en

we graft-2.SG and you enjoy-2.SG yourself ← we graft-1.PL

A syntactic structure for the agreement anticipation in (4-39a) is given in (4-39a'). Presumably, we are dealing with a coordination of two TnsPs, with the second conjunct being adjoined to the first. In the error, the agreement feature of the second conjunct subject is copied onto both verbs.[98]

(4-39) *Agreement copy in example (4-39a)*



Interestingly, anticipatory agreement, too, is attested as being a regular mechanism in a number of spoken languages. Below, I present some examples from the two Papuan Highland languages Tairora and Fore.

[98] In the tree structure (4-39a'), BP stands for Boolean Phrase, the head of which may be occupied by Boolean operators such as *und* "and", *oder* "or", and *sowie* "as well as". For further aspects of the syntax of coordination cf. Hartmann (2000).

In Tairora (Vincent 1973; McKaughan 1973), for instance, first conjunct verbs in a coordination structure which have an actor different from the actor of the second conjunct verb require not only a (portmanteau) suffix which indicates person and number of their own actor as well as tense; they also require an anticipatory actor suffix, i.e. a suffix which specifies person and number of the actor of the following verb. Therefore, in (4-40a), the suffix *-manta* indicates that the actor of the second conjunct is first person singular while the suffix *-ro* in (4-40b) makes clear that the third person singular actors of the two conjuncts are not the same. In the following examples, all anticipatory actor suffixes are in bold-face.

(4-40) *Anticipatory agreement in Tairora*

a. t-i-**manta** ir-una-ra
say-3.SG.PAST-1.SG *hear-1.SG.PAST-FOC*
"He spoke and I heard." (Vincent 1973:572)

b. na-iba-**ro** bi-ro
eat-3.SG.PAST-3.SG *go-3.SG.PAST*
"He$_1$ ate and he$_2$ left." (McKaughan 1973:592)

The different-actor dependent verbs of Fore (Scott 1978) are somewhat more complex in that they require the presence of the conjoiner morpheme (or dependent verb suffix) *-ki*. In Fore, marking for switch-reference is achieved through the use of a specific pronominal subject morpheme which indicates the subject of the verb, the tense of the verb, and also that the subject of the following conjoined verb will be different. This switch-reference subject morpheme is followed by the conjoiner morpheme *-ki* which in turn is followed by another suffix which anticipates the subject of the next clause. The anticipatory agreement suffix *-nisí* in (4-41a) e.g. indicates that the subject to follow is second person dual. The more complex example in (4-41b) illustrates that in fact every verb containing a conjoiner morpheme must also include an anticipatory subject marker.[99]

(4-41) *Anticipatory agreement in Fore (Scott 1978:121,125)*

a. kana-isí-ki-**nisí** a-ka-'kubu-a:s-e
come-3.DL.FUT.SWREF-CONJ-2.DL *3.SG.OBJ-see-FUT-2.DL-IND*
"They(dual) will come and you (dual) will see it."

[99] Similar clause chaining strategies are observed in Awa (Loving & McKaughan 1973) and Hua (Haiman 1980). Cf. Foley (1986:175ff) for a comprehensive survey of clause chaining in Papuan languages.

b. kana-a:-ki-**ni'** ka-ka-í-ki-**na'**
come-2.SG.FUT-CONJ-3.PL *2.SG.OBJ-see-3.PL.FUT-CONJ-2.SG*
u-wai-mu-'kubu-a:N-e
say-3.PL.OBJ-give-FUT-2.SG-IND
"When you come and they see you, you shall tell (it) to them."

Actually, the Papuan examples more closely resemble the speech error data than did the Daghestanian examples. That is, the structural conditions for anticipatory agreement are the same for the regular and the erroneous process. Moreover, agreement features are always anticipated but never perseverated in coordination constructions. Still, it is noteworthy that

in the speech errors, anticipatory agreement overrides regular subject agreement while in the Papuan examples, anticipatory agreement supplements regular subject agreement, i.e. in Tairora and Fore, the first conjunct verbs are inflected for their own subject as well as for the subject of the second conjunct. Such double marking is not observed in the errors; that is, there is no error like e.g. *wir schuft-en-**st** und du vergnüg-st dich* 'we graft-PL-2.SG and you enjoy-2.SG yourself'.

In the preceding two subsections, I have been considering processes of feature copy in subject-verb agreement errors. We have seen that in the German errors, verbs may not only exhibit defective agreement with a local DP - be it part of a complex subject DP or part of an object phrase - but also with the subject of another clause. Agreement of a verb with its object is, of course, also attested in many spoken languages. But some of the long-distance error patterns, too, have interesting parallels in various natural languages. For instance, long-distance agreement of a matrix verb with an argument of an embedded clause is attested in some Daghestanian languages while anticipatory agreement of a first conjunct verb with a second conjunct subject is observed in some languages spoken in Papua New Guinea.

In the following subsection, I will be concerned with the interaction of syntactic transformations and agreement feature copy. In particular, I will be considering the question if the DM idea of post-syntactic implementation of agreement nodes is supported by the error data.

4.4.3 *Transformations and Feature Copy*

In section 1.2.2, I have already discussed some psycholinguistic studies which are concerned with the psychological reality of syntactic transformations. Fay (1980a,b), for instance, cites a number of errors which he takes to be best analyzed as the result of the wrong or non-application of a transformational rule. Consider e.g. the following slip:

(4-42) <u>*Non-application of a transformational rule*</u>

Look at those clouds are moving [**how fast**]
← Look at how fast those clouds are moving (Fay 1980b:114)

The above error is analyzed by Fay (1980b) as involving an incorrect decision not to apply a rule. In particular, wh-fronting has not applied so that the wh-phrase *how fast* appears in

its deep structure position. Fay claims that the position of the wh-phrase in the error follows naturally from a transformational explanation, since an element not moved by a transformation must remain in its deep structure position.

Syntactic transformations and their interaction with slips of the tongue are the topic of this subsection. I will, however, not be dealing with transformational errors of any kind. Rather, I am going to investigate the interplay of syntactic movement and agreement feature copy. In the model of language production sketched in section 4.1 (Garrett 1975ff; Levelt 1989), agreement is assumed to be computed at the level of grammatical encoding (functional level). At this level, lemmas are retrieved from the mental lexicon (depending on the message the speaker wants to convey) and are assigned to slots in a hierarchical structure. That processing stage is followed by the stage of phonological encoding at which the phonological form of a sentence is spelled out.

So far, as we have seen, the course of processing is very well compatible with DM ideas, since in DM, too, the assignment of phonological forms (Vocabulary items) follows all processes of grammatical encoding. Pictures diverge, however, with regard to the precise locus of agreement computation. Within many syntactic and psycholinguistic theories (Chomsky 1981; Kempen & Hoenkamp 1987; Levelt 1989), it is assumed that agreement is computed during the construction of the hierarchical structure. But this is not true within the DM framework. Remember that in DM, late insertion of agreement nodes is assumed. Agreement nodes are adjoined to functional nodes at the level of Morphological Structure, that is, after syntactic operations have taken place but before Vocabulary insertion is executed.

This assumption has important consequences for the interpretation of speech error data. In particular, a DP which is local to a verb at deep structure may be separated from the verb by a syntactic movement operation, i.e. it is no longer local to the verb when agreement feature copy takes place at Morphological Structure. Linear proximity of a verb and a DP is, of course, not a prerequisite for agreement processes to take place. For SVA-errors, however, my prediction is that whenever the verb happens to agree with a wrong DP, the agreement error is due to the fact that the wrong DP is linearly closer to the verb at surface structure than the 'true' subject DP.

Unfortunately, there are only a few errors in my corpus which are informative in that context. First of all, 61 out of the 82 SVA-errors occur in embedded clauses in which no XP-movement has applied (except for movement of the subject DP from SpecvP to SpecTnsP). As is well-known, word order in German embedded clauses (SOV) is the

underlying word order. Therefore, in example (4-43a), the plural DP *Vergebärdler* "slips of the hand" which is a genitive complement within the subject DP is local to the verb at deep and at surface structure, i.e. at both levels, there is no other DP that is (linearly) closer to the verb. And even in a derived matrix clause (which would read *ein Teil der Vergebärdler sind dadurch entstanden*), the plural DP *Vergebärdler* would still be local to the verb. Only the former observation but not the latter is true for the agreement error in (4-43b) in which the verb agrees with the plural DP *Linguistiksätze* "linguistic sentences" which is part of an object PP. In this example, the singular demonstrative pronoun *das* "that" would be closer to the verb than the plural DP *Linguistiksätze* in the corresponding matrix clause *das sind mit Linguistiksätzen ab und zu so*.

(4-43) *SVA-errors in embedded clauses*

a. dass **ein Teil** der Vergebärdler dadurch entstanden **sind**, äh, ist
that a part of.the slip.of.the.hand.PL from.that resulted are, er, is

b. dass **das** mit Linguistiksätz-en ab und zu so **sind**
that that with linguistic.sentence-PL from time to time like.that are
← dass das ... ab und zu so ist
← *that that ... from time to time like.that is*

Moreover, there are six instances of matrix clause errors in my collection in which the error-triggering DP is local to the verb before and after XP movement has taken place. In (4-44a), the verb agrees with a plural DP inside the subject DP and in (b), the verb agrees with a topicalized object DP.

(4-44) *The agreement triggering DP is local at surface and deep structure*

a. **ein Ende** der Unruhen **sind** nicht abzusehen
an end of.the disturbances are not in.sight
← ein Ende der Unruhen ist nicht abzusehen
← *an end of.the disturbances is not in.sight*

b. die unschönen Sachen **vergess-en** **ich**, vergess-e ich
the not.nice things forget-PL I forget-1.SG I
meist ziemlich schnell
mostly quite fast
"Mostly, I forget the unpleasant things quite fast."

One particularly interesting property of the error in (4-44a) is that the DP which passes on its agreement feature to the verb is *more* local, i.e. adjacent, to the verb at surface structure. The deep structure of sentence (a) is ***ein Ende*** *der Unruhen nicht abzusehen* ***sind***. In (4-44b), the plural DP *die unschönen Sachen* is adjacent to the verb at deep and surface structure. The deep structure of sentence (b) reads ***ich*** *meist ziemlich schnell die unschönen Sachen* ***vergessen***. In the syntax, both verbs raise to Tns and then to C; in (a), the subject subsequently raises from SpecTnsP to SpecCP, while in (b), it is the direct object which moves to SpecCP. It is only after these movement operations have taken place that agreement nodes are implemented and features are copied onto AgrS.

Even more illuminating are, of course, those cases in which the erroneous agreement source is not local at deep structure - i.e. another DP with different number specification intervenes between that DP and the verb at that level - but is proximal to the verb at surface structure. In my corpus, there are seven such cases. Consider e.g. the error in (4-45a). At surface structure, the PP which contains an enumeration of three plural nouns is adjacent to the verb *suchen* "to look for". At deep structure, however, the singular DP *den Weg* "the way" appears between the subject phrase and the verb (***eine endlos lange Schlange*** *von Transportern, Lastwagen und anderen Fahrzeugen den Weg* ***hinaussuchen***). The slip in (4-45b) has different characteristics. Note that this is an embedded clause in which XP-movement (extraposition) has applied. Due to the extraposed relative clause, the object DP *Sachen* "things" is proximal to the verb at surface structure. At deep structure, this relative clause separates the DP and the verb and therefore, the singular DP *Arbeit* "work" is closest to the verb at that level (*weil* ***da*** *öfters über Sachen, die für seine Arbeit wichtig sind, geredet* ***wurden***).

(4-45) *Verb agrees with local DP on surface structure*

a. **eine endlos lange Schlange** von Transportern, Lastwagen und anderen
an endless long line of transporters, trucks and other
Fahrzeugen **such-en** den Weg hinaus
vehicles look.for-PL the way out
← eine endlos lange Schlange von Transportern ... such-t ...
← *an endless long line of transporters ... look.for-3.SG ...*

b. weil **da** öfters über Sachen geredet **wurden**, die für seine
because it quite.often about things talked were which for his
Arbeit wichtig sind ← weil da ... geredet wurde
work important are ← because it ... talked was

c. What things **are this kid**, is this kid going to say correctly?
(Levelt & Cutler 1983:206)

An English slip with similar properties is given in (4-45c). In that utterance, wh-movement of the direct object *what things* has applied. Due to that movement operation, the auxiliary *to be* appears adjacent to the plural noun *things*. At deep structure, however, adjacency of the agreement source and the auxiliary is not given, the deep structure of that sentence being ***this kid are*** *going to say what things correctly*.[100]

Therefore, the prediction made above is borne out. The errors cited in (4-45) - and to a lesser extent the one given in (4-44a) - suggest that agreement is computed after syntactic operations have been executed. As argued above, this is exactly the view taken by DM where agreement nodes are assumed to be inserted at the postsyntactic level of Morphological Structure.

There are only two slips in my corpus which point to the opposite direction, that is, slips in which the DP transmitting its agreement feature is local to the verb only at deep structure. Consider, for instance, example (4-46a). Once again, we are dealing with an extraposed relative clause here. The matrix verb *sein* "to be" agrees with the subject *er* "he" of the relative clause which is local to the verb only at deep structure (*wenn* ***zwanzig Sprachen****, die er untersucht hat, so* ***ist***).[101] In (4-46b), the comparative phrase *wie du* "as you" has been extraposed out of an object DP, i.e. the underlying structure of that sentence reads *weil* ***sie*** *fast wortgetreu dasselbe wie du gesagt* ***hast***. Therefore, the pronoun *du* "you" is proximal to the verb only at deep structure.

(4-46) *Verb agrees with local DP on deep structure*

a. wenn **zwanzig Sprachen** so **ist**, die er untersucht hat
when twenty languages like.that is which he investigated has
← wenn zwanzig Sprachen so sind
← *when twenty languages like.that are*

b. weil **sie** fast wortgetreu dasselbe gesagt **ha-st** wie du,

[100] In two slips from my collection, the DP that is local to the verb is a different one at deep and at surface structure. However, the important difference to the errors given in (4-45) is that both local DPs are plural. Consider, for example, the following error: ***die Höhe*** *ihrer Unterhaltszahlungen* ***richt-en*** *sich nach der Höhe ihrer Einkünfte* 'the size of.your maintenance.payments depend-PL REFL on the size of.your income' where the plural noun *Unterhaltszahlungen* "maintenance payments" is adjacent to the verb at surface structure but the plural noun *Einkünfte* "income" is adjacent to the verb at deep structure.

[101] Note that (4-46a) might also be analyzed as a blend of the two competing frames *wenn zwanzig Sprachen so sind* 'when twenty languages like.that are' and *wenn es in zwanzig Sprachen so ist* 'when it in twenty languages like.that is'.

because she almost verbatim the.same said have-2.SG as you,
dasselbe gesagt hat
the.same said has

The remaining four SVA-errors in matrix clauses are blends which are not informative in the present context, since in blends, no triggering local or non-local DP is involved.

I therefore conclude that the local SVA errors in my corpus - except for the ones given in (4-46) - are compatible with DM assumptions.[102] That is, the verb tends to erroneously agree with a DP which is local to it either at deep and at surface structure or at surface structure only. We may therefore assume that the implementation of agreement nodes is in fact executed only after syntactic movement operations have taken place, i.e. at the level of Morphological Structure. Due to the scarcity of relevant errors, however, one should acknowledge that the above slips do not constitute particularly strong evidence for or against one or the other hypothesis concerning the locus of agreement implementation.

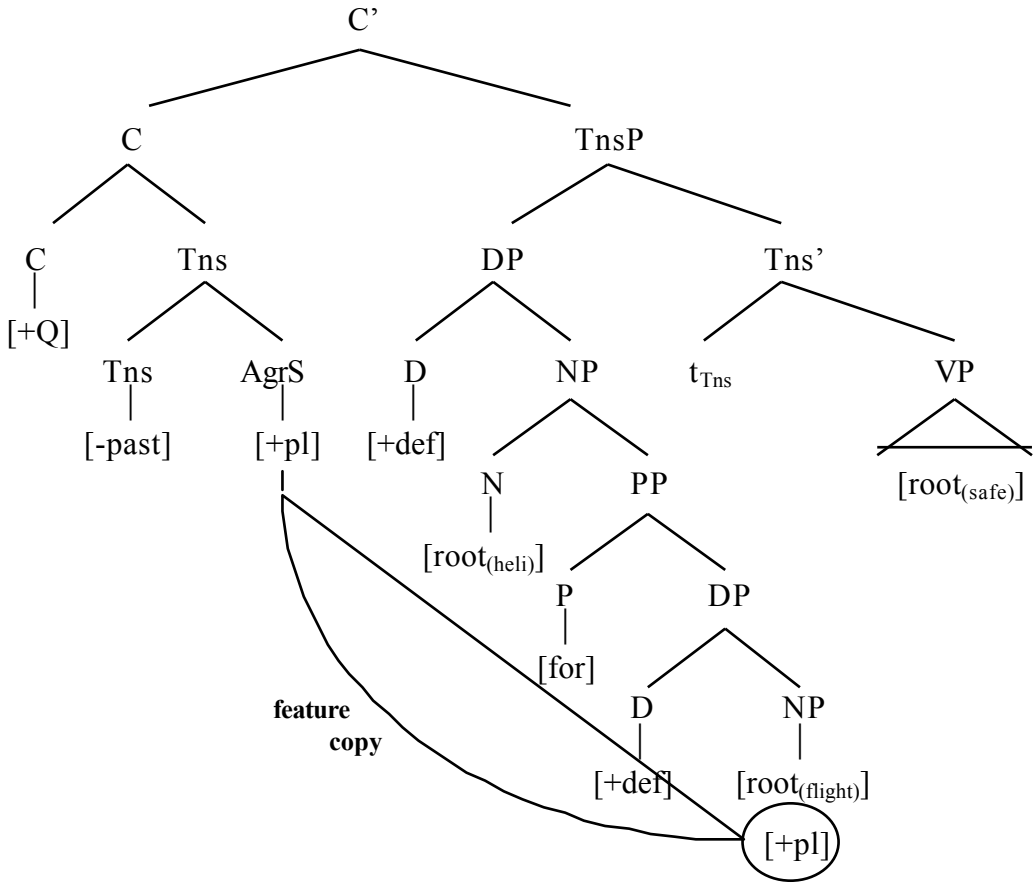
The influence of surface adjacency on SVA-errors was also assessed in an experiment conducted by Vigliocco & Nicol (1998). In a first experiment, in which participants were presented the familiar Bock & Miller-style sentence preambles (e.g. *the helicopter for the flights*), Vigliocco & Nicol were able to replicate the asymmetrical distribution of errors following singular vs. plural local nouns reported in the earlier studies. In a second experiment, however, participants were asked to make up questions from the material used in experiment 1. That is, they saw, for example, the adjective *safe* and then the phrase *the helicopter for the flights* and their task was to form the question *Is/was the helicopter for the flights safe?*

Interestingly, the frequency and distribution of agreement errors in the two tasks were similar although in the second experiment - due to subject-auxiliary inversion - the verb was not local to the plural noun. The fact that the participants tended to produce proximity concord errors like e.g. ***Are the helicopter*** *for the flights safe?* suggests that indeed linear proximity of the local noun to the verb does not matter. Therefore, Vigliocco & Nicol hypothesize that the errors arise as a consequence of syntactic proximity, i.e. deep

[102] Remember that different structural prerequisites hold for the long-distance agreement errors from my corpus discussed in subsection 4.4.2. Apparently, long-distance agreement is possible only when the agreement triggering DP has a certain case specification, viz. nominative case. As we have seen, the same is true for regular long-distance agreement in the Daghestanian languages which is observed only with absolutive arguments.

structure proximity. A surface structure representation for the erroneous response cited above is given in (4-47):

(4-47) *SVA-error in yes/no-question (Vigliocco & Nicol 1998)*



According to DM, the auxiliary which is base-generated under Tns raises and adjoins to C in the syntax and AgrS will be inserted as sister node of Tns at MS. Obviously, the plural noun *flights* is not local to AgrS when copy of the agreement feature takes place. This noun is only local to the agreement node if we assume that agreement is actually computed before Tns-to-C movement applies.

Therefore, the agreement errors elicited in the second experiment by Vigliocco & Nicol (1998) are not consistent with the spontaneous speech error data from my corpus. One may, however, question the validity of the experimental paradigm. First of all, while the errors obtained in the sentence completion task (experiment 1) resemble English errors from spontaneous speech (cf. subsection 2.2.1.2), evidence for spontaneous SVA-errors occurring in producing yes/no-questions is scanty if not non-existent. Possibly, in the experimental setting, participants use an agreement strategy that is different from the on-line strategy used in spontaneous speech. Since the participants knew that they were to produce a question, we may, for example, hypothesize that they were already computing an inflected auxiliary while the sentence preamble appeared on the computer screen

(duration: one second) and that they subsequently used that auxiliary in question formation after the preamble disappeared. That is, they were in fact computing the auxiliary for the declarative sentence and not for the syntactic question structure given in (4-47).

Consequently, the errors elicited in Vigliocco & Nicol's second experiment do not represent unambiguous counterevidence to the DM analysis sketched above for the spontaneous speech errors. I therefore conclude that in the light of the slip data, late insertion of Agr nodes at MS and subsequent feature copy can and should be assumed.

4.5 Local Licensing of l-Nodes in Language Production

My soul will rejoice
when your lips speak what is right.
(Proverbs 23,16)

Traditionally, many theories of (morpho)syntax emerging from Chomsky (1981) and subsequent work rely on the assumption that syntactic categories such as N, V, and A - each possibly being a combination of features of a more abstract sort (Chomsky 1970) - are labels of items in the lexicon and that these categories are also essential in building syntactic tree structures following an X-bar scheme. That is, nouns which are inserted into a terminal node project a noun phrase, verbs project a verb phrase, and so on.

As already pointed out in chapter 3, Distributed Morphology departs from this view in that words are not equated with syntactic terminals. Rather, phrase markers are constructed freely out of a set of universal abstract features such as tense, number, person, definiteness and so forth. Consequently, different argument structures are not determined by properties of lexical items - since presumably there is no such such thing as a "lexical item" within the computational system - but rather by different syntactic configurations.

In addition to that, Harley & Noyer (1998a,b) investigate the interesting possibility that categorial features are not amongst the features drawn from the universal set in order to enter the computational system. They adopt the view that syntactic terminals are of two basic types. The first type of terminal node consists of feature bundles for which the speaker has no choice regarding Vocabulary insertion; these are called "f-nodes". For the second type, which they call "l-nodes", a speaker's choice of Vocabulary item is not constrained in such way. Most importantly, l-nodes are not specified for syntactic category; that is, there is only one type of l-node whose categorial status is determined by

its syntactic context. l-nodes are said to be licensed in a given syntactic context, i.e. they are locally licensed by c-commanding f-nodes.

In subsection 3.2.1, I have already given an illustration of that assumption involving the different uses of the verb *sinken* "to sink". The same line of reasoning can be applied to the (acategorial) root *explode* (adopted from Harley & Noyer (1998a)). In any case, [root$_{(explode)}$] will be inserted into an l-node which heads an LP, this LP being locally licensed by a light verb. In its transitive use (as in *The terrorists exploded the embassy*), the l-node combines with a CAUSE morpheme in the head of the light verb phrase. The specifier of the vP is filled by an external argument while the complement of LP is filled by a direct object DP. In the intransitive unaccusative use (as in *The embassy exploded*), however, the light verb morpheme heading little v must be something like BECOME. Choosing BECOME as the head of vP will preclude the possibility of having an external argument in SpecvP (since BECOME does not select an external argument). Rather, *embassy* is an internal argument of the l-node. The chart in (4-48) displays the different choices for the available slots in a vP-structure. It also shows that for a verb like *give*, we must assume that all three DP slots are filled:[103]

(4-48) *Choices for slots in vP/LP-structure*

Verb	**SpecvP**	**v**	**SpecLP**	**CompLP**
explode (tr)	DP	CAUSE	Ø	DP
explode (intr)	Ø	BECOME	Ø	DP
give	DP	CAUSE	DP	DP

In this section, I will consider the consequences of abandoning lexical categories from a psycholinguistic point of view. As pointed out earlier (section 4.1), within psycholinguistic models of language production, it is assumed that lemmas, i.e. those items which are selected from the lexicon at the functional level in a first step of lexical retrieval, bear a category label. As we will see, abandoning these labels has important implications for a theory of language production.

[103] Harley & Noyer (1998a) point out that, since linear relations play no role in the syntax, there can be no distinction between an LP with just a complement and an LP with just a specifier, the sisterhood relation between the head and its single argument being identical in both cases after Merge has applied. Consequently, they note all these examples as having a complement only.

In the following, I will first have a look at how insertion of Vocabulary items into appropriate slots is achieved (subsection 4.5.1). We will see that Vocabulary items must be specified for certain context features in order to allow for their appropriate assignment to terminal nodes. In subsection 4.5.2, I am going to present some speech error data which receive a straightforward explanation under the assumptions that roots are acategorial in nature. However, there are also some problematic cases; these will be subject to discussion in subsection 4.5.3.

4.5.1 *Local Licensing of Vocabulary Items*

Following the assumption that terminal nodes as well as Vocabulary items lack categorial information, there must, of course, be another way to constrain the insertion of Vocabulary items into terminal nodes in a principled way in order to prevent them from appearing in inappropriate syntactic contexts (as e.g. in **They cat Mary*, where the item /kQt/ appears in an inappropriate context). In DM, this is achieved by listing appropriate syntactic environments for each Vocabulary item. That is, a Vocabulary item will come with subcategorization information specifying the possible syntactic contexts in which it may appear. Whenever a Vocabulary item appears in a syntactic context that meets its subcategorization requirements, it is said to be licensed.

Harley & Noyer (1998a) suggest that a Vocabulary item may be specified for [±v], [±be], [±cause], [±DP1], and [±DP2], at least. They also point out that an item may be underspecified for a given syntactic possibility, permitting it to appear with or without that particular syntactic element. For instance, an item which is not specified for [±v] may appear in a context where it is licensed by a light verb or it may appear in an l-node where it is licensed by a determiner. This is true, for example, for the element *shock* which may be licensed by a light verb as well as by D°. Some implications between features are straightforward: if a Vocabulary item is specified for [-v] then obviously it may not be specified for [+cause]. Moreover, while a [+be] item is necessarily non-eventive, a [-be] item may be further specified for type of event with [±cause].

Now, what consequences do these differing featural specifications have for the traditional notion of categories? Obviously, the licensing environment for a verb is [+v] (or possibly [+Asp] for continuative forms) with whatever further specification. In contrast, the licensing environment for a noun (or a nominalization) is [-v], implying that the closest licenser is a determiner. For instance, the element *arrive* is specified for the environment [+v], [+DP], [-cause] (indicating that there is no agent DP in SpecvP), while an element like *cat* is specified for a [-v] environment only.

These are the simple cases, of course. There are also some unclear issues and a particular problematic one concerns the licensing of the elements formerly known as adjectives. Harley & Noyer take elements such as *sink* and *open* to be characterized by the same set of features, viz. [±v], [+DP], and [±cause]. This assumption, however, leaves unexplained why in a non-verbal environment, *open* is realized as an adjective while in the

same environment, *sink* is realized as a noun.[104] The authors admit that this question is a thorny one; still, they stick to the "intuitively wrong" assumption that the two elements do not differ in their feature specification.

Possibly, this problem can be resolved using a proposal brought forward by Corver (1991, 1997). As is well known, a functional head analysis has been successfully applied in recent years to the verbal and nominal domain. As for the verbal system, it has been proposed that the lexical VP projection is included within a functional projection (Pollock 1989; Chomsky 1995) - be it vP, AgrP, or TnsP - while the nominal system has been reanalyzed as being a projection of the determiner which takes a lexical NP as its complement (Abney 1987). The general scheme for the functional head analysis is the following: $[_{FP}$ Spec $[_{F'}$ F LP]] (where F stands for "functional" and L stands for "lexical").

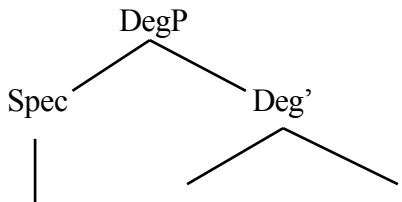
Focusing on the internal syntax of Dutch adjective phrases, Corver concludes that there is strong evidence for extending the functional head analysis to the adjectival system. That is, degree words which traditionally have been analyzed as occupying the specifier position of AP (Jackendoff 1977) should rather be interpreted as heading a functional degree phrase (DegP).[105] Consequently, using the scheme given above, the internal structure of the DegP is: $[_{DegP}$ Spec $[_{Deg'}$ Deg $[_{AP}$ A XP]]] in which the specifier position of DegP can be occupied by various elements qualifying the degree word. Consider the two Dutch examples given in (4-49ab) and their syntactic structure given in (4-49c):

(4-49) *Examples illustrating the structure of DegP (Corver 1997:292)*

a. twee centimeters te lang
   two centimeters too tall

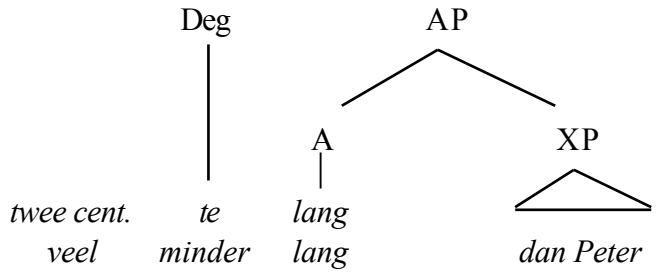
b. veel minder lang dan Peter
   much less tall than Peter

c.



[104] Following Halle & Marantz (1993) and Marantz (1997), Harley & Noyer (1998a) assume that in fact pairs like *sink-sinking* or *arrive-arrival* reflect single Vocabulary items which are related in a post-syntactic readjustment component. This readjustment component performs a variety of functions including not only the partial modification of stems (as in *destroy-destruction*; cf. subsection 3.2.4) but also the addition of morphemes which are not present in the syntax.

[105] Corver (1997) also argues that quantifier-like degree items behave differently from other degree words in various respects. He therefore claims that besides DegP, a functional quantifier phrase (QP) projection should be distinguished within the functional domain of the extended adjectival projection.



In his extensive study, Corver (1997) covers a broad variety of examples involving head-to-head movement within DegP, extraction from DegP, distribution of adverbs, and so on. In the present context, however, it suffices to note that, following Corver's analysis, we may conclude that - in a line with v and D - the functional head Deg° can also be a licensing element for l-nodes and that the licensing environment for Vocabulary items may also be specified for [±deg]. I assume the following implication: a Vocabulary item that is specified for [+v] may not be specified for [+deg], but a Vocabulary item that is specified for [-v] can either be [-deg] (i.e. a noun-like element) or [+deg] (i.e. an adjective-like element).

Consequently, in non-verbal environments, we are dealing with different licencers for the above mentioned elements *open* and *sink*, Deg for the former and D for the latter. I assume that the licensing environment for the Vocabulary item *open* is [-v], [+deg], [+DP] (i.e. *open* is locally licensed by a degree element and subcategorizes a complement DP) while the appropriate environment for *sink* is [-v], [-deg] (i.e. *sink* may be locally licensed by a determiner). In the latter case, insertion of the nominalizing suffix *-ing* is also required. In the next subsection, I am going to argue that this distinction also allows for an elegant explanation of some of the speech error data.

4.5.2 *Licensing and Spell-out of Roots in Speech Errors*

There is a number of quite intricate speech errors which can be accounted for in a straightforward way if we stick to the DM assumption that roots do not have category labels and that spell-out of roots as well as the insertion of suffixes crucially depend on the licensing environment in which a given root appears. That is, a root which participates in a speech error - be it in an exchange, anticipation or perseveration - may change its phonological form in its new position (due to a different licensing element) and it may trigger the insertion of a suffix different from the one required by the replaced element.

I will consider phonological readjustment of roots first; three examples illustrating this phenomenon are given in (4-50). In (4-50a), [$root_{(schreib)}$] "write" is perseverated and appears in a slot where it is licensed by a determiner. In this licensing environment, a readjustment rule applies which changes the root to *Schrift*. The facts are quite similar in (4-50b) except for that we are dealing with an anticipation here: after the error has taken place, [$root_{(zieh)}$] "drift", too, appears within the domain of D (an empty determiner) and therefore changes its phonological form to *Zug* (umlaut being triggered by the plural morpheme).

(4-50) *Phonological readjustment triggered by new licensing environment*

a. schreib-t man das mit Binde-**schrift** ← mit Bindestrich
write-3.SG one that with connect-writing ← *with connect.line*
"Do you write that with a hyphen?"

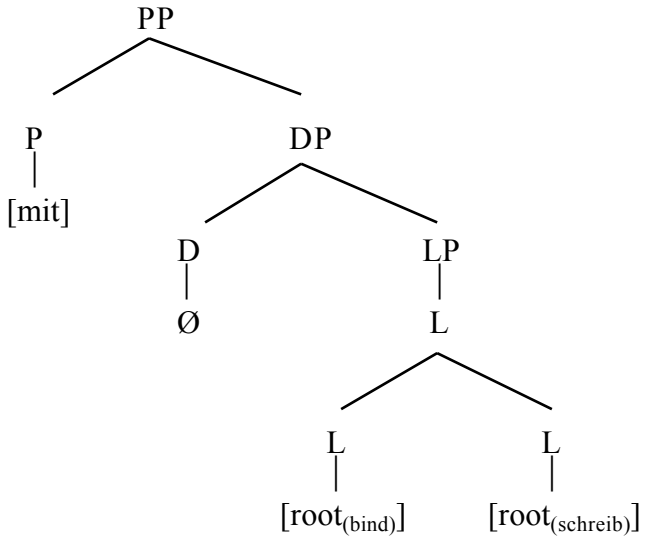
b. Rauch-**züg**-e, äh, Rauch-wolk-en zieh-en Richtung Westen
smoke-drifting-PL, er, smoke-clouds-PL drift-3.PL direction West
"Clouds of smoke drift westwards."

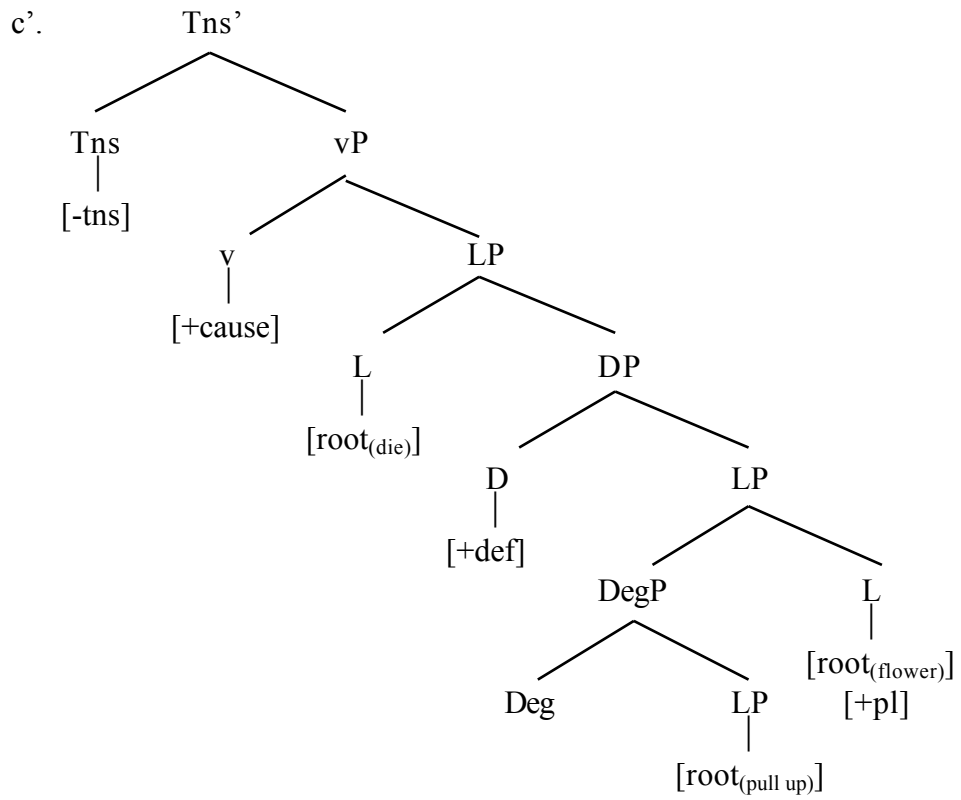
c. the gardener has to **die** the **pulled up** flowers
← to pull up the dead flowers (Fromkin 1973a:31)

Finally, in the English slip given in (4-50c), two roots are exchanged. Interestingly, the phonological shape of both of them changes. [$root_{(die)}$] lands in a position licensed by a light verb in which no phonological readjustment rule applies; [$root_{(pull\ up)}$] is shifted to a slot where the root is spelled out in its participial form, just as required by the [+deg] licenser. The structures below illustrate the licensing environments for the slips in (4-50a) and (c).

(4-50) *Licensing environments for the examples (4-50a) and (c)*

a'.





The Vocabulary items that realize the error elements in (4-50) are given in (4-51), these items also indicate that the elements may be inserted into various different licensing environments. Consider, for instance, the Vocabulary item /_raib/ in (4-51a): this item may be inserted in a [+v] environment (remember that [+v] is [-deg] by implication) but only in case the light verb head is filled by a CAUSE morpheme, as e.g. in *Claus schreibt einen Brief* "Claus is writing a letter". It may also be inserted in a [-v][-deg] environment (which, of course, is unspecified for [cause]), as in *die Schrift* "the writing". And finally, it may also appear in a [-v][+deg] context, as in *eine schriftliche Einladung* "a written invitation".[106]

The same is true for the Vocabulary item in (4-51b), the only exception being that in a [+v] environment, the head of vP may contain either a CAUSE morpheme (i.e. it is further specified [+cause], as in *Peter zieht an dem Seil* "Peter pulls the rope") or it may contain a BE morpheme (i.e. it is further specified for [-cause] and [+be], as in *Die Wolken ziehen* "The clouds drift"). The Vocabulary item /daI/, too, may appear in various environments (4-51c). In a [+v] environment, however, it is only licensed when v is filled by a BECOME morpheme, as in *The victim died*. It is this very restriction which makes the slip in (4-50c)

[106] In passing, I wish to point out that - as often enough - things are probably more intricate than this analysis may suggest. In particular, there are at least two other related phonological forms for [root$_{(schreib)}$] which may be inserted in a [-v][-deg] environment, one involving the nominalizing suffix *-er* (*der Schreiber*

quite awkward, since in that error, the element *die* appears in a [+cause] environment after the exchange has taken place.[107]

Finally, the Vocabulary item in (4-51d) is not licensed in a [-v][-deg] environment, that is, there is no nominalization of *pull up*. When appearing in a [+v] context, the light verb head must be filled by a CAUSE morpheme.

(4-51) *Vocabulary items for error elements in (4-50)*

a. $[root_{(schreib)}]$ ⟷ /_raib/
(licensing environment: [±v], [±deg], [+cause])

b. $[root_{(zieh)}]$ ⟷ /tsi:/
(licensing environment: [±v], [±deg], [±cause], [+be])

c. $[root_{(die)}]$ ⟷ /daI/
(licensing environment: [±v], [±deg], [-cause])

d. $[root_{(pull\ up)}]$ ⟷ /pUl √p/
(licensing environment: [±v], [+deg], [+cause])

Above, I have already mentioned that some of these Vocabulary items undergo phonological readjustment in certain licensing environments. For instance, in the perseveration in (4-50a), the Vocabulary item /_raib/ is shifted from a [+v] environment to an environment in which it is licensed by a determiner. In the latter environment, the readjustment rule given in (4-52a) will apply at the level of Phonological Form. A similar change of environment is observed with respect to the Vocabulary item /tsi:/ in the anticipation error cited in (4-50b); the relevant readjustment rule is given in (4-52b). In the exchange in (4-50c), a different kind of rule applies. The rule in (4-52c) does not affect the phonological shape of the stem; rather, it adds a feature to the featural description of the terminal node. Consequently, the Vocabulary item /pUl √p/ will be spelled out in its participial form in a [+deg] environment. With respect to the Vocabulary item /daI/, the situation is different. After the error has occurred, this element appears in an environment in which it is not affected by a readjustment rule.

(4-52) *Readjustment rules for the speech errors in (4-50)*

"the writer"), the other involving the suffix *-en* (*das Schreiben* "the letter"). In the present context, however, I shall not try to give an account of how a decision between these different forms is made.

[107] Adopting ideas of Generative Semantics, the combination of the atomic predicates *cause* and *die* - i.e. CAUSE and $[root_{(die)}]$ - should give rise to the insertion of the Vocabulary item *kill*, since it is exactly the combination of these two predicates that paraphrases the meaning of *kill* (Katz 1970; Lakoff 1971).

a. /_raib/ → /_rift/ / [-v][-deg]

b. /tsi:/ → /tsu:g/ / [-v][-deg]

c. /pUl √p/ → /pUl √p/ / [+deg]
[+part]

Apparently, the (extended) functional head analysis in combination with the notion of local licensing of l-nodes allows for a straightforward explanation of the speech error data in (4-50). Irrespective of the licensing environment, there is only one Vocabulary item for a given root. This item, however, may be subject to the application of a readjustment rule at Morphological Structure or Phonological Form.

I now turn to those speech errors in which the post-error environment of a shifted element triggers the insertion of a suffix that is different from the one required by the replaced element. In subsection 2.4.2, I have termed that phenomenon "morphological accommodation". Four such slips are given in (4-53).

In the root exchange (4-53a), the element *befriedig* "satisfy" appears with the appropriate nominalizing suffix *-ung* after the error has taken place, i.e. the ungrammatical sequence *seine Befriedig-nis zu bedürfen* does not surface. Since the error in (4-53b) is self-corrected by the speaker, we are not in a position to decide if we are dealing with an anticipation or (part of) an exchange (Stemberger's (1989) error category "incomplete"). The interesting fact about this slip is that [$root_{(farb)}$] "colour" appears with the adjectival ending *-ig*, this ending not being part of the intended utterance.

(4-53) <u>*Choice of appropriate suffix in speech errors (morphol. accommodation)*</u>

a. er war nur darauf aus, seine **Befriedig**-ung zu **bedürf**-en
he was only interested in his satisfy-N to need-INF
← sein Bedürf-nis zu befriedig-en
← *his need-N to satisfy-INF*
"He was only interested in satisfying his need."

b. das ist aber eine **farb**-ig-e, äh, eine schön-e Farbe
that is really a.f colour-ADJ-f, er, a.f nice-f colour(f.)

c. I think it's **care**-ful to measure with **reason**
← it's reasonable to measure with care (Fromkin 1973a:31)

d. people still see Libya as a **nation**-al **danger**, as a danger-ous nation

In the English exchanges in (4-53cd), too, the appropriate adjectival suffixes are inserted. While in (4-53c), *reason* takes the suffix *-able*, *care* derives its adjectival form by

attachment of the suffix *-ful*. And in (4-53d), spell-out mechanisms insert the suffix *-al* in a position that was meant to host the adjectival suffix *-ous*.

Traditionally, it has been assumed that suffixes subcategorize certain lexical categories; the German suffix *-ig* as well as the English Suffix *-ful*, for instance, were taken to subcategorize [+N] elements. In the DM framework, however, category labels are no longer available. We must therefore assume that in the examples in (4-53), the insertion of the respective suffixes crucially depends on the licensing environments, [-v][-deg] in (a) and [+deg] in (bcd). Moreover, suffixes must have certain subcategorization properties, since obviously neither the suffix *-ig* nor the suffix *-ful*, for example, attach to all elements in a [+deg] environment (and neither is it true that they attach to all traditional [+N] elements). Consequently, the Vocabulary items for the suffixes do not only indicate the licensing environment in which they are inserted but also to what roots they attach.[108]

In (4-54), I supply morpheme insertion rules which determine the appearance of the relevant suffixes in the examples in (4-53).

(4-54) *Morpheme insertion rules*

a. Insert /-uN/ / X + [-v][-deg]
(where X = [root$_{(befriedig)}$], ...)

b. Insert /-Ig/ / X + [+deg]
(where X = [root$_{(farb)}$], ...)

c. Insert /-fUl/ / X + [+deg]
(where X = [root$_{(care)}$], [root$_{(beauty)}$], ...)

d. Insert /-ˊl/ / X + [+deg]
(where X = [root$_{(nation)}$], ...)

Suffixes like the ones mentioned in (4-54cd) are in competition with each other as well as in competition with all other suffixes that are specified for insertion in a [+deg] environment. It is only the additional specification of the context X which guides the selection of one suffix over the other.

In the light of these remarks, let us briefly reconsider the error in (4-53d). In this slip, [root$_{(nation)}$] is anticipated into a terminal node where it is licensed by a [+deg] element. The Vocabulary item /neI_ˊn/ states that this is a possible licensing environment for this root. In

[108] Phonological and semantic factors as well as blocking effects may, of course, also play an important role in the selection of suffixes. In German, for instance, regular nominalization of the transitive verb *stehlen* "to steal" with the suffix *-er* (**Stehler*) is blocked by the existence of the lexical item *Dieb* "thief".

contrast to the elements listed in (4-52) which are affected by phonological readjustment rules, no noch such rule applies in (4-53d). In this particular case, however, the morpheme insertion rule in (4-54d) will be triggered by the appearance of [root$_{(nation)}$] in a [+deg] environment.[109] Consequently, the utterance which surfaces is neither **a nation danger* nor **a nationous danger* but rather the fully grammatical string *a national danger*. A similar line of reasoning can be applied to the other errors presented in (4-53).

4.5.3 *Accounting for Categorial Identity*

In the preceding subsection, I have argued that some quite complex speech errors are readily accounted for when we stick to the DM assumption that only abstract, categorially non-specified elements are manipulated within the computational system. Most importantly, we do not need to call upon the service of costly accommodatory processes in order to rectify possible morphological or phonological inconsistencies (see section 4.7 for further discussion).

Besides the examples given in (4-50) and (4-53) which involve derivational morphology (stem change and/or choice of the appropriate affix), this observation also holds true for plural and participial allomorphy in German. This is exemplified by the following two examples:

(4-55) *Correct spell-out of plural and participial allomorph*

a. die **silben**tragenden **Akzent**-e ← die akzenttragenden Silbe-n
the syllable.bearing accent-PL ← the accent.bearing syllable-PL

b. ich habe einen **Wurf** ge-**blick**-t ← einen Blick ge-worf-en
I have a throw glance-PART ← a glance throw-PART

In (4-55a), [root$_{(akzent)}$] is spelled out with the appropriate plural suffix *-e*, while in (4-55b), [root$_{(blick)}$] appears with the correct participial circumfix *ge-...-t* (moreover, [root$_{(werf)}$] is subject to a different readjustment rule in a [-v][-deg] environment).

[109] Harley & Noyer (1998a) state that for roots like *destroy*, a combination of a phonological readjustment and a morpheme insertion rule must be assumed when appearing in a [-v][-deg] environment. The readjustment rule will modify the phonological form of the stem to *destruct*, the insertion rule will add the nominalizing suffix *-ion* (also cf. Marantz 1997).

Abandoning category labels, however, also gives rise to some serious conceptual problems. Most importantly, it is a well-known fact that the grammatical category of the involved elements plays a prominent role in word exchanges. In particular, there is a strong tendency for the exchanged elements to be of the same category (the same category constraint: nouns change place with nouns, verbs with verbs, and so on). However, this observation does not hold for stranding errors and sound exchanges which typically involve words belonging to different grammatical categories. It is that very property of exchange errors which lead Garrett (1975, 1980a) to the assumption that different types of exchanges occur at different processing levels: word exchanges arise at the functional level at which phrasal membership and grammatical category of words are determined while sound exchanges and stranding errors arise at the positional level at which the serial order of words as well as aspects of their form are specified. Three representative exchange errors from Garrett (1980a:179,188) are given in (4-56), a word exchange in (4-56a), a stranding error in (b), and a sound exchange in (c).

(4-56) *Different types of exchange errors*

a. I left the **briefcase** in my **cigar** ← the cigar in my briefcase

b. I thought the **park** was **truck**-ed ← the truck was parked

c. on a **s**ot **h**oldering iron ← a hot soldering iron

Garrett (1980a:189) states that out of a number of 200 word exchanges from his corpus, 85 per cent satisfy the same category constraint; out of a number of 100 stranding errors, the same is true for only 43 per cent, and out of a number of 200 sound exchanges, the constraint is satisfied in only 39 per cent of the errors.

To date, there are 163 clear instances of word exchanges in the Frankfurt corpus. Of these, only twenty (i.e. 12,3 per cent) involve words of different grammatical categories. With respect to sound exchanges, however, percentages are different from what Garrett reports. There are 394 sound exchanges in the corpus. 190 of these sound exchanges occur within a word, be it morphologically complex like e.g. ***W****esser****b****isser* ← *Besserwisser* "know-all" or monomorphemic like e.g. *K****v****a****l****ier* ← *Klavier* "piano", and were therefore not considered. Of the remaining 204 sound exchanges, 107 involve words of different categories (i.e. 52,5 per cent). Interestingly, for the 88 stranding errors, the bias towards mixed-category errors is much stronger: in 76 of them (i.e. 86,4 per cent), words of

different categories are involved. For your convenience, these numbers are summarized in table 9.

	SAME CATEGORY	DIFFERENT CATEGORY
WORD EXCHANGES (N = 163)	143 (87,7 %)	20 (12,3 %)
STRANDING ERRORS (N = 85)	9 (10,6 %)	76 (89,4 %)
SOUND EXCHANGES (N = 204)	97 (47,5 %)	107 (52,5 %)

Table 9: *Grammatical category constraint in exchanges*

Leaving sound exchanges aside for the moment, we still need to account for the fact that the same category constraint obviously holds for word exchanges but not for stranding errors. Remember that following DM assumptions, we can not assume that words are exchanged before Vocabulary insertion takes place, since the only elements available for exchange prior to Vocabulary insertion are abstract features and roots. Consequently, word exchanges resemble stranding errors in that in both roots are exchanged, the only difference being that in word exchanges, both roots tend to have the same kind of licenser while in stranding errors, the licensing elements tend to be different ones for the two roots.

I assume that the licensing elements have an important influence on the probability of two roots to interact in an error. That is, roots are not randomly exchanged. Rather, there is a strong tendency for roots to take a position in which they are licensed by the same kind of functional head as in the position where they come from. This constraint on interacting elements, however, only holds for errors that occur before Vocabulary insertion takes place. After insertion of Vocabulary items - possibly being accompanied by phonological readjustment and/or morpheme insertion -, the job of the licensing elements is done. All errors occurring after that point can no longer be constrained by the licensing environment of the involved elements; that is, they are purely phonological. These different phenomena are exemplified by the slips in (4-57).

(4-57) *Exchanges before and after Vocabulary insertion*

a. eine **Theorie** ist eine **Grammatik** des Wissens
a.f theory(f.) is a.f grammar(f.) of.the knowledge
← eine Grammatik ist eine Theorie des Wissens
← *a.f grammar(f.) is a.f theory(f.) of knowledge*

b. ich weiß nicht, wie man eine **Nadel** in den **Faden** kriegt
I know not how one a.f needle(f.) in the.m thread(m.) gets
← wie man einen Faden in die Nadel kriegt
← *how one a.m thread(m.) in the.f needle(f.) gets*

c. es ist nicht alles **glänz-t**, was **Gold** ← Gold, was glänz-t
it is not all glitter-3.SG that gold ← gold that glitter-3.SG

d. da wird mancher **Neid** vor **blass** werden ← blass vor Neid
there will some.people envy with pale become ← pale with envy

In (4-57ab), two roots are exchanged which are licensed by the same kind of functional element, viz. D. In (4-57b), the exchange is accompanied by an accommodation of the material in D, i.e. the respective gender features of the exchanged roots are copied onto D. This accommodatory process unambiguously indicates that the roots are exchanged before Vocabulary insertion takes place, since after Vocabulary insertion, copy of the gender features is no longer possible (and therefore, the expected outcome would be **wie man einen Nadel in die Faden kriegt* 'how one a.m needle(f.) in the.f thread(m.) gets').

In contrast to that, the exchanges in (4-57cd) affect elements from different licensing environments. In (4-57c), an inflected verb takes a noun slot, and vice versa. The root of the shifted element *glänzt* "glitters" is actually *glanz*, with umlaut formation being triggered in a [+v] environment but not in a [-v][-deg] environment. For [$root_{(gold)}$], it is not clear if it can be licensed by a light verb at all (possibly, it could be spelled out as *vergolden* "to gold-plate" in case the light verb head is filled with a CAUSE morpheme). Therefore, if in fact two roots had been exchanged in (4-57c) prior to Vocabulary insertion, the expected (properly licensed) outcome would be *es ist nicht alles **Glanz**, was **Gold*** or perhaps *es ist nicht alles **Glanz**, was ver**gold**et*. However, the fact that the verb is shifted in its inflected form (with umlaut) suggests that we are dealing with a phonological error here; that is, the error occurs at a stage at which implementation of the agreement node, licensing, Vocabulary insertion, and phonological readjustment have already applied.

In (4-57d), a noun and an adjective are exchanged but neither of the two elements is properly spelled out in its new licensing environment. According to the licensing specifications, the expected outcome would be ***neid**-isch vor **Bläss**-e* "envious with

paleness", with [root$_{(neid)}$] triggering the insertion of the suffix *-isch* in a [+deg] environment, and [root$_{(blass)}$] undergoing stem change (umlaut) and triggering the insertion of the suffix *-e* in a [-v][-deg] environment. For that error, we can either assume that we are dealing with a root exchange plus subsequent failure of rule application (for whatever reason) or - in a line with (4-57c) - that the error occurs after Vocabulary insertion and application of rules, i.e. that the two spelled out phonological forms /blas/ and /naid/ are exchanged.

With respect to "word exchanges", I therefore conclude that they come in two different types. The first one is actually a root exchange which happens before Vocabulary insertion is carried out. This kind of exchange is constrained by the licensing environments of the elements involved in the error. Moreover, it triggers accommodatory processes (as e.g. observed in (4-57b)). The second type is an exchange of phonological material (phonological words) which occurs after Vocabulary insertion. With respect to this type, similar licensing environments are not relevant. Since all processes of feature copy, readjustment, and morpheme insertion have been completed at this point, the exchanged elements can not be adjusted to their new environment (as exemplified by (4-57c) and (d)).

The situation is different for stranding errors which appear not to be subject to the licensing environment constraint: in almost 90 per cent, the exchanged elements are of different grammatical category (cf. table 9). This observation implies that stranding errors (like exchanges of phonological words) occur at a stage at which licensing elements are not relevant. We therefore predict that neither adjustment of the exchanged phonological strings to the new licensing environment nor adjustment of stranded material to the exchanged elements should be observed. As a matter of fact, this is true for most of the stranding errors. Consider, for instance, the two errors in (4-58).

(4-58) <u>*Stranding without adjustment of exchanged or stranded elements*</u>

a. der Mann hat mich **Straf**-en ge-**lüg**-t ← Lüg-en ge-straf-t
the man has me punish-PL lie-PART ← lie-PL punish-PART
"The man has given the lie to me."

b. ein **kolleg**-isch-er **Malai**-e ← malay-isch-er Kolleg-e
a colleague-ADJ-m Malay-N(m.) ← Malay-ADJ-m colleague-N(m.)

The utterance in (4-58a) is ungrammatical because the participial form of *lügen* "to lie" is *gelogen*. Obviously, the required phonological readjustment rule which affects the vowel of the Vocabulary item for [root$_{(lüg)}$] in a [+v] environment has not applied. Moreover, the appropriate participial allomorph for that item was not inserted. In (4-58b), the stranded adjectival suffix gives rise to ungrammaticality, since the correct sequence would be *ein* ***kolleg****-ialer* ***Malai****-e*. The fact that in a large number of stranding errors, the exchanged elements are not spelled out correctly follows automatically from the assumption that these errors occur after Vocabulary insertion.

There is, however, a group of slips, which do not receive a straightforward explanation following the assumptions made so far. These are the stranding errors in which an exchanged element changes its phonological shape in the new environment and/or a contextual accommodation takes place. In contrast to the slips in (4-58), these errors definitely occur prior to Vocabulary insertion; still, for the most part, they involve elements from different licensing environments. Altogether, there are 14 such problematic slips in my corpus. Some of these have already been presented above (cf. (4-50), (4-53), and
(4-55)), two more are given in (4-59) (IMP = imperative).

(4-59) <u>*Stranding prior to Vocabulary insertion*</u>

a.	da	war	der	**Bruch** ge-**bann**-t	←	der	Bann	ge-broch-en
	there	*was*	*the*	*break spell-PART*	←	*the*	*spell*	*break-PART*
b.	**nerv**-e	die	**Nahr**-ung,	nähr-e		den	Nerv	
	nerve-IMP	*the.f*	*food-N(f.)*	*feed-IMP*		*the.m*	*nerve(m.)*	

In (4-59a), two things are of interest: firstly, [root$_{(brech)}$] "break" is phonologically readjusted to *Bruch* in a [-v][-deg] environment; secondly, the correct participial suffix *-t* is chosen for the new element in the [+v] environment. In (4-59b), too, we observe two striking changes. On the one hand, [root$_{(nahr)}$] "feed/food" is shifted from a [+v] environment to a [-v][-deg] environment where the required nominalizing suffix *-ung* for this root is inserted; on the other hand, the gender feature of *Nahrung* "food" is copied onto the determiner. If these two errors had occurred following Vocabulary insertion, the

two ungrammatical sequences **da war der **Broch** ge-**bann**-en* and ****nerv**-e den **Nähr*** should have surfaced.[110]

How can these errors be accounted for if we stick to the assumption that a similar licensing environment is a precondition for the exchange of roots. One way might be to somewhat loosen the same-licenser constraint. It is a well-known fact that the so-called word exchanges typically involve elements from different phrases, while stranding errors (as well as sound exchanges) typically involve elements which appear under the same maximal projection (Garrett 1980a:189). We may therefore hypothesize that the closer the exchanged elements are to each other in a syntactic tree structure, the less influence the same-licenser constraint has. This is exemplified by the bracketed structures for the two representative root exchanges in (4-57a) and (4-55b), respectively, given in (4-60).

(4-60) *Bracketed structures for (4-57a) and (4-55b)*

a. [$_{CP}$ [$_{DP}$ eine [$_{LP}$ **Theorie**]] [$_{TnsP}$ ist [$_{LP}$ [$_{DP}$ eine [$_{LP}$ **Grammatik** ...]]]]

b. [$_{LP2}$ [$_{DP}$ einen [$_{LP1}$ **Wurf**]] [$_{L}$ ge-**blick**-t]]

These are simplified structures, of course. In fact, Garrett's statement that stranding errors typically involve members of a single phrase is not completely adequate. In (4-60b), for instance, a lexical phrase (LP_1) and a DP separate the two error elements, which, however, appear under the same maximal projection LP_2. Still, it is true that in almost all of the exchanges which affect roots from similar licensing environments, these roots are separated from each other by a larger number of maximal projections.

Interestingly, a closer look at the root exchanges reveals that in almost all of them, the roots which interact are adjacent to each other in the sense that no other root - i.e. no other possible candidate for exchange - intervenes between the exchanged elements. In my corpus, there are only two stranding errors in which the exchanged elements appear in considerable distance from each other; in both of them, however, the exchanged roots are licensed by the same kind of element. In (4-61a), for instance, [root$_{(trink)}$] and [root$_{(fahr)}$] are

[110] For some of the stranding errors, it is impossible to unambiguously decide if they occur before or after Vocabulary insertion. For instance, in the slip *der erste **fleisch**-liche **Weiber**-geselle* ← *der erste weib-liche Fleischer-geselle* 'the first female-ADJ butcher-journeyman', the resulting sequence is semantically awkward but still fully grammatical without readjustment or morpheme insertion of any kind. We may therefore be dealing with a root exchange or with an exchange of phonological material.

both licensed by a light verb. You will notice that another root ([root$_{(etwas)}$] "something") appears between the exchanged elements, this root, however is licensed by a determiner.[111]

(4-61) *Intervening roots in root exchanges*

a. Männer können noch **trink**-en, wenn sie etwas ge-**fahr**-en haben
men can still drink-INF when they something drive-PART have
← noch fahr-en, wenn sie etwas ge-trunk-en haben
← *still drive-INF when they sth. drink-PART have*

b. der **Affe** stammt vom **Menschen** ab
the ape descends from man PARTICLE
← der Mensch stammt vom Affen ab
← *the man descends from ape PARTICLE*

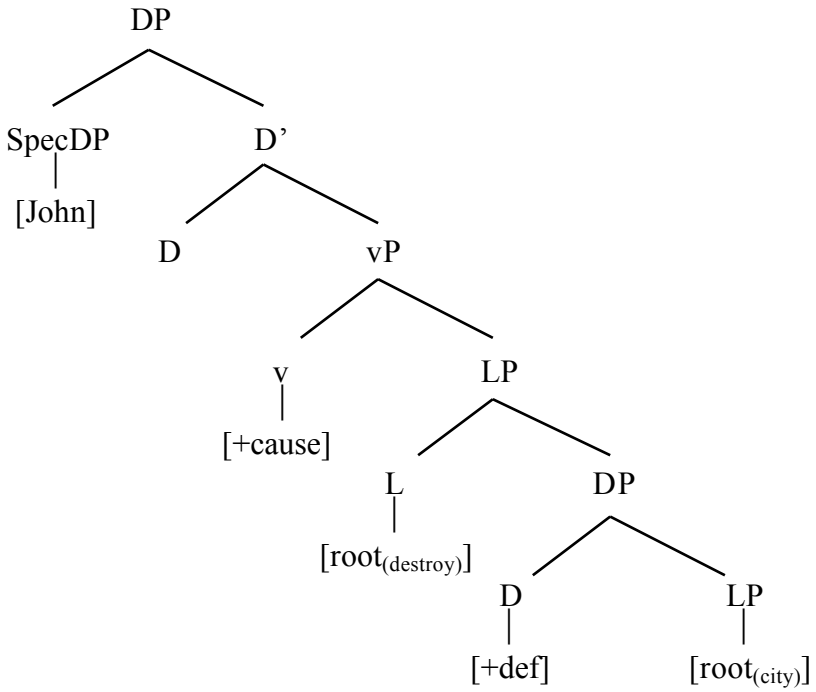
c. ein **Sommer** macht noch keine **Schwalbe**
one summer makes yet no swallow
← eine Schwalbe macht noch keinen Sommer
← *one swallow makes yet no summer*

Moreover, there are twelve "word exchanges" - i.e. root exchanges without stranded material - in my corpus, in which another root intervenes between the exchanged elements. But for those, too, it is true that the intervening root is licensed by a different functional head. Two examples are given in (4-61bc). In both of them, the exchanged elements are licensed by a determiner while the intervening roots - [root$_{(stamm)}$] "descend" in (4-61b) and [root$_{(mach)}$] "make" in (4-61c) - are licensed by [+v].

A short discussion of certain English nominalizations in Marantz (1997) possibly opens up another way to account for the problematic data involving the exchange of differently licensed roots. Marantz claims that light verb heads which serve to "verbalize" roots in their environment also occur in certain nominalizations. Therefore, these nominalizations do not only contain a nominalizing environment (D) but also a verbalizing environment (v). The internal structure of a noun like *destroying* (as in *John's destroying the city*), for instance, should be the one given below:

[111] In this error, the intervening pronoun *sie* "they", too, occupies a position which is licensed by D. Still, it is not a possible candidate for an exchange, since it is not a root. The terminal node in which it is inserted is characterized only by the morphosyntactic features [3rd] and [+pl]. This is not to say that pronouns may not be exchanged; consider e.g. the slip ***sie*** *war 21, als* ***ich*** *gestorben bin* ← *ich war 21, als sie gestorben ist* 'I was 21 when she died be-3.SG'. Presumably, in that error, only person features are exchanged. That is, roots may interact with other roots in errors and features may interact with other features, but roots may not interact with features.

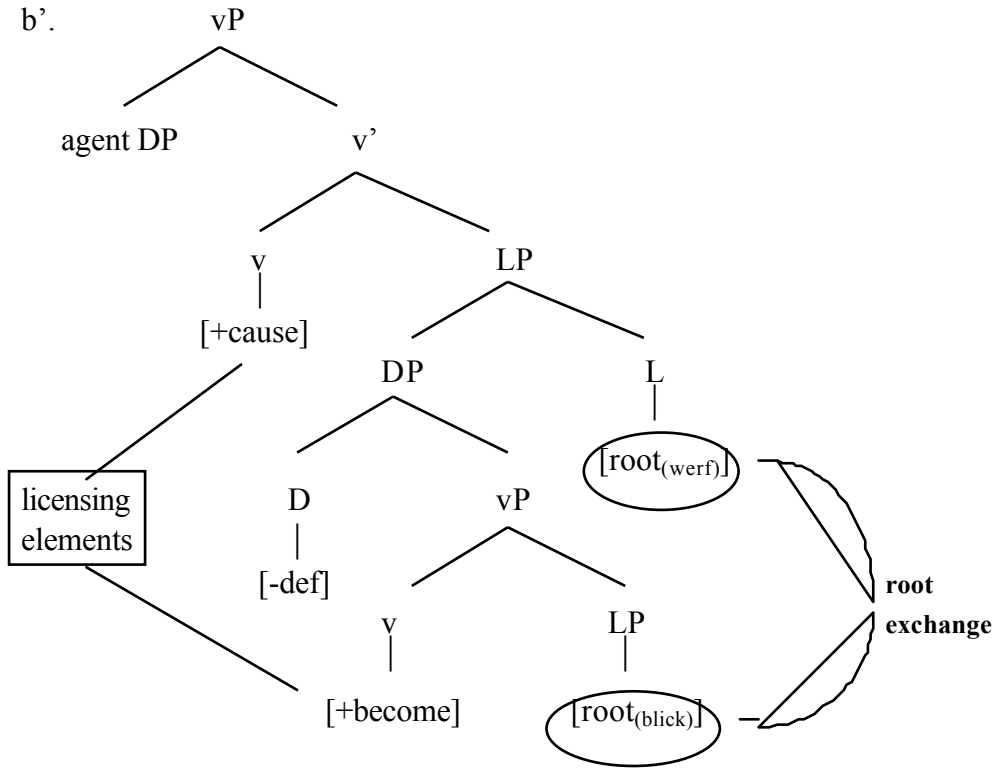
(4-62) *Internal structure of an -ing nominalization (Marantz 1997)*



Suppose that other nominalizations have a comparable internal structure involving light verb projections. With respect to the error in (4-55b) - *ich habe einen **Wurf** ge-**blick**-t* ← *einen Blick ge-worf-en* 'I have a throw glanc-ed ← a glance throw-n' -, we could, for instance, assume that in its original position [root$_{(blick)}$] is not (directly) licensed by D but rather by a light verb (possibly containing a BECOME morpheme). Consequently, the two elements which are exchanged in that error, i.e. [root$_{(blick)}$] and [root$_{(werf)}$], are both licensed by a light verb, as is illustrated by the structure in (4-55b').[112]

[112] Such an assumption could also help us to account for tricky cases like those mentioned in footnote 43 in which different nominalizations of a given root are available. The difference between *Schreiber* "writer", *Schrift* "writing", and *Schreiben* "letter" - all derived from [root$_{(schreib)}$] - might be that the first involves a CAUSE morpheme within the DP, the second a BE morpheme, and the third a BECOME morpheme.

(4-55) *Possible licensing structure for the root exchange in (4-55b)*



Such an analysis may look promising at first sight, but it immediately gives rise to new problems. Most importantly, in a structure like (4-55b'), correct spell-out of roots is no longer guaranteed. Note that in this structure [root$_{(werf)}$] is shifted to a position in which it is licensed by a light verb. In this licensing environment, however, no phonological readjustment rule applies - just as little as such a rule applies in the original position of this root - and consequently the expected output would be ***einen Werf** geblickt*.

Maybe this problem could be settled for good by assuming fusion operations within DP. Suppose, for instance, that the root exchange occurs at a point of the derivation at which both roots are licensed by the same kind of element, i.e. a light verb. Before Vocabulary insertion takes place, the l-node within DP will fuse with the light verb and only one Vocabulary item which meets the specification of the fused node will be inserted. In the above example this will be the item /vUrf/ "throw"; if the light verb contained a CAUSE morpheme, the related item /vɛrfå/ "thrower" might be selected from the Vocabulary.

Still, so far this costly analysis only allows us to account for the interaction of nouns with verbs. It is not at all clear if a similar analysis is applicable to errors involving adjectives and nouns or adjectives and verbs. We could of course consistently stick to the above proposal and assume that DegPs, too, contain a light verb phrase. This would amount to the claim that in fact all roots are licensed by light verbs. This, however, is

definitely an unwelcome consequence since then the observed differences between "word exchanges" and stranding errors could no longer be explained.

In conclusion of this subsection, I want to present two root exchanges which are not readily accounted for following the analysis sketched above. One such problematic case is the English stranding error in (4-53c), repeated here as (4-63a). In that error, the appropriate adjectival suffix *-ful* is inserted, and we must therefore assume that the error occurs before Vocabulary insertion. Since the exchanged roots appear in considerable distance from each other - i.e. in different clauses - we would expect them to be licensed by the same kind of element (as in (4-61a) above). This, however, is not the case. Moreover, there is another root - [$\text{root}_{(\text{measure})}$] - intervening between the exchanged elements which, again, has a different licenser. In this sequence, we would therefore either expect [$\text{root}_{(\text{reason})}$] to interact with [$\text{root}_{(\text{measure})}$] or [$\text{root}_{(\text{measure})}$] to interact with [$\text{root}_{(\text{care})}$], but not [$\text{root}_{(\text{reason})}$] to change place with [$\text{root}_{(\text{care})}$].

(4-63) *Two problematic root exchanges*

a. I think it's **care**-ful to measure with **reason**
   ← it's reasonable to measure with care (Fromkin 1973a:31)

b. das ist **Marc**-s Bruder **Anke**, Anke-s Bruder Marc
   that is Marc-GEN brother Anke Anke-GEN brother Marc

In (4-63b), the same-category constraint is satisfied, since the exchanged elements are both licensed by a determiner. What is peculiar about this error is that [$\text{root}_{(\text{bruder})}$] which is also licensed by D separates the exchanged elements. Above, however, I have argued that whenever another root intervenes between two elements which are exchanged prior to Vocabulary insertion, this intervening root should be one from a different licensing environment (cf. (4-61bc)). Possibly, in this error, we need to take into account that the exchanged elements *Marc* and *Anke* are not really roots but rather proper names.

Let me briefly recollect the facts: In this subsection, I have tried to give an account for the well-known fact that in word exchanges but not in stranding errors, elements of the same grammatical category tend to interact. I have argued that this tendency can be explained without bothering category labels, when we assume that before Vocabulary insertion, the interaction of roots in an error is constrained by the licensing environment of these roots.

This constraint, however, may become ineffective whenever the affected roots are sufficiently close to each other and are not separated by another root.

Moreover, I have claimed that word exchanges and stranding errors are actually not that different from each other. In fact, both types of errors may occur before and after the insertion of Vocabulary items into terminal nodes. When they occur before Vocabulary insertion, we are actually dealing with instances of root exchanges (since words are not manipulated within the computational system). When the error occurs at this point, the exchanged roots are subsequently subject to phonological readjustment and morpheme insertion while the new environment of the exchanged elements is subject to morphosyntactic acccommodation (e.g. feature copy onto D).

As we have seen, word exchanges as well as stranding errors may also occur after Vocabulary insertion. In these cases, however, we are actually dealing with an exchange of phonological material. Neither does the grammatical category of the error elements constrain the error at this stage of the derivation nor do we observe stem adjustment, morpheme insertion, or accommodation.[113]

4.6 Feature Shift and Feature Stranding

> Man muss sich sehr hüten, sich über einen Fehler geringschätzig hinwegzusetzen.*
>
> (Erasmus von Rotterdam)

In the preceding section, I have argued that within the computational system, i.e. before Vocabulary items are inserted into terminal nodes, neither word exchanges nor stranding errors in the true sense exist. Rather both types of errors must be interpreted as root exchanges. It is clear that spell-out of roots from different licensing environments (as in (4-59)) is much more likely to involve phonological readjustment or the insertion of morphemes than that of roots from similar licensing environments (as in (4-57ab)).

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[113] In this respect, these two types of exchanges resemble sound exchanges. There is, for instance, no sound exchange in the Frankfurt corpus in which the exchange accidentally results in an existing word which subsequently triggers accommodation on an adjacent element. Consider e.g. the following slip: *ihr dürft die **K**raut **b**üssen* ← *die Braut küssen* 'you(pl.) may the bride kiss'. Here, the first word resulting from the exchange of /k/ and /b/ happens to be an existing German word: *Kraut* means "cabbage". But in contrast to *Braut* "bride" which is feminine, *Kraut* is of neuter gender. Still, the definite article is not changed from *die* 'the.f' to *das* 'the.n'. Such an accommodation would be quite surprising, of course, since all processes of feature copy have already been executed when the error occurs.

This is not to imply, however, that before Vocabulary insertion takes place, only roots can be affected by errors. We have seen that terminal nodes consist of roots and morphosyntactic features. A fair amount of the errors discussed above already made clear that it is not necessarily the whole content of a given terminal node which is affected in an error. On the one hand, morphosyntactic features may be left behind in their original position, that is, they are capable of stranding; on the other hand, they may also be shifted in various ways, i.e. exchanged, perseverated, or anticipated.

In this section, I will consider instances of stranding and shift involving the morphosyntactic features number, gender, tense, and case. The number feature shall be subject to investigation first. Consider the following examples.

(4-64) *Stranding vs. non-stranding of the number feature*

a. dafür werde ich mir nicht die **Ohren** um die **Nacht** schlagen
for.that will I me not the ear-PL around the night hit
← die Nacht um die Ohr-en
← *the night around the ear-PL*
"For that, I will not make a night of it."

b. examine the **horse** of the **eyes** ← the eyes of the horse
(Fromkin 1971:43)

c. ich habe der **Hilfe** für ihre **Kind-er** gedankt
I have the.SG.f.DAT help(f.) for their.PL child-PL thanked
← den Kind-er-n für ihre Hilfe
← *the.PL.DAT child-PL-DAT for their.f help(f.)*

d. ein **Buchstabe** ist vier **Wört**-er lang, äh,
a letter is four word-PL long, er,
ein Wort ist vier Buchstabe-n lang
a word is four letter-PL long

e. a hole **full** of **floor**-s ← a floor full of hole-s (Fromkin 1973b:258)

In the examples (4-64ab), the roots are exchanged along with their number ([+plural]) and gender ([+fem]) features which are copied onto the determiners at the respective landing sites. Note that these two examples can also be analyzed as the exchange of complete DPs (e.g. [$_{DP}$ the horse] and [$_{DP}$ the eyes] in (4-64b)).[114] The error cited in (4-64c), on the other

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* "One must take good care not to contemptuously disregard an error."

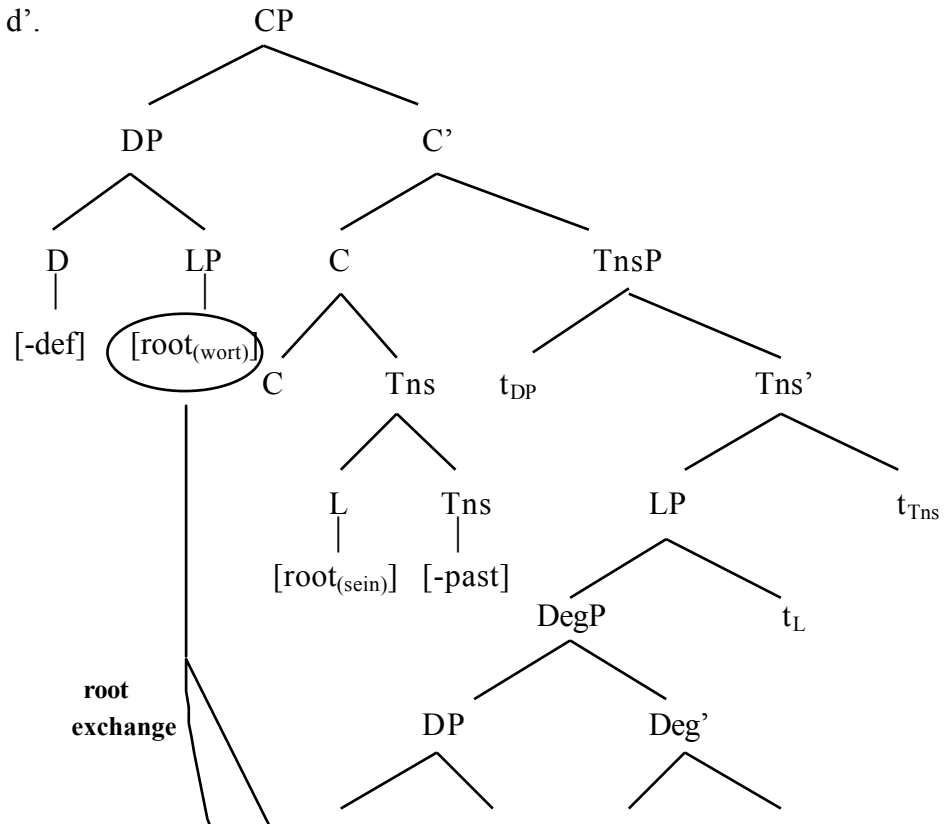
[114] That the exchange of whole DPs is in fact an option, is illustrated by the following slip in which the respective determiner positions contain different material: *I got into **this guy** with **a discussion** ← into a*

hand, is an unambiguous case of a root exchange in which the roots take along their number features.[115]

Finally, the two errors in (4-64de) are clear instances of number stranding. The German slip in (d) illustrates in an impressive way that we are not dealing with suffix stranding, since after the exchange has taken place, the appropriate plural allomorph is chosen for [root$_{(wort)}$] and umlaut formation is triggered. Stemberger (1985) reports that stranding of the plural, as in (4-64de), is about four times as frequent in his corpus as non stranding cases, such as (4-64abc). In the Frankfurt corpus, there are only 18 informative errors, i.e. errors in which a plural and a singular root interact; in 14 of these, however, the plural feature strands.

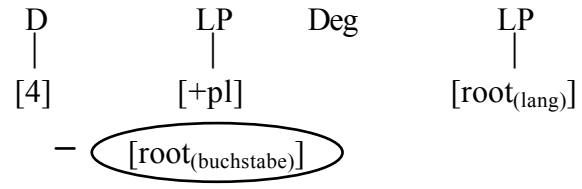
Below, I give an exemplary structure for the root exchange in (4-64d) (neglecting the light verb phrase below Tns'):

(4-64) *Structure (prior to root exchange) for (4-64d)*



discussion with this guy (Garrett 1980a:192). This error can only be analyzed as an exchange of [$_{DP}$ a discussion] and [$_{DP}$ this guy].

[115] In (4-64c), a DP exchange would have resulted in *ich habe **ihrer Hilfe** für **die Kinder** gedankt* while a root exchange with stranding of number (as in (4-64de)) would have given rise to the sequence *ich habe den **Hilfe**-n für ihr **Kind** gedankt*. I did not come across an error in which two DPs are exchanged but the number feature strands, i.e. *ich habe **ihren Hilfe**-n für **das Kind** gedankt*.



After the exchange has taken place, [root$_{(wort)}$] will share a terminal node with the stranded plural feature and will be spelled out accordingly. The above examples make clear that a given root may either be exchanged together with its number feature or leave its number feature behind in its initial position. Moreover, there are two slips in my corpus in which a plural feature is shifted or perseverated, respectively.

(4-65) *Shift and perseveration of plural feature*

a. bei dieser Ausgabe sind vier Buch in den Schuber-**n**,
in this edition are four book in the.PL slipcase-PL
äh, vier Büch-er im Schuber
er, four book-PL in.the slipcase

b. er hatte fünf Punkt-e Vorsprüng-**e** ← fünf Punkt-e Vorsprung
he had five point-PL lead-PL ← *five point-PL lead*

In (4-65a), the plural feature is shifted from [root$_{(buch)}$] "book" to [root$_{(schuber)}$] "slipcase". From [root$_{(schuber)}$], the plural feature is passed on to the definite article which is spelled out correctly and does not cliticize to the preposition. The DP [$_{DP}$ vier Buch] "four book", however, is ungrammatical, simply because there is no way to adjust the numeral *vier* to a singular noun. In (4-65b), the plural feature from *Punkt* "point" is perseverated. The fact that *Vorsprung* "lead" appears with umlaut proofs that we are not dealing with a mere sound perseveration here.

So far, we have only been concerned with the number feature (i.e. the [+plural]-feature). But what about other morphosyntactic features? Are they capable of shifting and stranding, too? Let us next have a look at the gender feature. In section 4.3, I have argued that gender is an inherent feature of roots and that roots are inserted into a syntactic structure along with their gender feature. That is, roots are more closely related to their gender feature than they are, for instance, to the number feature (the choice of which is due to the message intention of a speaker, i.e. to the activation of a conceptual node MULTIPLE(X) at the conceptual level). It is therefore very unlikely that roots are accessed, e.g. exchanged, in an error leaving their gender feature behind.

What should such an error look like? In contrast to plural stranding, a displaced root would, of course, not be spelled out differently because of a stranded gender feature. The only errors which could possibly be analyzed as instances of gender stranding are those in which two roots are exchanged without subsequent accommodation of the material in D to the new root. There are eight such cases in my corpus, two of which are given in (4-66):[116]

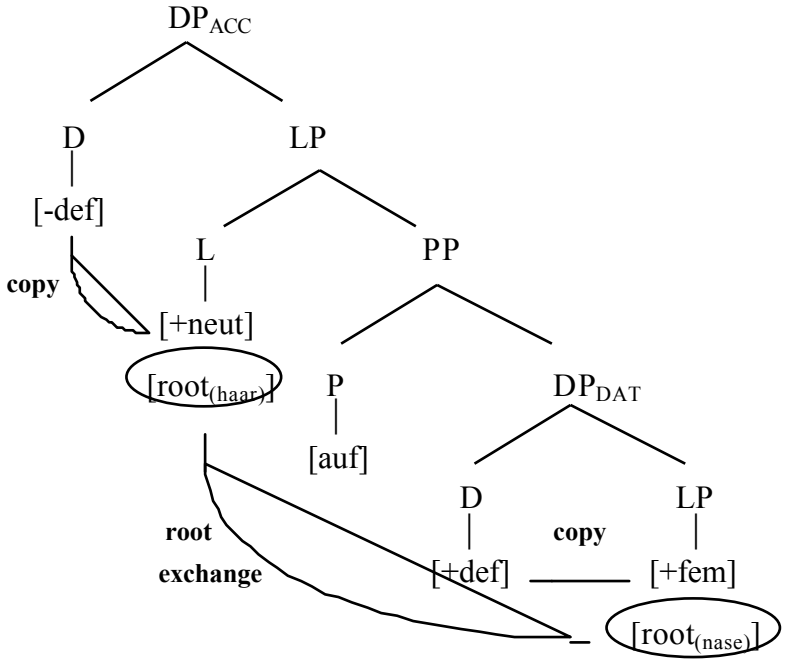
[116] Moreover, there are two root anticipations that result in a gender conflict, e.g. *Holst du mir in der **Handtuch** das Küchenhandtuch?* ← *in der Küche das Küchenhandtuch* 'Fetch you for.me in the.f. towel(n.) the.n. kitchen.towel(n.)'. The analyses sketched below for the root exchanges in (4-66) can also be applied to the root anticipations.

(4-66) *Errors possibly involving stranding of the gender feature*

a. da bringt er dem **Hasen** den **Kind**
there brings he the.SG.m/n.DAT rabbit(m.) the.SG.m.ACC child(n.)
← dem Kind den Hasen
← *the.SG.n.DAT child(n.) the.SG.m.ACC rabbit(m.)*

b. ich hab' ein **Nase** auf der **Haar**, äh,
I have a.SG.n.ACC nose(f.) on the.SG.f.DAT hair(n.), er,
ein Haar auf der Nase
a.SG.n.ACC hair(n.) on the.SG.f.DAT nose(f.)

b'.



In both of the above examples, two roots change place, the determiners, however, appear with the gender features of the original roots. Consequently, both of the utterances are ungrammatical (only the DP [$_{DP}$ dem Hasen] in (4-66a) happens to be fully grammatical because in the dative, the definite article is the same for neuter and masculine nouns). A possible analysis for the slip (4-66b) is sketched in the structure in (4-66b'). Assuming that the gender features have stranded, these features will be copied onto the D-positions and the matching Vocabulary items will be inserted: /ain/ for [-def][+neut][ACC] and /de:å/ for [+def][+fem][DAT]. Note that following this interpretation of the facts, the errors in (4-66) do not constitute instances of anti-agreement within DP (cf. subsection 2.2.2), since the (stranded) gender feature associated with the root and the gender feature of the determiner are the same.

A serious problem, however, concerns the insertion of Vocabulary items for the exchanged roots. Remember that in section 4.3, I have argued that Vocabulary items, too, are specified for grammatical gender. But following this assumption, the two Vocabulary items /ha:å/ and /na:z´/ do, of course, not match their respective terminal nodes with respect to the gender feature. Halle & Marantz (1993) point out that at the point of Vocabulary insertion, the Vocabulary is searched for the entry that best matches the content of a given terminal node. It is true that Vocabulary items may be underspecified for a given feature in a terminal node but none of their morphosyntactic features may conflict with a morphosyntactic feature present in that node. Consequently, the insertion of the entries /ha:å/ and /na:z´/ should be blocked.[117]

Alternatively, we might think of the root exchanges in (4-66) as taking place at the level of MS after the respective gender features have been copied onto the determiners. Only then are we in fact dealing with instances of anti-agreement within DP, since the exchanged roots (which take along their gender feature) do not agree with their determiners with respect to the gender feature.[118]

As far as other types of displacement of the gender feature are concerned, there are hardly any informative errors in my corpus. Three out of nine errors which may be analyzed as a gender perseveration, anticipation, or exchange, respectively, are given in (4-67). These errors are different from the ones discussed above in that they all involve pronouns. While Vocabulary insertion for a root is not influenced by the gender feature of that root (i.e. the phonological form of the Vocabulary item is not affected by the gender feature), the phonological form of a pronoun crucially depends on the gender feature contained in the terminal node.

(4-67) *Perseveration and exchange of the gender feature*

a. die Frau hat **ihren** ganzen Kram, hat seinen ganzen Kram
the woman(f.) has her whole stuff(m.) has his whole stuff
auf die Straße gestellt
on the street put

b. er kommt aus einem Ort, **das** aus drei Häusern besteht
he comes from a.m village(m.) which.n of three houses(n.) consists

[117] The only way to save the gender stranding analysis would be to assume a flaw at Vocabulary insertion. That, is, the Vocabulary items which best match the features of the terminal node are selected and inserted in spite of the feature conflict that arises. However, an explanation along these lines, i.e. the assumption of a second error, seems to be very unlikely.

[118] A third possibility might be to analyze slips like the ones given in (4-66) as phonological errors occurring after Vocabulary insertion has taken place.

←	einem	Ort,	der ...	besteht
←	*a.m*	*village(m.)*	*which.m ...*	*consists*

c. **er** hat **ihr** einen Schock versetzt,
3.SG.m.NOM has 3.SG.f.DAT a shock given
sie hat ihm einen Schock versetzt
3.SG.f.NOM has 3.SG.m.DAT a shock given
"She has given him a shock." (Berg 1987:282)

In (4-67a), the possessive pronoun erroneously appears in its feminine form. One might hypothesize that this gender feature is perseverated from [root$_{(frau)}$] "woman". Note that the possessive pronoun has two distinct gender features. Firstly, the gender feature [+feminine] of the wrong antecedent *Frau* is responsible for the selection of *ihr* "her" over *sein* "his". Secondly, within DP, the [+masculine] feature of [root$_{(kram)}$] "stuff" is copied onto D, this feature (in combination with the case feature) being responsible for the appearance of the suffix *-en*.

In the singular, spell-out of a relative pronoun also depends on the gender feature that is copied onto that relative pronoun. In the example (4-67b), a wrong root was selected as antecedent, viz. [root$_{(haus)}$] "house"which follows the pronoun in the relative clause and which is associated with a [neuter] feature. Consequently, the neuter pronoun *das* is inserted.[119]

For the error in (4-67c), two alternative analyses are available. On the one hand, this slip can be analyzed as an exchange of only the gender features of the two pronouns. On the other hand, however, we may also assume that the whole content of the two terminal nodes is exchanged, one node containing [3rd] and [+fem], the other containing [3rd] and [+masc]. At both landing sites, case features will be added and the appropriate Vocabulary items will be inserted.

Due to the scarcity of data and to the unclear status of the examples discussed in connection with the gender feature, it is - in contrast to the [+plural] feature - not at all clear if this feature can in fact be manipulated separately, i.e. if roots can be exchanged leaving their gender feature behind or if the gender feature alone can be exchanged or shifted in an error. At least for pronouns - i.e. whenever feature copy is involved - perseveration and anticipation of a gender feature seems possible.

The third feature to be considered in this section is the tense feature. The tense feature behaves, of course, somewhat differently from the features discussed so far, since it does

[119] Erroneous copy of a gender feature onto a relative pronoun is also involved in the errors in (4-34) at the end of subsection 4.4.1 ("Local Agreement"). However, in the two slips cited in (4-34), the pronouns agree in gender with a local noun that is part of a phrase that modifies the head noun.

not share a terminal node with a root; rather, it heads a projection of its own. In the syntax, a root that is licensed by a light verb will raise and adjoin to Tns and consequently, this root and Tns are sisters under a Tns node. In an error, two such roots may be exchanged leaving the adjacent Tns nodes behind. We may therefore speak of the Tns information as being stranded, but still we should keep in mind that this kind of stranding is structurally different from the one discussed before (in the context of the number and the gender feature).

For exemplification consider the following three exchange errors:

(4-68) *"Stranding" of tense features*

a. es **droh**-te zu **schein**-en ← es schien zu droh-en
it threat-PAST to seem-INF ← it seem.PAST to threat-INF

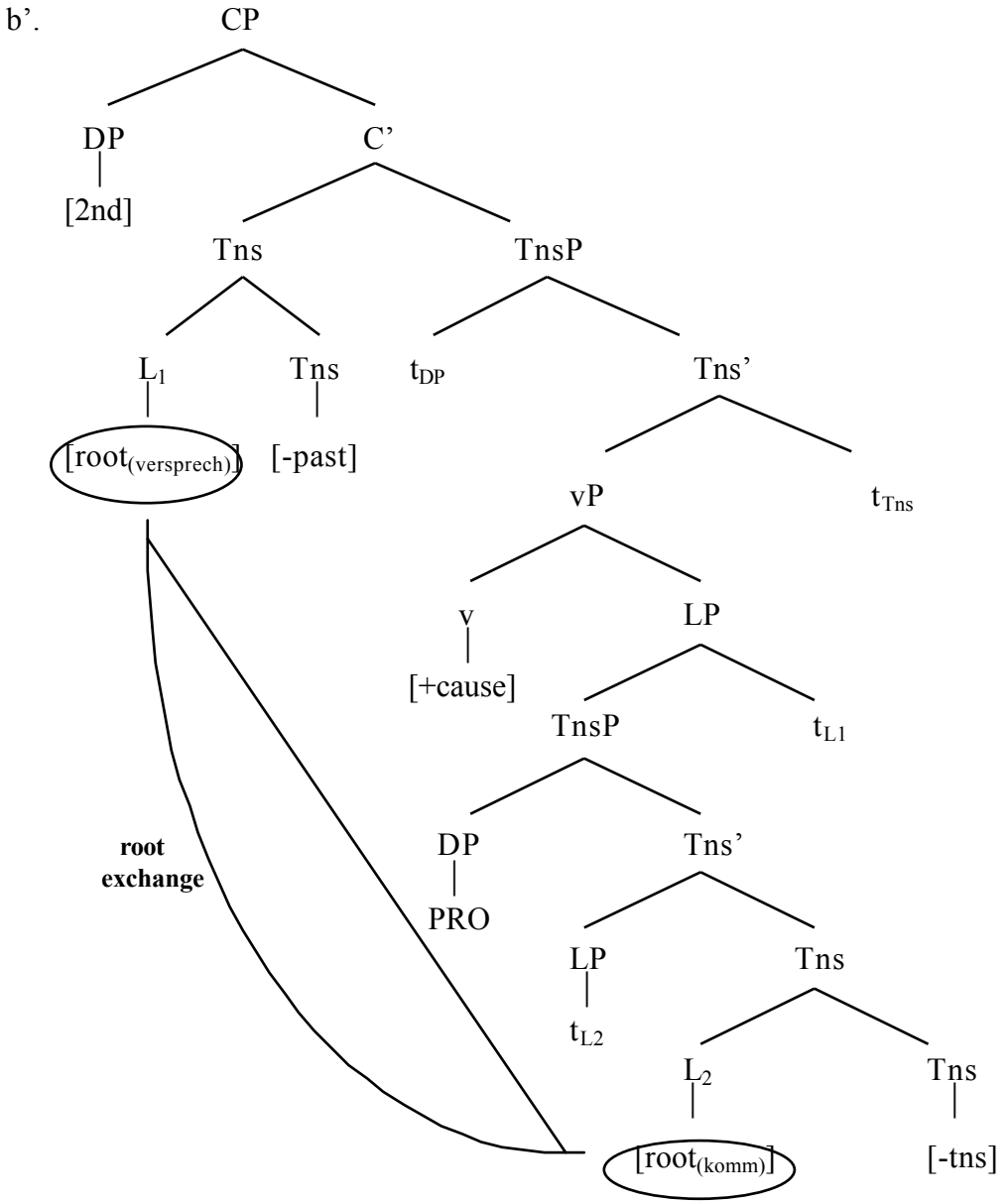
b. du **komm**-st zu **versprech**-en ← versprich-st zu komm-en
you come-2.SG to promise-INF ← promise-2.SG to come-INF

c. I don't know that I'd **hear** one if I **knew** it
← that I'd know one if I heard it (Garrett 1980b:264)

All examples in (4-68) are biclausal and involve the exchange of roots. In (a), [root$_{(schein)}$] "seem" and [root$_{(droh)}$] "threat" change place and are combined with the "stranded" tense information of the other root. For the former root, ablaut formation (/_i:n/) is not triggered in the new [-tns] environment. The error in (b) is very similar: [root$_{(versprech)}$] "promise" and [root$_{(komm)}$] "come" are exchanged, and again, the former root does not surface in its ablaut form (/fɛå_prIç/) in the new environment. In the English example in (c), [root$_{(know)}$] and [root$_{(hear)}$] are exchanged and both appear in their correct phonological form. Moreover, [root$_{(know)}$] does not take the regular past tense suffix *-d* in the error.

A syntactic structure for the error in (4-68b) is given in (4-68b'):

(4-68) *Syntactic structure (prior to root exchange) for the slip (4-68b)*



We are not in a position, though, to unambiguously decide whether the two roots are actually exchanged after having been adjoined to Tns (as indicated in the above structure) or whether they are exchanged before head movement has applied, i.e. while still taking the positions t_{L1} and t_{L2}, respectively, in which they are in fact structurally closer to each other. The same is true for the other two root exchanges in (4-68).

There are only very few instances in which tense features are perseverated or exchanged. Fay (1980b) and Stemberger (1985) report some errors of this kind; in my corpus the only relevant slip is the one given in (4-69a). In this error, the feature [+past] is

perseverated and is substituted for the [-tns] feature. Consequently, both verbs appear in their past tense form which is realized by ablaut on the verb *kommen* "to come".

(4-69) *Perseveration and exchange of tense features*

a. er wollte **kam**, äh, er wollte komm-en
he wanted came, er, he wanted come-INF

b. I **wind** up **rewrot**-ing twelve pages
← I wound up rewriting (Stemberger 1985:163)

c. they're just clouds that are **been** divert-**ing**, that are being divert-ed from the north (Stemberger 1985:163)

In the very interesting and extraordinary slip in (4-69b), the [+past] feature is shifted from *wind* to *rewrite*. In the intended utterance, however, [root$_{(rewrite)}$] is not supposed to appear with any tense feature at all; rather, it is adjoined to an aspectual head (containing a [continuative] feature). In the error, the aspectual feature is not substituted for by the tense feature (which would have given rise to *I wind up rewrote twelve pages*); rather it enriches the featural make-up of the structure under the Asp node. The tense feature (or the Tns node) is adjoined to the L-node containing [root$_{(rewrite)}$] and this root is spelled out accordingly. Still, the aspectual feature - which, of course, is incompatible with the feature [+past] - is also spelled out.

(4-69c) is the only good example from the corpus of Stemberger (1985) in which two features (according to Stemberger "two affixes") fully exchange, namely a tense and an aspectual feature. In this error, a [+past] feature takes the place of a [continuative] feature, and vice versa.

With regard to stranding and shift of the tense feature, there are also some problematic cases which do not receive a straightforward explanation in the present framework. One such tricky case is cited in (4-70a). At first sight, this error looks like an anticipation of [root$_{(kauf)}$] "buy" with stranding of the tense feature [+part]. However, the participle form of *kaufen* is *gekauft* while *verkauft* (as it appears in the error) is the participle form of the verb *verkaufen* "to sell". Consequently, anticipation of [root$_{(kauf)}$] should have given rise to the sequence *was ich ge-kauf-t habe* 'what I buy-PART have'. Obviously, a part of the intended verb *vergessen* "to forget" was left behind. But this implies that [root$_{(vergess)}$] as a whole is not substituted for by [root$_{(kauf)}$] (note that *ver-* in *vergessen* is a pseudo-prefix). Alternatively, we may argue that we are dealing with a

merely phonological anticipation here, i.e. anticipation of /kauf/. But then we are facing the problem that there is no way to account for the insertion of the appropriate participle morpheme. If the error had in fact occurred after Vocabulary insertion, then the utterance **was ich verkauf-en habe* should have surfaced. Therefore, this error - as simple as it may look at first sight - remains unexplained.

(4-70) *Two intricate errors*

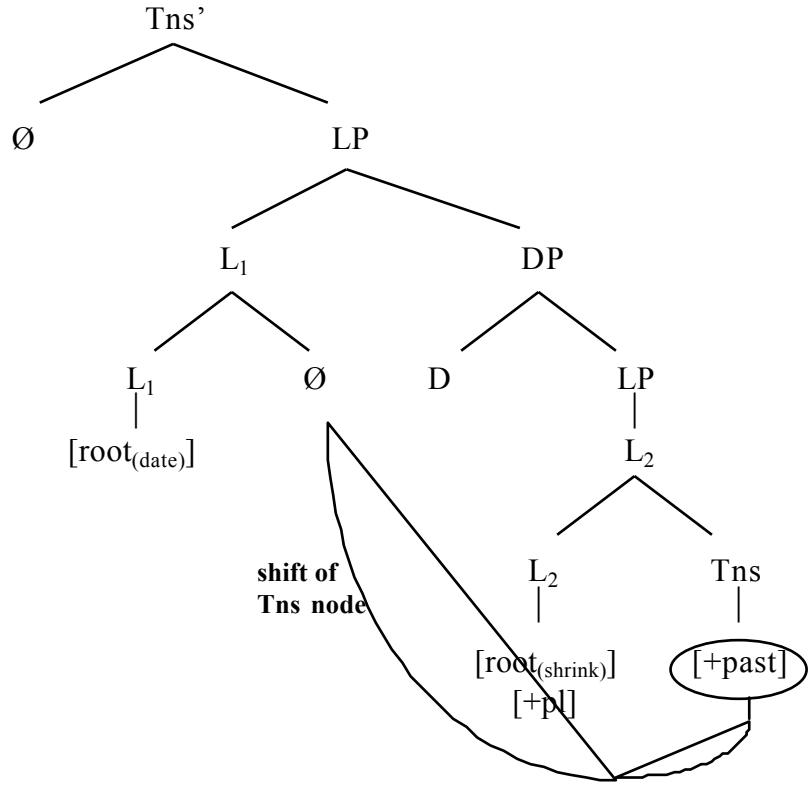
a. ich weiß, was ich ver**kauf**-t habe, was ich vergess-en habe zu kaufen
I know what I sell-PART have what I forget-PART have to buy

b. Rosa only date **shrank**s ← Rosa only dated shrinks (Fromkin 1973a:32)

Another particularly intricate error is the one given in (4-70b). This was Victoria Fromkin's favourite slip, probably one of the most-cited errors of all times. In this error, the [+past] feature is shifted. In a model in which categorial specification of nodes is assumed, this feature is shifted from a verb to a noun (which possibly has a verbal base); in DM terms, however, the Tns node which - after merger of Tns with the l-node L_1 - is sister to L_1 is shifted and adjoins to the acategorial l-node L_2, as indicated in the structure below:

(4-70) *Structure for the error (4-70b) after shift of the tense node*

b'.



Note that in this example, we cannot assume that only the tense feature is shifted, since there is no other Tns node the place of which it might take. Rather, we must assume that the Tns node is shifted and adjoins to L_2. At Morphological Structure, the Vocabulary item /_rINk/, which is licensed by a determiner, will be inserted; this Vocabulary item will subsequently undergo phonological readjustment (ablaut) in a [+past] context. Still, due to

the [+plural] feature, Vocabulary insertion will also supply a plural suffix. Probably, the most awkward thing about this particular error is that the Tns node is adjoined to an l-node which is licensed by a determiner, a fact that is definitely unexpected. Possibly the adjunction process - in contrast to Vocabulary insertion - is blind with respect to the licensing environment of the node it targets.

Last but not least, I shall have a look at the case feature in language production. Once again, we are dealing with different structural facts. Originally, a case feature is neither associated with an l-node (as e.g. the gender and number features are) nor is it base-generated under an f-node (as e.g. the tense feature). Rather, a case feature is assigned to a DP according to the case-assignment properties of a lexical item. From the DP, the case feature will percolate down to all elements dominated by this DP.

In connection with errors such as those given in (4-71) below, I have been speaking of "case stranding" in subsection 2.4.1. However, as with the tense feature discussed before, the term "stranding" is not quite accurate in this context, since the case feature does not necessarily share a terminal node with other features when the error occurs. In other words, for the errors in (4-71), it is quite possible that the exchanges take place before the respective case features have percolated down to the terminal nodes. Use of the term "stranding" is therefore only justified insofar as in the erroneous utterance, the same case features are assigned to the same DPs as in the intended utterance.

(4-71) *"Stranding" of case features*

a. was mich zu **mir** führt ← mich zu Ihnen führt
what 1.SG.ACC to 1.SG.DAT brings ← 1.SG.ACC to 3.PL.DAT(polite) brings
"what brings me to you"

b. bis **er**'s bei **dir** abhol-t,
until 3.SG.m.NOM'it from 2.SG.DAT pick.up-3.SG
bis du's bei ihm abhol-st
until 2.SG.NOM'it from 3.SG.m.DAT pick.up-2.SG
"until you pick it up from him" (Berg 1987:282)

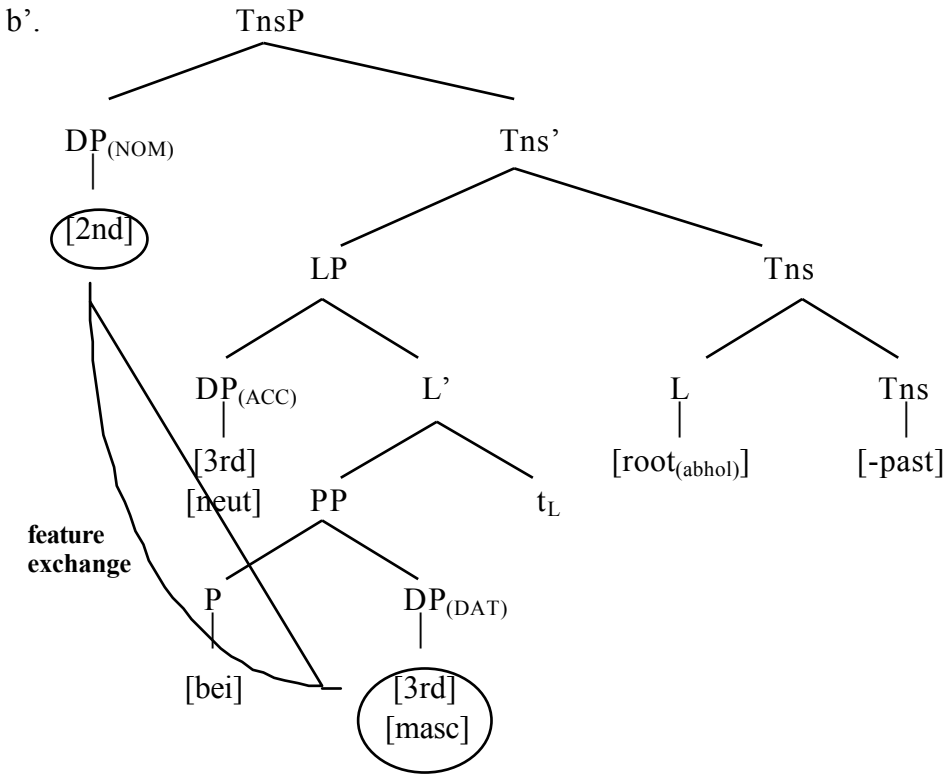
c. **you** must be too tight for **them** ← they must be too tight for you
(Stemberger 1982a:345)

The slip in (4-71a) is a perseveration of the person feature [1st]; in combination with the case feature [DAT], which is assigned by the preposition *zu* "to", this person feature will be

spelled out as /mi:å/. In (b), the person feature [2nd] changes place with the person feature [3rd] and the gender feature [+masc], the case properties, however, remain unaltered. The Vocabulary item for a terminal node containing the features [3rd], [+masc], and [NOM] is /e:å/, while the item for the feature complex [2nd] and [DAT] is /di:å/. Moreover, after the exchange, the appropriate feature is copied onto the AgrS node, i.e. the verb appears in its 3rd person singular form in the erroneous utterance. Finally, in (4-71c), the feature [2nd] (and possibly [+plural]) changes place with the features [3rd] and [+plural]. Once again, case (nominative and accusative, respectively) is assigned to the same DP positions as in the intended utterance.

Below, I present a syntactic structure for the slip in (4-71b). Note that the case specification of the DPs is indicated in brackets, since it is also possible that the features are exchanged before case assignment has taken place.

(4-71) *Syntactic structure for (4-71b) before feature exchange*



While in the above examples, case features are assigned to the same positions within a syntactic structure before and after the exchange of person and number features has taken place, there are also some instances in which case features are assigned to a different DP projection in the error. In (4-72), you will find one perseveration of a case feature as well as one exchange of case features.

(4-72) *Perseveration and exchange of case features*

a. ich bin mir fast sicher, dass er sie **mich**, äh,
I am REFL almost sure that he 3.SG.f.ACC 1.SG.ACC, er,
dass er sie mir ausspannen wollte
that he 3.SG.f.ACC 1.SG.DAT pinch wanted
"I am almost sure that he wanted to pinch her from me."

b. (er/sie) stellte **mich** **ihm** vor,
(he/she) introduced 1.SG.ACC 3.SG.m.DAT PARTICLE
mir ihn vor
1.SG.DAT 3.SG.m.ACC PARTICLE
"(He/she) introduced him to me." (Berg 1987:283)

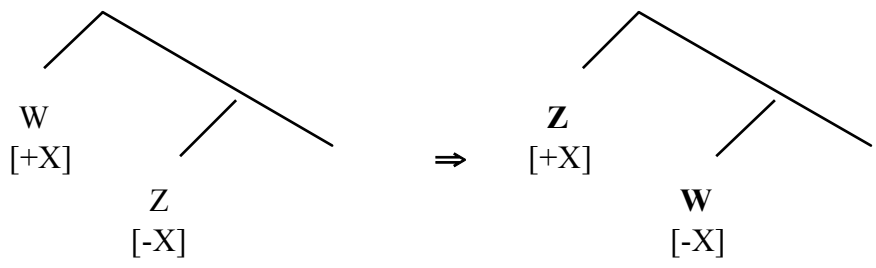
In (4-72a), the verb *ausspannen* "to pinch" requires three case-marked arguments, one nominative, one accusative, and one dative. In the error, however, the accusative feature is perseverated, i.e. accusative is assigned twice, thereby violating the subcategorization properties of the verb. The verb *vorstellen* "to introduce" in (4-72b), too, requires a nominative, an accusative, and a dative argument. In the slip, all three of them are assigned, the accusative and dative, however, change place. Since in German, the order of accusative and dative arguments is fairly free, the erroneous utterance in (b) is not ungrammatical; it just reverses who is introduced to whom: in the error, it is said that I was introduced to someone, while in the intended utterance, someone was introduced to me.

In this section, I have considered the possibilities of shift and stranding of abstract features in language production. Since prior to Vocabulary insertion, abstract features are manipulated and assigned, respectively, it is worthwhile investigating if their manipulation or assignment may be subject to errors.

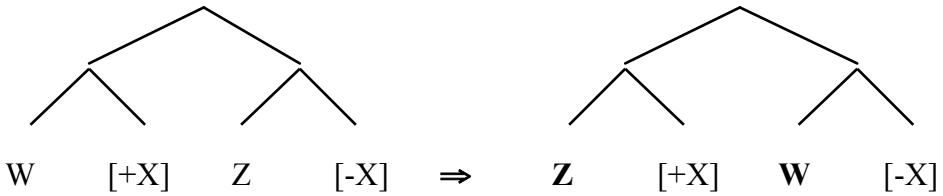
As expected, errors involving morphosyntactic features are observed. Firstly, all features except the gender feature may be left behind when a root or other features are exchanged. However, there are qualitative differences: Only the number feature shares a terminal node with a root, while the tense feature heads a projection of its own and the case feature is assigned to an argument DP. The different structural conditions for the three features are sketched in (4-73) (the exchanged elements are in bold-face).

(4-73) *Schematized structures for stranding of number, tense, and case features*

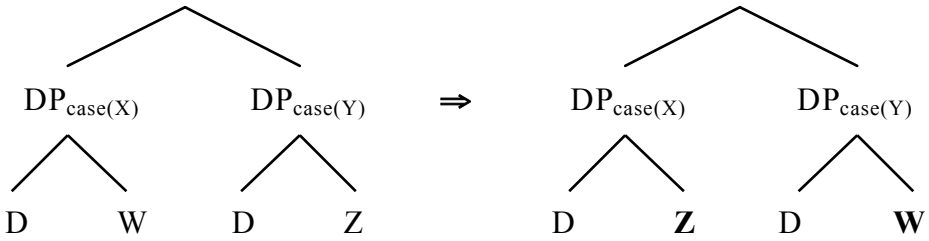
a. number feature:



b. tense feature:



c. case feature:



I assume that stranding of gender features is not observed, since gender is an inherent feature of a root and can therefore not be separated from that root in a root exchange.

Secondly, abstract features may also be displaced in various ways. Note that the structures in (4-73) only represent root exchanges (only in (4-73c) may W and Z also be features, as e.g. in (4-71) above). However, the examples discussed in this section have made clear that all features - gender as well as number, tense, and case - may also be anticipated, perseverated, shifted, or exchanged in an error. With respect to the structures in (4-73), this implies that the elements W and Z stay in their original position but [±X] or case(X/Y) are affected by the error.

4.7 Rethinking Accommodation

Ein Wort, das hilft,
ist nie ein schlimmes Wort.*
(Sophokles, Elektra)

Before concluding this chapter with the detailed discussion of three particularly intricate speech errors, I shall once again consider the notion of accommodation. Accommodation is

* "A word that helps is never a bad word."

a phenomenon that has fascinated psycholinguists for a long time and it is therefore worthwhile to carefully reconsider this phenomenon in the light of the remarks made in the previous sections.

In subsection 2.4.2, I have already pointed out the important difference between "context accommodations" and "error accommodations". Let me briefly repeat the basic facts. According to Berg (1987:279), in a context accommodation, the error unit - be it a phoneme, a morpheme or a word - affects the context, while in an error accommodation, the context affects the error unit. The two types of accommodation are illustrated by the examples in (4-74).

(4-74) *"Context accommodation" versus "error accommodation"*

a. der Unterschied von Frage-satz und normaler **Frage**
the difference between question-sentence and normal.f question(f.)
← und normalem Satz
← *and normal.m sentence(m.)*

b. der **Sprung**, äh, der Funke spring-t hier über
the jump, er, the spark jump-3.SG here over

c. **du** behinder-st **sie**, sie behinder-t dich
2.SG.NOM hinder-2.SG 3.SG.f.ACC, 3.SG.f.NOM hinder-3.SG 2.SG.ACC
"You hinder her, she hinders you."

In example (4-74a), *Frage* "question" (which is part of a compound) is perseverated. At its landing site, the context, i.e. the adjective *normal*, accommodates to the gender feature of the error element *Frage*. Therefore, we are dealing with a context accommodation here. In (4-74b), [$root_{(spring)}$] is anticipated. In contrast to the first example, the root itself changes its phonological form at the landing site, i.e. the error element is spelled out according to the requirements of the new environment. Therefore, this slip exemplifies a so-called "error accommodation". Finally, the error cited in (4-74c) is a combination of both types of accommodation: both pronouns are realized according to the respective case specifications (error accommodation); moreover, the verb accommodates to the new pronoun in subject position with respect to its person specification (context accommodation).

In subsection 4.7.1, I will once again be dealing with the so-called context accommodations. Most importantly, I am going to propose that no repair strategies are involved in context accommodations. Subsequently, I am going to consider error instances

in which accommodation is not observed, i.e. errors that violate well-formedness restrictions, in subsection 4.7.2.

4.7.1 *Against Repair Strategies*

In subsection 2.4.2, I claimed that only context accommodations really deserve to be called accommodations, since only they allow for an interpretation as errors involving two steps: firstly, the error itself; secondly, the adaptation of the environment to certain grammatical well-formedness restrictions (e.g. agreement within DP, subject-verb agreement). Error accommodations, I have argued, are in fact a special type of stranding errors (cf. section 4.6). The slip in (4-74c), for instance, is of the type schematized in (4-73c) above: person/gender features are exchanged, but the case features are assigned to DPs as intended. The combination of the exchanged features with the respective case features gives rise to the insertion of the appropriate Vocabulary items; no second error step is involved. The situation in (4-74b) is somewhat different: in that error, an abstract root is anticipated. Spell-out of this root depends on the licensing environment in which it appears; in a [+d] environment, it will be spelled out as /_prUN/. In that case, we may therefore speak of a "stranded" licenser which is responsible for the accommodatory process. Again, no second error step is involved.

In the following, I am going to reconsider context accommodations. In doing so, the concept of accommodation will be further modified, or, to put it differently, it will be further weakened. Berg (1987:277) states that an accommodation is "a process whereby a processing conflict between the actual error and the context of the original utterance is reconciled". He assumes that this is evidence for the fact "that the processing system is sensitive to the eventual output" and that "[a]ccommodation can thus be viewed as a blind repair process which brings utterances in line with linguistic constraints". In contrast to Berg, I am going to claim (a) that no processing conflict is reconciled in a context accommodation, (b) that therefore no repair strategy is involved (not even a "cost-free" adaptation; cf. Leuninger & Keller 1994:89), and (c) that output-oriented processing need not be assumed for context accommodations.

In principle, we are dealing with a processing conflict whenever two nodes stand in an agreement relationship, but a feature contained in one node does not match the feature

contained in the other. Moreover, such a conflict may arise when a stem appears with a suffix - be it derivational or inflectional - that does not meet the stem's subcategorization requirements. Consider the following examples:

(4-75) *Reconcilation of processing conflicts?*

a. **you**'re too good for **that** ← that's too good for you
(Stemberger 1982a:344)

b. er hat das **Geld** voller **Tasche-n**
he has the.SG.n.ACC money(n.) full.of bag-PL
← die Tasche-n voller Geld
← *the.PL.ACC bag-PL full.of money(n.)*

c. ich bin mir sicher, dass noch viele Christen an den **Glaub**-e-n
I am REFL sure that still many Christians in the.m.ACC belief-N-ACC
aufersteh-en ← an die Aufersteh-ung glaub-en
resurrect-3.PL ← in the.f.ACC resurrect-N believe-3.PL

d. angesichts des **Haus**-es unserer **Farbe**-n
in.view.of the.SG.n.GEN house(n.)-GEN of.our colour(f.)-PL
← der Farbe unserer Häus-er
← *the.SG.f.GEN colour(f.) of.our house-PL*

According to Berg's (1987) analysis, the following processing conflicts are reconciled in the above examples: a feature conflict between the subject pronoun *you* and the copula verb in (4-75a), a feature conflict between the noun *Geld* "money" and the definite article in (b), conflicts between the stem *glaub* "believe" and the intended nominalizing suffix[120] as well as between the noun *Glaube* and the definite article in (c), and, finally, conflicts between the noun *Farbe* "colour" and the plural suffix as well as between the noun *Haus* "house" and the definite article in (d). Presumably, in each of the examples, the processor 'sees' the conflict that - due to the error - is about to arise and applies a repair strategy in order to prevent the conflict. Consequently, in each of the examples, the appropriate verb, determiner, and/or suffix is chosen.

However, following DM assumptions, the reasoning is different. Most importantly, none of the elements that are responsible for the processing conflict - be it a feature or a suffix - is present when the error takes place. The verb is not yet specified for person/number features, the determiner is not yet specified for a gender feature, and plural as well as derivational suffixes have not yet been inserted.

In all of the slips given in (4-75), a root (or feature) exchange occurs within the computational system, i.e. before the level of Morphological Structure. After the exchange has taken place, various operations are executed at MS and PF. Firstly, an agreement node is implemented as sister of the Tns node and features of the subject DP are copied onto the AgrS node. In (4-75a), the relevant feature in subject position is [2nd] (or possibly [+pl]); the appearance of this feature in AgrS gives rise to the insertion of the item /A:^{r}/ at PF (which subsequently cliticizes to the pronoun). Secondly, in the German examples

[120] Wurzel (1970) as well as Wiese (1996) assume that the noun-final schwa in words such as *Glaub-e* is a derivational, noun-forming suffix. Wiese (1996) points out that *-e*, just like any other derivational suffix, determines its plural marker, the corresponding plural suffix being *-n*. Moreover, word-final schwa does not occur if another derivational suffix is attached (e.g. *gläub-ig* "devout", *glaub-haft* "believable").

Alternatively, one might, of course, assume that schwa is deleted under certain circumstances (cf. Kloeke 1982). But even then, a processing conflict is reconciled in (4-75c), since the conflicting nominalizing suffix *-ung* is deleted.

(4-75bcd), gender features of an exchanged root are copied onto the determiner. The [+def] feature in D together with the copied gender feature, the case and the number feature

triggers the insertion of the respective Vocabulary items (note that in (4-75b), two roots are exchanged along with their number features while in (4-75d), we observe number stranding). Thirdly, morpheme insertion rules apply at PF; these rules take into account the subcategorization properties of roots. For [$root_{(glaub)}$] in (4-75c), for instance, the suffix /-´/ is inserted in a [-v][-deg] environment. Moreover, at MS, the appropriate plural allomorph /-n/ is selected in (4-75d). The insertion of this plural suffix, however, is not due to a morpheme insertion rule but rather to a competition amongst a number of allomorphs all of which realize the [+pl] feature.

All of these operations apply anyway, no matter which root appears in a given terminal node. For the processor, it does not make any difference (in terms of a processing effort) what feature is copied (onto AgrS or D) or what morpheme is inserted. Consequently, the errors in (4-75) above do not involve the application of control mechanisms or repair strategies of any kind. Rather, it is only the application of regular MS operations that gives rise to a fully grammatical surface form.

This, in turn, implies that context accommodations are not accommodations at all, as was claimed in subsection 2.4.2, and neither are they cost-free adaptations of errors to grammatical well-formedness restrictions. Still, different types of mechanisms are to be held responsible for the well-formedness of the errors that were classified as context accommodations. On the one hand, the slips that I have subsumed under the term "morphosyntactic accommodation" all involve processes of feature copy. That is, no verbs, adjectives, or determiners are accommodated in these errors; these elements just receive a different feature (either from the subject DP or from a root within DP) and are spelled out accordingly. On the other hand, the errors that were termed "morphological accommodation" either involve the application of morpheme insertion rules or a competition amongst allomorphs. That is, no affix accommodates to a new stem, but rather a different suffix is inserted which meets the subcategorization properties of a given root.

But what about the other two types of context accommodations that were distinguished in subsection 2.4.2, namely "phonological" and "morphophonological accommodations"? As a reminder, consider the following three errors:

(4-76) <u>*Phonological and morphophonological accommodations*</u>

a. **p**an**k**eren ← kamperen (Cohen 1965:183)
   (error) ← *to camp*

b. you just count **wheel**-s [-z] on a **light** ← light-s [-s] on a wheel

(Stemberger 1985:162)

c. he **roast**-ed [-Id] a **cook** ← he cook-ed [-t] a roast (Garrett 1976:238)

As a matter of fact, I only came across very few phonological accommodations, i.e. errors in which the context adjusts to an error element with respect to phonological features. In (4-76a), you find a Dutch within-word sound exchange. The phonemes /k/ and /p/ change place and subsequently, the nasal /m/ assimilates to the place features of the adjacent /k/ and surfaces as [N]. If the phoneme /m/ was in fact fully specified for all phonological features, then we had to assume that in the slip, one feature value is changed, that is, that we are dealing with a true context accommodation here. But this is most probably not the case. Within underspecification theory (e.g. Archangeli 1988; Yu 1992; Steriade 1995), it is assumed that certain feature values may be underlyingly unspecified. These values will either be inserted by complement or default rules or they will be determined by processes of assimilation (feature spreading). In Dutch and German, for instance, nasal consonants are not specified for place of articulation; rather, they assimilate to a neighboring obstruent with respect to the place feature. Consequently, in the error in (4-76a), the nasal receives its place feature [velar] from the neighboring /k/ and surfaces as the velar nasal, while in the intended utterance it would have received the feature [labial] from the segment /p/.[121]

Presumably, a similar line of reasoning can be applied to the few other cases of "phonological accommodation". Therefore, these errors, too, need not be analyzed as involving a repair strategy (change of a feature value). Rather, a process of feature spreading that fills in an unspecified feature guarantees that the appropriate phoneme surfaces.[122]

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[121] Cf. Yu (1992:187ff) for an account of nasal assimilation in German. Note that a similar process of assimilation is observed in English, as is exemplified by the two prefixed forms *in-definite* vs. *im-perfect*.

[122] In speech errors, feature spreading is not only observed from an error element onto the context but also from the context onto an (underspecified) error element. There is one phonological error accommodation in my corpus which involves the perseveration of a nasal, i.e. not the segment adjacent to the error element assimilates (as in (4-76a)) but rather the moved segment itself: *Bauerntö**m**pel* ← *Bauerntölpel* "country bumpkin", where the perseverated /n/ assimilates to the place features of /p/ and surfaces as [m].

A similar phenomenon is exemplified by the following slip: *Ich habe den Buch [bUx], Butt und die Blechtrommel [blɛç] geschrieben* 'I have the "Butt" and "Die Blechtrommel" written' (Berg 1993:61). In this error, the anticipated palatal [ç] appears as the velar [x] in its new position. The distribution of the two dorsal fricatives is fully predictable: [x] appears after back vowels only, while [ç] appears in all other positions, i.e. [x] and [ç] assimilate to the feature [α back] of the preceding segment.

Therefore, Yu (1992) and Wiese (1996) propose to use /X/ as an abbreviatory symbol for the underspecified segment from which the dorsal fricatives [ç] and [x] are derived, this underlying segment being specified only for the features [+cons], [+cont], and [dorsal] (cf. Berg (1991) and Stemberger (1991) for discussion of redundant features and underspecification in language production).

In morphophonological accommodations, the choice of a particular allomorph is determined by phonological factors. In English, such conditioned allomorphy is observed e.g. for the plural suffix (4-76b) and for the past tense suffix (4-76c). In the examples (4-76bc), number and tense features, respectively, strand and at PF, the appropriate suffixes are selected from the Vocabulary.

There are two possibilities to account for the correct spell-out of these suffixes. Firstly, we may assume that there is only one underlying (tense or plural) morpheme that is underspecified for a certain feature (e.g. [±voice] for the plural morpheme), the specification of this feature depending on the context of insertion. Moreover, a default vowel insertion rule will apply in certain contexts. Alternatively, the Vocabulary may contain several items that compete for insertion under a given node, each item specifiying the context in which it may be inserted (e.g. [+past] ←→ /-t/ / Z +___, where Z = *cook*, *dwell*, *buy* ...; cf. Halle & Marantz 1993:125f). No matter which of the two positions one adopts, for both it is true that accommodation of the suffix need not be assumed. Once again, we must not call upon the service of a costly repair strategy. Rather, we are either dealing with a spreading rule (option 1) or with competition amongst Vocabulary items (option 2), both of which are not triggered only in the erroneous utterances but would have been effective in the intended utterances in exactly the same way.[123]

Since all the processes that determine the surface form of the slips in (4-76) depend on the phonological form of Vocabulary items, it is clear that they must apply after Vocabulary insertion has been executed. We must further assume that roots are spelled out before morphosyntactic features (such as [+pl] of [+past]), since spell-out of the latter may depend on phonological properties of a root. Consequently, the sequence of PF operations is roughly the following: Firstly, Vocabulary items for roots are inserted. Secondly, phonological readjustment rules apply; these may either be triggered by a licensing element (e.g. *destroy* → *destruct* in a [-v][-deg] environment) or by a

[123] It is not entirely clear if the same strategy can be applied to the accommodation of definite and indefinite articles, as e.g. observed in *if you give the [T´] nipple an infant* ← *the [Ti:] infant a nipple* (Garrett 1976:238). That is, it is not clear if there are two allomorphs for each article, the insertion of which depends on the first segment of the following word, or if we are dealing with a phonetic phenomenon here, comparable e.g. to liaison in French. It is clear that in the former case, the insertion of Vocabulary items for nouns must precede the insertion of the articles, the Vocabulary items for the articles specifying the appropriate phonological context for insertion.

A similar phenomenon is observed in Italian, where the selection of definite determiners is influenced by a noun's gender feature (as in German and French) and for masculine determiners also by phonological characteristics of the word that follows the determiner. That is, the gender feature determines only the allomorphic set of determiners (*il* and *lo* in the singular, *i* and *gli* in the plural) while the choice of one of the allomorphs over the other depends on phonological factors (cf. Miozzo & Caramazza 1999).

morphosyntactic feature (e.g. *swim* → *swam* / [+past]). Thirdly, morpheme insertion rules apply. Fourthly, morphosyn-tactic features are spelled out and fifthly, within-word assimilation rules apply.

This sequence of operations is exemplified by the German noun *Kränk-ung-en* ([krɛNkUN´n]) 'insult-N-PL' (note that the /N/ in the Vocabulary item indicates that this segment is underspecified for place features):[124]

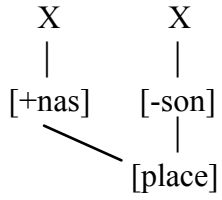
(4-77) *PF operations for the German noun "Kränkungen"*

a. $[root_{(krank)}]$ ←→ /kraNk/ — Vocabulary insertion (root): ⇒ /kraNk/

b. [+back] → [-back] / [-v][-deg] — Phonological readjustment: ⇒ /krɛNk/

c. Insert /-UNg/ / X + [-v][-deg], where X = *kränk*, ... — Morpheme insertion rule: ⇒ /krɛNkUNg/

d. [+pl] ←→ /-´n/ / X-UNg + ___ — Vocabulary insertion: ⇒ /krɛNkUNg´n/

e.


Nasal assimilation (and *g*-deletion): ⇒ [krɛNkUN´n]

To sum up: In this subsection, I have argued against repair strategies in language production. In particular, I have claimed that the different types of context accommodations that were distinguished in subsection 2.4.2 in fact result from the application of various mechanisms and rules, all of which apply anyway in the derivation of an utterance. Consequently, no second error step or control mechanism must be assumed for these errors.

I have shown that morphosyntactic accommodations are due to processes of feature copy at MS (e.g. gender copy onto D in German). In contrast to that, morphological, morphophonological, and phonological accommodations all involve the application of different PF operations. Morphological accommodations, for instance, are due to morpheme insertion rules (choice of appropriate derivational suffix) or to competition

[124] Etymologically, the verb *kränken* "to insult" is a causative of the adjective *krank* "sick", meaning "to make sick". Still, it is very well possible that there is a separate root $[root_{(kränk)}]$. If this is the case, then the operation (b) in (4-77) is superfluous. Also note that the sequence of the operations (b) and (c) might be reversed, i.e. morpheme insertion might apply before phonological readjustment (here: umlaut) of the stem.

amongst Vocabulary items which realize the same features but have different context specifications (e.g. choice of plural suffix in German). The reason for morphophonological accommodations, I have claimed, is either a competition amongst alternative Vocabulary items or assimilation of an underspecified suffix (e.g. English past tense and plural allomorphs). Finally, phonological accommodations result from underspecification and feature spreading (e.g. nasal assimilation).

Still, there is one important exception to the generalization made above that repair strategies play no role in language production; these are the slips involving lexical construal (or lexical control). Consider the following two examples:

(4-78) *Errors involving lexical construal*

a. und die macht keinen **Kummer**, keinen Finger krumm
and she makes no grief no finger bent
"and she does not lift a finger"

b. durch die **Kutsche** latschen ← durch die Küche
through the coach wander ← through the kitchen

Both errors in (4-78) are anticipations that occur after Vocabulary insertion. In (4-78a), the word (or possibly the syllable) /krUm/ is anticipated while the pseudo suffix *-er* is stranded.[125] The expected non-word /krUmå/, however, does not surface. Similarly, in (4-78b), the sequence /t_/ is anticipated but the non-word /kYt_´/ is not uttered. Note that both forms could have arisen, since neither of them violates the phonotactic restrictions of German. Still, they are replaced by the existing words *Kummer* "grief" and *Kutsche* "coach", respectively, i.e. by forms that are part of the Vocabulary.

Presumably, these errors involve two computational steps. Firstly, after Vocabulary insertion, a contextually induced error occurs. Secondly, the resulting non-word is matched with an existing Vocabulary item. As was pointed out by Leuninger & Keller (1994), this second step is of the type of a formal substitution. That is, the Vocabulary is accessed a second time and an item is selected that is phonologically similar to the non-word. In contrast to the different types of accommodations discussed above, this second step is definitely not cost-free, i.e. it does not involve a mechanism that applies anyway. We must therefore assume that instances of lexical construal do in fact result from a costly repair strategy.

4.7.2 *Adaptation Failures*

After having discussed slips of the tongue in which the application of various MS and PF mechanisms guarantees that a fully grammatical utterance surfaces, I shall now have a brief look at those errors in which the application of these mechanisms fails, i.e. errors that violate certain well-formedness restrictions. In the following, I am going to examine how these violations can be accounted for within the model sketched above. Three types of

[125] If the error had occurred before Vocabulary insertion, that is, if [$root_{(krumm)}$] "bent" had been anticipated, then the expected (properly licensed) outcome would have been *die macht keine **Krümm**-ung, äh, keinen Finger krumm*, with gender feature copy onto D, phonological readjustment, and morpheme insertion.

errors will be considered in this context: agreement errors within DP, errors of subcategorization, as well as certain errors involving stranding of morphemes.

Let us first have a look at agreement errors within DP. There are 101 such errors in my corpus. In 76 of them, the feature conflict is due to the fact that a feature is not copied from a noun onto other elements within DP after the error has taken place. Such a feature conflict may result from several types of errors. First of all, there are thirteen noun substitutions in my corpus in which the noun does not agree with the determiner; twelve of these substitutions are form-based (e.g. (4-79a)) while only one is meaning-based (4-79b).

(4-79) *Feature conflict (gender) due to a substitution*

a. immer der gleiche **Chaos**, äh, Kasus
always the.m same chaos(n.), er, case

b. als er bei der **Bruder**, äh, bei der Schwester
when he with the.f.DAT brother(m.), er, with the.f.DAT sister(f.)
von R. in London war
of R. in London was

In subsection 4.3.3, I have already pointed out that this distribution actually is the expected one. Remember that meaning-based substitutions occur when roots are selected from List 1, i.e. at a point at which agreement relations have not yet been established. In contrast, form-based substitutions occur when Vocabulary items are selected for insertion at PF. At this point, the implementation of agreement nodes and the copying of agreement features have already been executed and therefore, there is no way for the gender feature of the erroneously selected Vocabulary item to be copied onto the determiner. Consequently, the reason for the observed feature conflicts in noun substitutions is that these errors simply occur too late for the conflicts to be smoothed out. The meaning-based substitution in

(4-79b), however, does not receive a straightforward explanation under this analysis. If we assume that [$root_{(bruder)}$] is selected from List 1, then we cannot account for the appearance of the feature [feminine] on the determiner. Alternatively, we may hypothesize that we are dealing with a blend here, that is, that two competing roots enter the computational system. Feature conflicts resulting from blends will be further discussed below (cf. (4-81)).

The second type of error that may lead to anti-agreement within DP are exchanges and anticipations of roots (in my corpus, there is no root perseveration that gives rise to a feature conflict). In most cases of root displacement, features of the affected root are

properly copied onto other material within DP at the root's landing site (cf. the examples in (4-75bcd) in the preceding subsection). Sometimes, however, feature copy fails. In my corpus, there are eight exchanges and two anticipations in which a gender conflict is observed. Two of the exchanges were already cited in (4-66) in section 4.6, one more exchange and an anticipation are given in (4-80).

(4-80) *Feature conflict (gender) due to exchange or anticipation of roots*

a. das **Mund** läuft mir im **Wasser** zusammen
the.n mouth(m.) runs me in.the.m/n water(n.) together
← das Wasser läuft mir im Mund zusammen
← *the.n water(n.) runs me in.the.m mouth(m.) together*
"It makes my mouth water."

b. holst du mir in der **Handtuch** das Küchenhandtuch?
fetch you for.me in the.f.DAT towel(n.) the.n.ACC kitchen.towel(n.)
← in der Küche das Küchenhandtuch
← *in the.f.DAT kitchen(f.) the.n.ACC kitchen.towel(n.)*

In (4-80a), *Mund* "mouth" and *Wasser* "water" change place; *Mund*, however, appears with a definite article that is marked for the [neuter] feature of *Wasser* (the element *im* which is the result of cliticizing the definite article *dem* to the preposition *in* is ambiguous with respect to the gender feature). In (4-80b), the neuter compound *Handtuch* "towel" is anticipated and combines with the feminine dative article of *Küche* "kitchen".

In section 4.6, I have argued that there are two ways to account for these errors. Since the determiner positions are marked for the gender feature of the original roots, the errors must occur after the copying of agreement features has been executed. We may therefore assume that first the gender features are copied onto D at MS, that after gender copy, the roots are exchanged or anticipated, respectively (also at MS), and that finally, Vocabulary items are inserted. Alternatively, we may think of these errors as occurring at PF, i.e. after Vocabulary items were inserted. This, of course, implies that not roots are affected in these errors but rather words. Once again, these PF errors can not be followed by adaptation processes of any kind (just as the formal substitutions discussed before).

Blends have by far the highest share in DP agreement errors. There are 53 blends in my corpus that give rise to a feature conflict, two of which are given in (4-81).

(4-81) *Feature conflict (gender) due to a blend*

a. das wird ein ganz spannend-es **Wettkampf**, äh, Finale
that be.FUT a.m/n very exciting-n competition(m.), er, final(n.)
← ein ganz spannend-es Finale // ein ganz spannend-er Wettkampf
← *a very exciting-n final(n.) // a very exciting-m comp.(m.)*

b. er hat uns durch diesen Wein**gewölbe** gejagt
he has us through this.m wine.vault(n.) chased
← durch diesen Weinkeller // durch dieses Weingewölbe

← *through this.m wine.cellar(m.) // through this.n wine.vault(n.)*

In these blends, two roots which are semantically close to each other receive activation from the conceptual level; both of them enter the computational system and compete for one single terminal node. At first, no decision is made. When feature copy takes place at MS, only one of the competing roots can transmit its gender feature to the adjective and/or the determiner: in (4-81a), [$root_{(finale)}$] transmits its feature [neuter], in (4-81b), [$root_{(keller)}$] transmits its feature [masculine]. However, when Vocabulary insertion takes place, the Vocabulary item corresponding to the other root is inserted. That is, it is only at PF that a decision between the two roots is made.

In passing, I wish to point out that this is not true for all blends. Rather, in a number of blends, a decision between two alternatives is made at an earlier point of the derivation. All of these, however, involve a competition amongst phrases. Consider the following two slips:

(4-82) <u>*Blends involving accommodation*</u>

a. das ist wirklich ein dick-es **Stück**
that is really a.n thick-n.NOM piece(n.)
← ein dick-er Hund // ein stark-es Stück
← *a.m thick-m.NOM dog(m.) // a.n heavy-n.NOM piece(n.)*
"That's really a bit much!"

b. er hat eine Menge Leute, die ihm nach der **Fahne** reden
he has a lot.of people who him after the.f.DAT flag(f.) speak
← die ihm nach dem Mund reden //
← *who him after the.m.DAT mouth(m.) speak //*
die ihr Fähn-chen nach dem Wind hängen
who their flag(f.)-DIM after the.m wind(m.) hang
"He has a lot of people who say what he wants to hear //
who swim with the tide."

Both of the above errors involve idiomatic expressions. In (4-82a), the two idiomatic expressions - both meaning "That's really a bit much" - receive activation from the conceptual level. Then [$root_{(stück)}$] for some reason replaces [$root_{(hund)}$] in the competing planning frame. This replacement takes place before agreement features are copied. Consequently, the gender feature of [$root_{(stück)}$] will be copied onto the indefinite article and the adjective. At PF, the Vocabulary item /_tYk/ will be inserted and a fully grammatical utterance surfaces. Note that if replacement of [$root_{(stück)}$] for [$root_{(hund)}$] had occurred after

feature copy at MS, then the ungrammatical utterance *das ist wirklich ein dicker Stück* 'that is really a.m thick.m piece(n.)' would have surfaced.[126]

In subsection 2.4.2, I have already pointed out that blends like (4-82a) allow for two

[126] Since in (4-81), two roots compete and not two phrases, replacement of one root for the other before feature copy would of course not have given rise to an error. Maybe, the speaker would have uttered *ein spannender Wettkampf* instead of *ein spannendes Finale*, but only the self-repair would have given a clue that something went wrong.

different interpretations. The alternative interpretation is to assume that not [root$_{(stück)}$] is the intruder whose gender feature will be copied onto the adjective, but rather that [root$_{(dick)}$] takes the place of [root$_{(stark)}$]. A similar analysis, however, is not available for the blend in (4-82b). In this error, it is unambiguously [root$_{(fahne)}$] (without the diminutive feature) which intrudes into the competing planning frame and takes the position of another root that is licensed by a determiner. Again, the gender feature of [root$_{(fahne)}$] will be copied and a perfectly well-formed sentence is uttered.[127]

The second type of error that may lead to a feature conflict are errors of subcategorization. In my corpus, there a 81 slips of this type, 70 of which result from a blend. Two examples for these are presented in (4-83).

(4-83) *Feature conflict (case) due to a blend*

a. dass wir keine Sprache erwerben, die bestimmten UG-Prinzipien **verletzt**
that we no language acquire that certain.DAT UG-principles violates
← die bestimmten UG-Prinzipien widerspricht //
← *that certain.DAT UG-principles contradicts //*
die bestimmte UG-Prinzipien verletzt
that certain.ACC UG-principles violates

b. wer hat dich am meisten **imponiert** ← dich am meisten
who has 2.SG.ACC the most impressed ← 2.SG.ACC the most
beeindruckt // dir am meisten imponiert
impressed // 2.SG.DAT the most impressed

The explanation for these two errors is quite similar to the one given above for the DP agreement errors resulting from blends (cf. (4-81)). Once again, two roots compete for one single terminal node (this time being licensed by a light verb) and, once again, no decision is made prior to PF. At MS, one of the two competing roots assigns case to the argument DPs. At PF, however, the other root is selected for insertion from the Vocabulary. Consequently, a case conflict arises.

In (4-83a), [root$_{(verletz)}$] "violate" and [root$_{(widersprech)}$] "contradict" are in competition, the former assigning accusative case, the latter assigning dative case. In the error,

[127] The remaining 25 cases of anti-agreement within DP are not due to the fact that a gender feature was not copied from a root onto other elements within DP. Rather, they either result from erroneous feature copy (comparable to erroneous feature copy in SVA errors; see footnote 27 and (4-88a) below for examples) or from anticipation, perseveration, or exchange of material in D (as e.g. in *den Hand vor die Mund, äh, die*

[root$_{(widersprech)}$] assigns case to the object DP at MS, but [root$_{(verletz)}$] is inserted at PF. Obviously, the English interlinear translation for (4-83b) is not very helpful, since the

---

Hand vor den Mund gehalten 'the.m.ACC hand(f.) in.front.of the.f.ACC mouth(m.), er, the.f.ACC hand(f.) in.front.of the.m.ACC mouth(m.) hold').

German verbs *imponieren* and *beeindrucken* are both translated as "to impress". Still, *imponieren* assigns dative case to the object DP (here: the pronoun) while *beeindrucken* assigns accusative case. At MS, the pronoun receives case from [$root_{(beeindruck)}$], at PF, however, the Vocabulary item /Imponi:å/ is inserted.[128]

Finally, failures of adaptation may also be observed in stranding errors. In these errors, the conflict is not due to a case or gender mismatch. Rather, the reason for the conflict is either that a suffix does not meet the subcategorization properties of a stem or that a stem is not properly spelled out in its new environment. Two relevant examples were presented in (4-58) in subsection 4.5.3, two more are given below:

(4-84) *Failure of adaptation in stranding errors*

a. im **Wolk**-en **nord**-ig ← im Norden wolk-ig
in.the.m.DAT cloud(f.) north-ADJ ← in.the.m.DAT north(m.) cloud-ADJ

b. um ihre **Kräft**-er zu **bänd**-ig-en
in.order her strength-PL to ligament-ADJ-INF
← ihre Bänd-er zu kräft-ig-en
← *her ligament-PL to strength-ADJ-INF*

Apparently, in both of the errors in (4-84), no roots are exchanged. In (4-84a), the stranded element *-en* happens to be the plural suffix of *Wolke* "cloud", but this is a mere coincidence, since no plural feature is present in the intended utterance. The stranded element *-ig* is an adjective-forming suffix; still, it is not the appropriate one for [$root_{(nord)}$]. Moreover, there is a feature mismatch between the cliticized article and the noun. All these characteristics indicate that the error occurs after Vocabulary insertion, that is, that phonological material has been exchanged at PF. If two roots had been exchanged before Vocabulary insertion, the expected outcome would have been *in der **Wolke nörd**-lich* (or possibly ***nord**-isch*) 'in the.f.DAT cloud(f.) north-ADJ'.

---

[128] Some of the subcategorization errors resulting from blends are more intricate. Consider e.g. the following slip: *diesen Ausdruck gefällt mir gut ← diesen Ausdruck finde ich gut // dieser Ausdruck gefällt mir gut* 'this.ACC expression pleases 1.SG.DAT good ← this.ACC expression find 1.SG.NOM good // this.NOM expression pleases 1.SG.DAT good ("I think this expression is good // this expression pleases me very much"). In order to explain this error, we must assume that each of the competing roots assigns one case at MS, [$root_{(find)}$] assigns accusative case to [$_{DP}$ diesen Ausdruck] while [$root_{(gefall)}$] assigns dative case to the first person singular pronoun. Consequently, there is no nominative argument in the error.

The eleven remaining errors of subcategorization that do not result from blends are either due to case anticipations/perseverations, to the anticipation/exchange of definite articles, or to the anticipation/exchange of words.

The same is true for the exchange in (4-84b). If two roots had been exchanged, we would expect [root$_{(kraft)}$] to appear with the appropriate plural suffix (the plural form of *Kraft* “strength” is *Kräfte*). It is, however, not entirely clear if *bändigen* “to tame” would be

the expected outcome for [root$_{(band)}$] in a position that is licensed by v. In any case, stranding of the plural suffix of *Band* "ligament" implies that we are not dealing with a root exchange prior to Vocabulary insertion but rather with a PF error.

In conclusion of this subsection, let me emphasize the following facts: There is a considerable number of errors in my corpus in which adaptation of either the affected element(s) or of the environment to post-error conditions is not observed. Failure of adaptation may concern feature copy within DP, case assignment, and proper spell-out of stems and affixes.

I have claimed that the reason for the various failures of adaptation is that the errors occur too late for adaptation to take place. Most of the feature conflicts within DP (blends and form-based substitutions) arise at the point of Vocabulary insertion, i.e. at a point of the derivation at which features have already been copied. The only exception are the few exchanges and anticipations that lead to a feature conflict. I have argued that those are probably due to a root exchange/anticipation after feature copy but before Vocabulary insertion. Blends leading to a subcategorization error - just as blends leading to anti-agreement within DP - are due to a late decision between two elements competing for one terminal node. That is, at PF, the Vocabulary item corresponding to the competitor that has not transmitted its feature (case or gender) at MS is inserted. Finally, adaptation failures in stranding errors are also due to the phonological character of these errors. Such slips occur at PF and therefore, they can not have any impact on morpheme insertion rules or phonological readjustment rules.

Consequently, the errors presented in this subsection contrast sharply with the morphosyntactic, morphological, and morphophonological "accommodations" presented in subsection 4.7.1, all of which involve the manipulation of abstract roots (or features) before or at the level of MS. I therefore conclude that whenever an adaptation to grammatical well-formedness restrictions is observed in an error, this error must have occurred before Vocabulary insertion is executed.

At the end of this section, I do not want to fail to present another particularly intricate error, the explanation of which is a challenge for every theory:

(4-85) <u>*Another problematic error*</u>

man	muss	die	**Wurzel**	an	der	**Übel**	packen
one	*must*	*the.f.ACC*	*root(f.)*	*at*	*the.f.DAT*	*evil(n.)*	*grab*

←	das	Übel	an	der	Wurzel	packen
←	*the.n.ACC*	*evil(n.)*	*at*	*the.f.DAT*	*root(f.)*	*grab*

The problematic property of this exchange error is that adaptation to well-formedness restrictions, i.e. copy of the gender feature, is observed in only one position. While the DP [$_{DP}$ die Wurzel] is fully grammatical, there is a feature mismatch in the DP [$_{DP}$ der Übel]. To be honest, I see no elegant way to account for these facts. On the one hand, if two roots had been exchanged before feature copy (just as in (4-75bd) above), then the grammatical sequence *die **Wurzel** an dem **Übel** packen* should have surfaced (with feature copy within both DPs). On the other hand, if the root exchange had taken place after gender features of the roots were copied onto the respective determiners (just as in (4-80a) above), then the 'even more ungrammatical' utterance *das **Wurzel** an der **Übel** packen* (which involves feature mismatches within both DPs) would be the expected one. In order to somehow handle this slip, we have to assume that firstly, the gender feature of [root$_{(wurzel)}$] but not that of [root$_{(übel)}$] is copied onto the determiner, secondly, the roots are exchanged, and thirdly, the gender feature of [root$_{(wurzel)}$] is copied for a second time at its landing site. That is, the gender feature of [root$_{(wurzel)}$] is copied twice while the gender feature of [root$_{(übel)}$] is not copied at all.

4.8 Three Complex Cases

> ... l'irrégularité, c'est-à-dire l'inattendu,
> la surprise, l'étonnement sont une partie
> essentielle et la caractéristique de la beauté.*
>
> (Charles Baudelaire, Fusées)

In the final section of this chapter, I shall present a detailed analysis and discussion of three particularly interesting slips of the tongue, thereby summarizing the mechanisms argued for in the preceding sections and illustrating how the derivation of (erroneous) utterances proceeds. Note that the errors analyzed below are definitely exceptional cases with respect to the number of MS and PF operations that need to be referred to in order to account for them. Still, such errors - rare as they may be - are processed and require an explanation.

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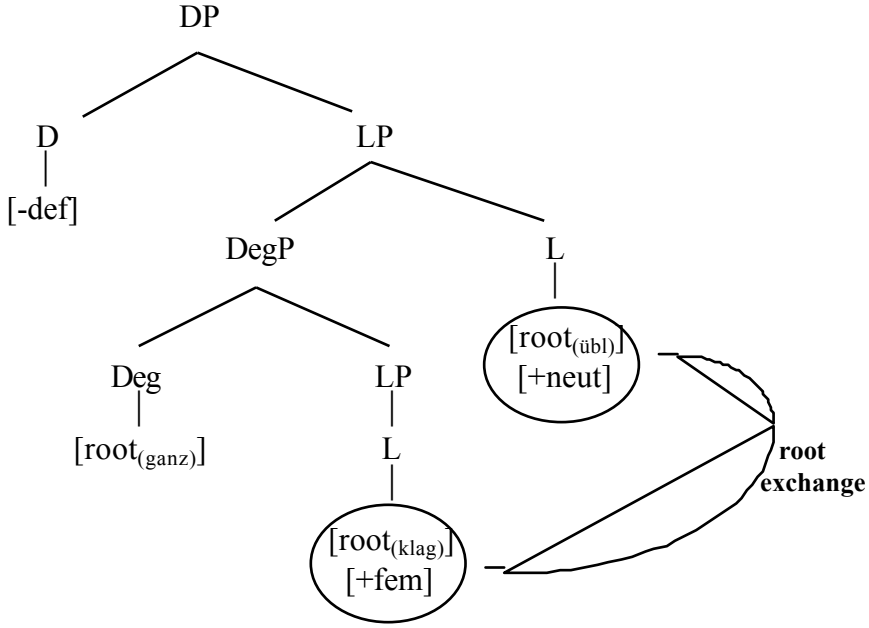
* "...the irregular, that is, the unexpected, the surprise, the astonishment are an essential part and the characteristic of beauty."

The first slip I want to discuss is the one given in (4-86a). This is an instance of an incomplete, i.e. the erroneous utterance is self-repaired immediately after the error element *klägliches* (meaning "miserable"). Still, in this particular case, we can say with certainty that we are dealing with a root exchange (and not an anticipation), since in the error, the indefinite article as well as the adjective appear in their neuter form. This adaptation of the article and the adjective is due to the fact that the second error element [root$_{(übl)}$] "bad", i.e. the one that is not part of the erroneous utterance due to the self-repair, is of neuter gender. Therefore, we may assume that the complete erroneous utterance that was planned actually was *das ist wirklich ein ganz **kläg**-liches **Übel*** 'this is really a.n very miserable.n evil(n.)'. A syntactic structure for the DP after root exchange is given in (4-86b).

(4-86) *Slip #1: Syntactic structure after root exchange*

a. das ist wirklich ein ganz **kläg**-lich-es, äh,
this is really a.n.NOM very charge-ADJ-n, er,
eine ganz übl-e Klage
a.f.NOM very bad-f charge
"This is really a very miserable, er, a very bad charge."

b.



Note that due to the assumption that roots are acategorial in nature, we must also assume that they are always selected from List 1 along with their inherent gender feature, no matter what licensing environment they appear in. Still, this inherent feature plays a role only when a given root takes a position that is licensed by a determiner; that is, only in these cases will the gender feature be transmitted to other elements at MS. In (4-86b), the gender

feature of [root$_{(klag)}$] does not play any role in a [+deg] environment; it may therefore be deleted at MS. This deletion is accounted for by the morphosyntactic readjustment (impoverishment) rule in (4-86c). In contrast to that, it is clear that [root$_{(übl)}$] must bring along its gender feature in the exchange, since it is that very feature that is copied onto other elements within DP at MS. If we assumed that roots that are not licensed by a determiner do not possess a gender feature, then the post-error adaptation in (4-86a) could not be explained.

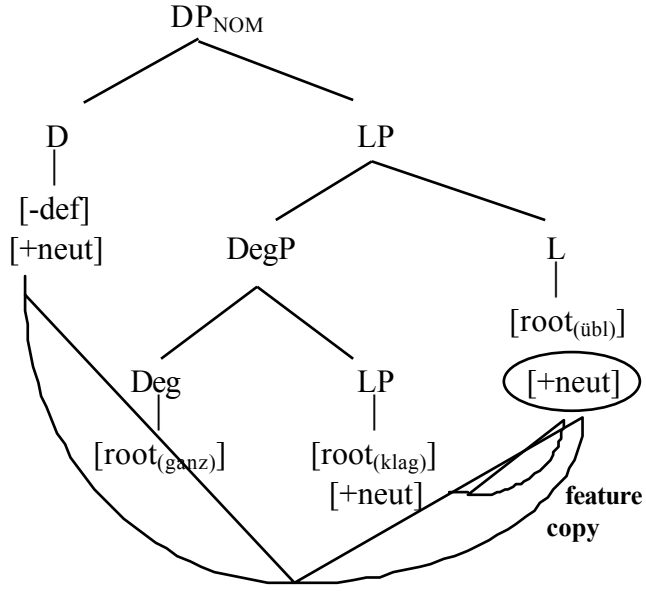
After the root exchange has taken place, feature copy will be executed. Moreover, at MS, the DP will receive nominative case. These operations are indicated in the structure in (4-86d) below.

(4-86) *Slip #1: MS operations (readjustment, case assignment, feature copy)*

c. Morphosyntactic readjustment rule:

[gender feature] → Ø / [+deg]

d.



The structure (4-86d) is the basis for Vocabulary insertion at PF. As you can see, the Vocabulary item for [root$_{(klag)}$] is licensed in all environments, in a [+v] environment, however, only if the light verb is filled by the feature [+cause] (i.e. except for certain poetic contexts, *klagen* only takes agentive arguments in SpecvP). The feature complex in D - the [+def] feature taken from List 1, the [+neut] feature that was copied, and the [NOM] feature that percolated down from DP - is realized by the Vocabulary item /ain/. Finally, a

combination of the features [+neut] and [NOM] will trigger the insertion of the suffix /-´s/.[129]

[129] Note that the feature combination [+neut] and [NOM] may also appear in a [-v][-deg] environment (i.e. in a position licensed by a determiner). In this environment, however, these features will necessarily cooccur with the feature [3rd] and consequently, the more specified Vocabulary item /´s/, the third person singular neuter nominative pronoun, will be inserted.

(4-86) *Slip #1: PF operations*

e. Vocabulary insertion:

[$root_{(klag)}$] ⟷ /kla:g/
(licensing environment: [±v], [±deg], [+cause])

[-def][+neut] ⟷ /ain/
[NOM]

[+neut][NOM] ⟷ /-´s/

f. Phonological readjustment rule for /kla:g/

[+back] → [-back] / [-v][-deg]

g. Morpheme insertion rule

Insert /-lIX/ / Y + [+deg]
(where Y = [$root_{(klag)}$], ...)

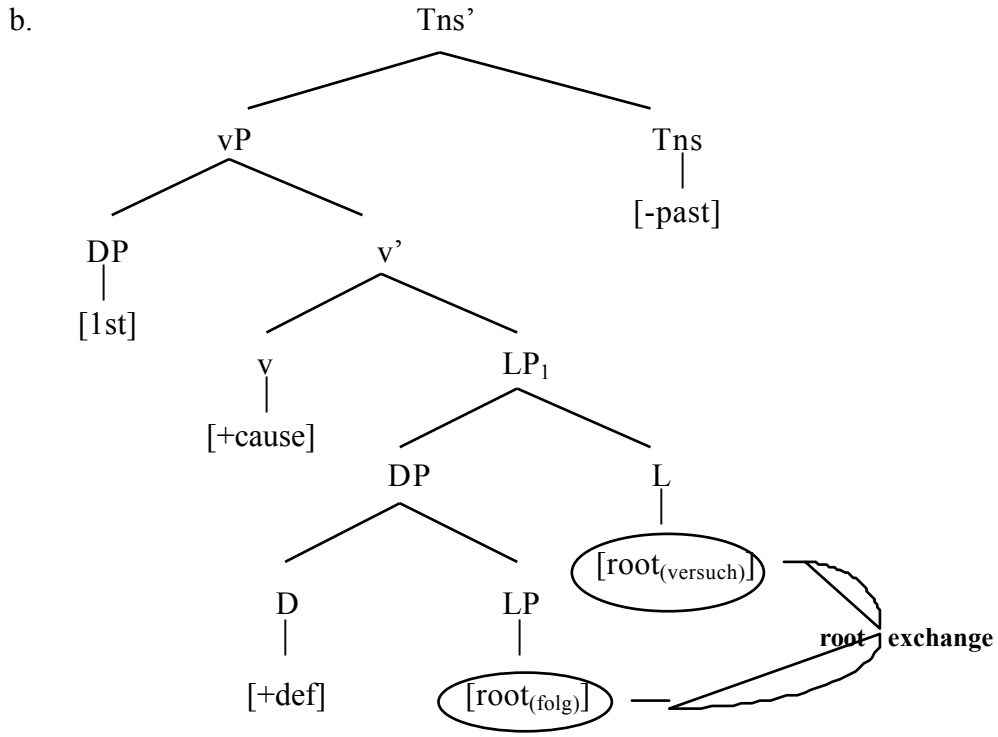
Moreover, at PF, the phonological readjustment rule (4-86f) will trigger umlaut formation in the Vocabulary item /kla:g/ and the morpheme insertion rule (4-86g) will insert /-lIX/ in a [+deg] environment (as argued for in footnote 59, the underspecified segment /X/ will surface as /ç/ after front vowels). Note that we may also assume that the morpheme is inserted first and that umlaut is triggered in Y in the context Y + /-lIX/ (there are, however, exceptions to that rule; cf. *Frage* "question" → *fraglich* "questionable" (**fräglich*)).

The second slip that will be subject to discussion is the one cited in (4-87a). This is a root exchange, too, but one without self-repair. The structure in (4-87b) indicates that I assume that [$root_{(folg)}$] "follow" and [$root_{(versuch)}$] "tempt/try" change place before movement of [$root_{(folg)}$] to v, Tns, and C. This assumption - albeit unprovable - is based on the fact that at deep structure, the two roots are adjacent to each other (within LP_1) while at surface structure, they are in considerable distance from each other.

(4-87) *Slip #2: Syntactic structure after root exchange (at DS)*

a. ich **versuch**-e die **Folg**-e ← folg-e der Versuch-ung
I tempt-1.SG the.f.ACC follow-N(f.) ← *follow-1.SG the.f.DAT tempt-N(f.)*
"I try the order/sequence ← I follow the temptation."

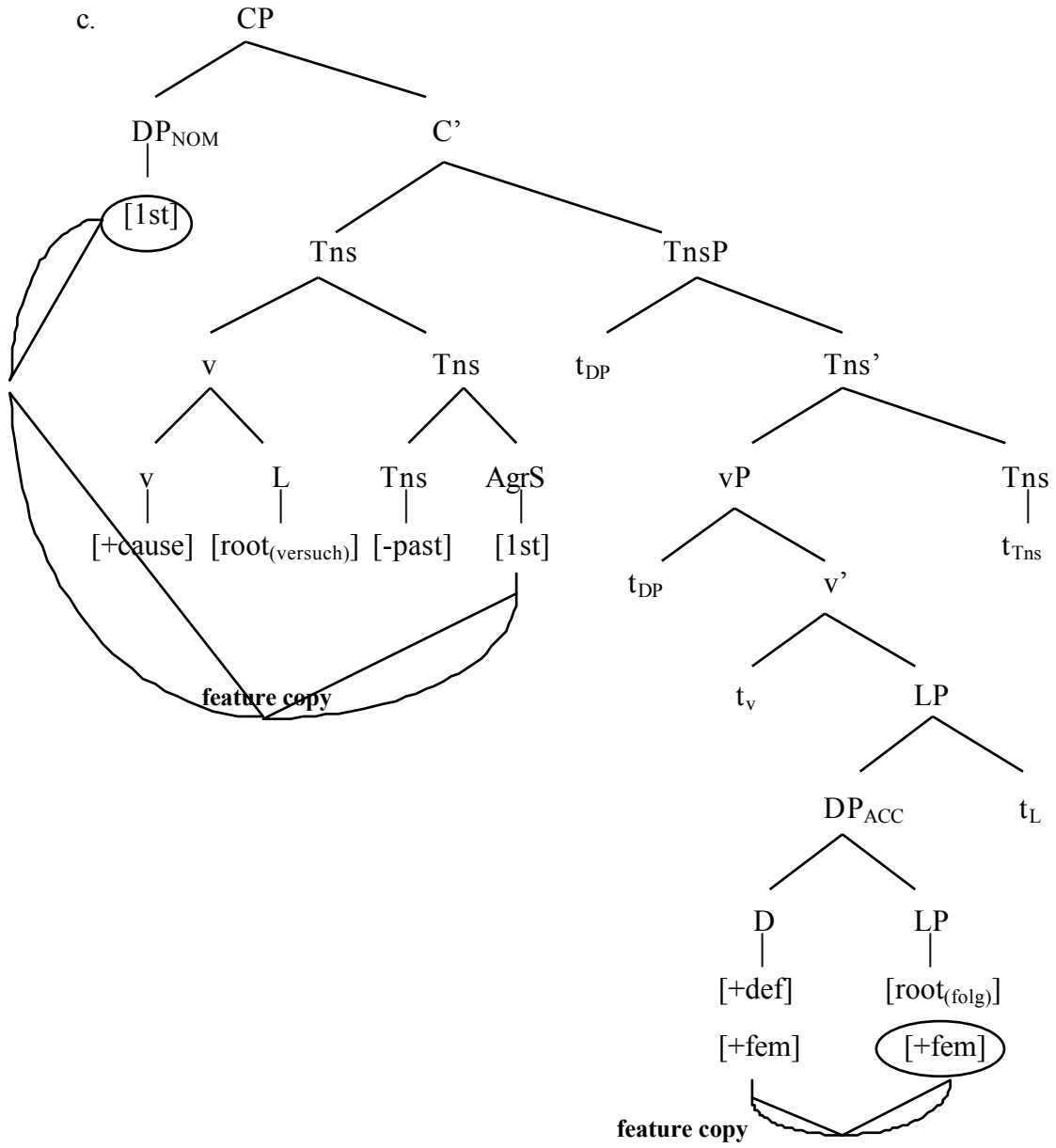
b.



After error occurence, it is [root$_{(versuch)}$] that is raised to the light verb, then to Tns, and finally to C. Once again, a fully grammatical utterance surfaces, the translation of *ich versuche die Folge* being something like "I try the order/sequence".

At MS, various things happen: Firstly, AgrS is implemented as a sister node of Tns and features of the subject DP are copied onto AgrS (subsequently, Tns and AgrS will probably fuse, since no Vocabulary item is inserted for [-past]). Secondly, the gender feature of [root$_{(folg)}$] is transmitted to the determiner (here, I neglect the deletion of the gender feature of [root$_{(versuch)}$]). One particularly interesting property of this error, however, is that after the exchange, the object DP is assigned a different case feature. While in the intended utterance, [root$_{(folg)}$] assigns dative case to the object DP, in the erroneous utterance, accusative case is assigned by [root$_{(versuch)}$].

(4-87) *Slip #2: MS operations (case assignment, AgrS insertion, feature copy)*



At PF, Vocabulary items are inserted into terminal nodes (4-87d). The items for [root$_{(folg)}$] and [root$_{(versuch)}$] are both licensed in all three possible environments. One difference, however, concerns the insertion in a [+v] environment. While [root$_{(versuch)}$] is only permissible in a [+cause] context, [root$_{(folg)}$] is also allowed in a [-cause] context (as e.g. in *genauere Informationen folgen* 'more.precise informations follow').

The features [1st] and [NOM] are realized by the Vocabulary item /Iç/ (neglecting underspecification). The feature complex in D - the only difference to the intended utterance being the case feature - triggers insertion of the item /di:/. Moreover, the feature [1st] under the fused Tns/AgrS node is responsible for insertion of the suffix /-´/.

(4-87) *Slip #2: PF operations*

d. Vocabulary insertion

[root$_{(folg)}$] ⟷ /fçlg/
(licensing environment: [±v], [±deg], [±cause])

[root$_{(versuch)}$] ⟷ /fɛåzu:x/
(licensing environment: [±v], [±deg], [+cause])

[1st][NOM] ⟷ /Iç/

[+def][+fem] ⟷ /di:/
[ACC]

[1st] ⟷ /-´/

e. Morpheme insertion rule:

Insert /-´/ / X + [-v][-deg]
(where X = [root$_{(folg)}$], ...)

If we follow Wiese's (1996) analysis of schwa as a noun-forming suffix (see footnote 57), then we must postulate the morpheme insertion rule in (4-87e) which suffixes /-´/ in case [root$_{(folg)}$] is licensed by a determiner. Alternatively, we might assume that the Vocabulary item realizing [root$_{(folg)}$] (or [root$_{(folge)}$]) is actually /fçlg´/, with schwa being deleted in certain contexts.

The third and final slip of the tongue I wish to present in this section is quite different from the ones analyzed above. Firstly, the error in (4-88a) is not a root exchange but rather a combination of two errors, namely of a root anticipation (or exchange) and a copy failure. Secondly, the resulting utterance is ungrammatical. In the structure in (4-88b), I choose to analyze the first error step as a root anticipation at deep structure. Due to the self-repair, however, the slip might also be analyzed as an incomplete root exchange. Moreover, the error may also have occurred at surface structure. Note that - except for head movement of [root$_{(hab)}$] "have" to v and then to Tns - the structural conditions within LP_1 are exactly the same at deep and at surface structure.

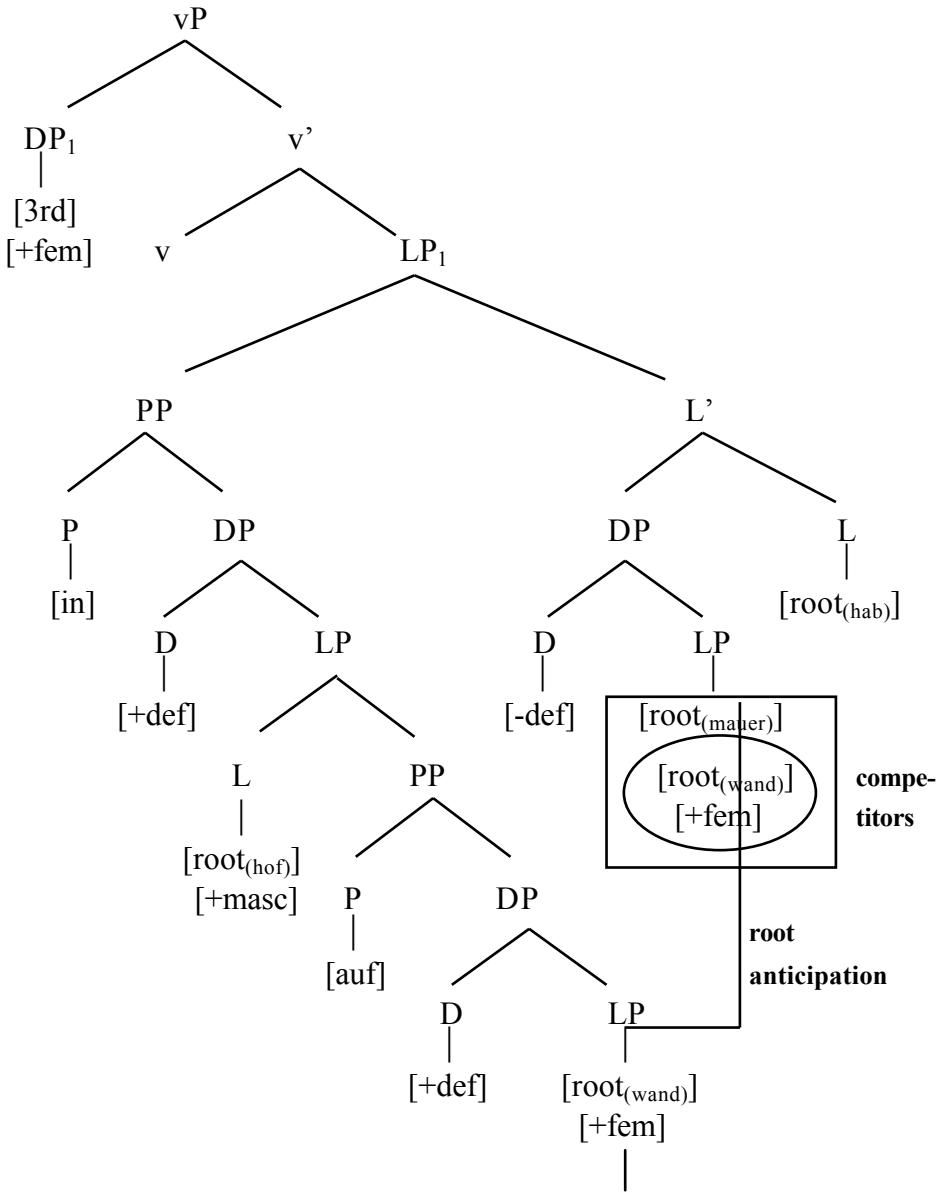
As argued for in subsection 4.2.2, concepts are activated at the conceptual stratum according to a preverbal message intention. Due to the network character of the conceptual stratum, activation may spread from activated concepts to neighboring concepts. The two concepts WAND "wall" and MAUER "wall" in (4-88a) are obviously semantically related to

each other. Therefore, they both receive activation at the conceptual stratum. Activation is feeded forward to List 1 where no decision between the two competitors is made. Rather, both roots are selected and compete for insertion in one terminal node, as is indicated by the rectangle in (4-88b) (note that [root$_{(wand)}$] and (root$_{(mauer)}$] are specified for the same gender feature).

(4-88) *Slip #3: Anticipation of competing root (at DS)*

a. weil sie im Hof auf **dem** **Wand**, äh,
because she in.the.m.DAT courtyard(m.) on the.m.DAT wall(f.), er,
auf der Seite eine Mauer hat
on the.f.DAT side(f.) a.f.ACC wall(f.) has

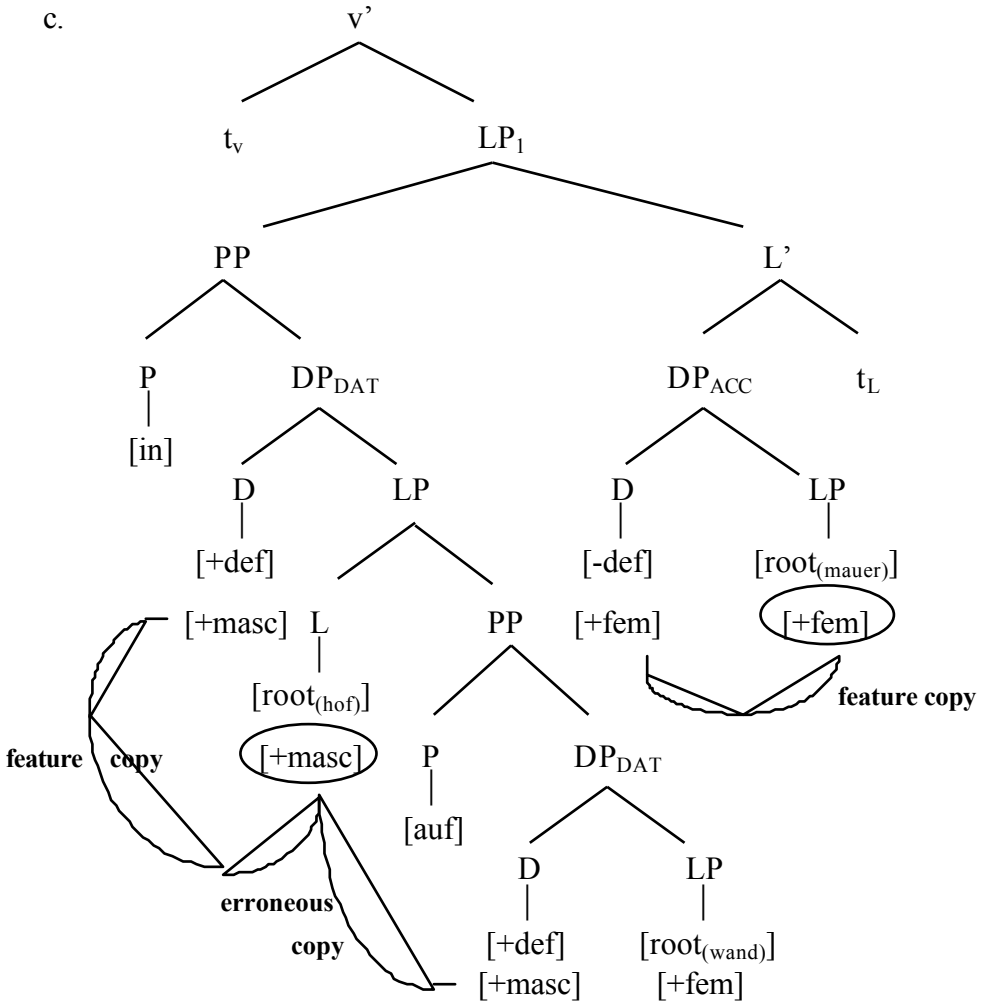
b.



In the error, one of the competitors - namely [root$_{(wand)}$] - is anticipated into another position that is licensed by a determiner, i.e. it is substituted for [root$_{(seite)}$] "side".

Subsequently, the subject DP (DP$_1$) is moved from SpecvP to SpecTnsP, while [root$_{(hab)}$] raises to v and then to Tns (the structure above v' is neglected in (4-88c) below). At MS, the usual operations are executed: AgrS is inserted, case features are assigned to DPs by the two prepositions and by [root$_{(hab)}$], and features are copied. At this point, however, a second error occurs: the gender feature [+masc] of [root$_{(hof)}$] "courtyard" is erroneously copied onto the definite article of [root$_{(wand)}$]. Consequently, we observe anti-agreement within the lower DP.

(4-88) *Slip #3: MS operations (case assignment, feature copy)*



At PF, the Vocabulary items given in (4-88d) are inserted. [root$_{(hof)}$] and [root$_{(mauer)}$] can appear in each of the possible licensing environments, in a [+v] environment, however, only when the light verb is filled by a [+cause] feature (as e.g. in *ich hofiere dich* "I court

you" and in *er mauert eine Wand* "he builds a wall"). In contrast, [root$_{(wand)}$] cannot appear in a [+v] environment and its appearance in a [+deg] environment is questionable (the only possible forms in a [+deg] context are some very few derived compounds like *dünnwandig* "thin-walled"; note, however, that the noncompound adjective *wandig* is not attested). Moreover, Vocabulary items are inserted that match the feature complexes (case, gender, and definiteness) in D.

(4-88) *Slip #3: PF operations*

d. Vocabulary insertion

[root$_{(hof)}$] ⟷ /ho:f/
(licensing environment: [±v], [±deg], [+cause])

[root$_{(wand)}$] ⟷ /vaNd/
(licensing environment: [-v], [±deg])

[root$_{(mauer)}$] ⟷ /mauå/
(licensing environment: [±v], [±deg], [+cause])

[+def][+masc] ⟷ /de:m/
[DAT]

[-def][+fem] ⟷ /ain´/
[ACC]

In this example, no readjustment or morpheme insertion rules apply. However, various phonological rules are at work. For the purpose of illustration, I will consider only the Vocabulary item /vaNd/. As argued in subsection 4.7.1, nasals are not underlyingly specified for place features and assimilate to the place feature of a following obstruent (regressive spreading). Therefore, the underspecified segment /N/ will receive the place feature [coronal] from the segment /d/. The segment /d/ itself is also affected by a phonological rule, namely final devoicing. Consequently, the phonetic form of the Vocabulary item that surfaces is [vant].

The error in (4-88a) is definitely not of the sort that Cutler (1988) would call a "perfect speech error", since other interpretations than the one sketched above are also conceivable. We could, for instance, analyze the error as a phonological perseveration of the segment /m/ at the level of PF. Moreover, since cliticization of the definite article *dem* to the preposition *in* is a late process, we might also hypothesize that the whole article is perseverated at PF. The same qualification does, of course, hold for many of the other slips discussed in this thesis.

Nevertheless, all of the errors presented and discussed in this chapter - as well as those presented in chapter 2 - make an important contribution to our understanding of the processing and manipulation of morphosyntactic and syntactic features in language production. In particular, the above discussion of three complex speech errors has illustrated how the interplay of syntactic operations (e.g. head movement), morphosyntactic operations (e.g. feature copy), Vocabulary insertion, phonological readjustment rules, and morpheme insertion rules - the last three determined and constrained by licensing elements - allows us to give an account for these and many other speech errors.

5 Conclusion: The Grammar as Processor

> From the fruit of the mouth
> one's stomach is satisfied;
> the yield of the lips brings satisfaction.
> (Proverbs 18,20)

In this chapter, I will come back to the psycholinguistic multi-level model of language production (as sketched in section 4.1). I shall first show how the DM model of grammar (cf. (3-1)) can be integrated into the production model (cf. (4-5)). Basically, I assume that the DM model takes the place of the formulator in Levelt's (1989) model of language production. In order to exemplify the basic mechanisms that are active in the generation of an utterance, I will sketch the derivation of a simple intransitive sentence. Secondly, I will consider where the psycholingustic processing levels are to be situated in this integrated model and at which stages of the grammatical derivation the various types of spontaneous speech errors occur. In conclusion of this final chapter, I am going to claim that there is no distinction between the grammar and the processor.

In chapter 2 of this thesis, I have presented various types of speech errors all of which alter the grammatical structure of an utterance. Some of these errors result in an ungrammatical utterance due to a feature conflict (e.g. gender mismatch within DP, feature mismatch between subject DP and verb), while in others, a fully grammatical string surfaces due to the adaptation of either the error element itself or of the error environment to the new facts (e.g. choice of appropriate determiner or affix, stem change).

In chapter 4, I have argued that all of these slips receive a straightforward explanation when we adopt ideas of Distributed Morphology. On the one hand, the operations that establish a relation between elements in a sentence - most importantly, feature copy but also case assignment - may be defective in the sense that morphosyntactic features are either transmitted to wrong elements or not transmitted at all. On the other hand, the post-error application of a number of cost-free DM mechanisms (e.g. feature copy, readjustment, and morpheme insertion) often guarantees the grammatical well-formedness of an erroneous utterance.

The discussion has made clear how the speech errors presented in chapter 2 fit into the time course of grammatical encoding in the DM model. Roughly speaking, whenever an error occurs within the computational system - that is, before the level of MS - MS and PF operations make sure that a grammatical utterance surfaces. In contrast to that, errors that occur after MS operations have applied may lead to ungrammatical sequences, since at this stage of the derivation it is simply too late for adaptation to take place.

On the following two pages, you will find a fleshed-out model that integrates the DM model of grammar into a multi-level model of language production (as developed by Garrett (1975ff) and Levelt (1989)). I shall use the sentence *Die Katzen schnurren* "The cats are purring" in order to illustrate the derivation.

Figure (5-1) consists of various processing components, each of which receives some kind of input and produces some kind of output. The output of one component may become the input for another component. A prerequisite for the generation of an utterance is, of course, a communicative intention of a speaker, the wish to convey some message. On the basis of the message intention, nodes are activated at the conceptual level (or conceptual stratum). In the present example, the concept nodes KATZE "cat", SCHNURREN "to purr", MULTIPLE(X) (which must be linked to KATZE) and possibly DEF (indicating that the speaker refers to some particular cats) are activated. The conceptual level is a highly interconnected network and therefore some of these nodes feed activation to neighboring concept nodes, as e.g. TIER "animal", HUND "dog", MIAUEN "to miaow", and BELLEN "to bark".

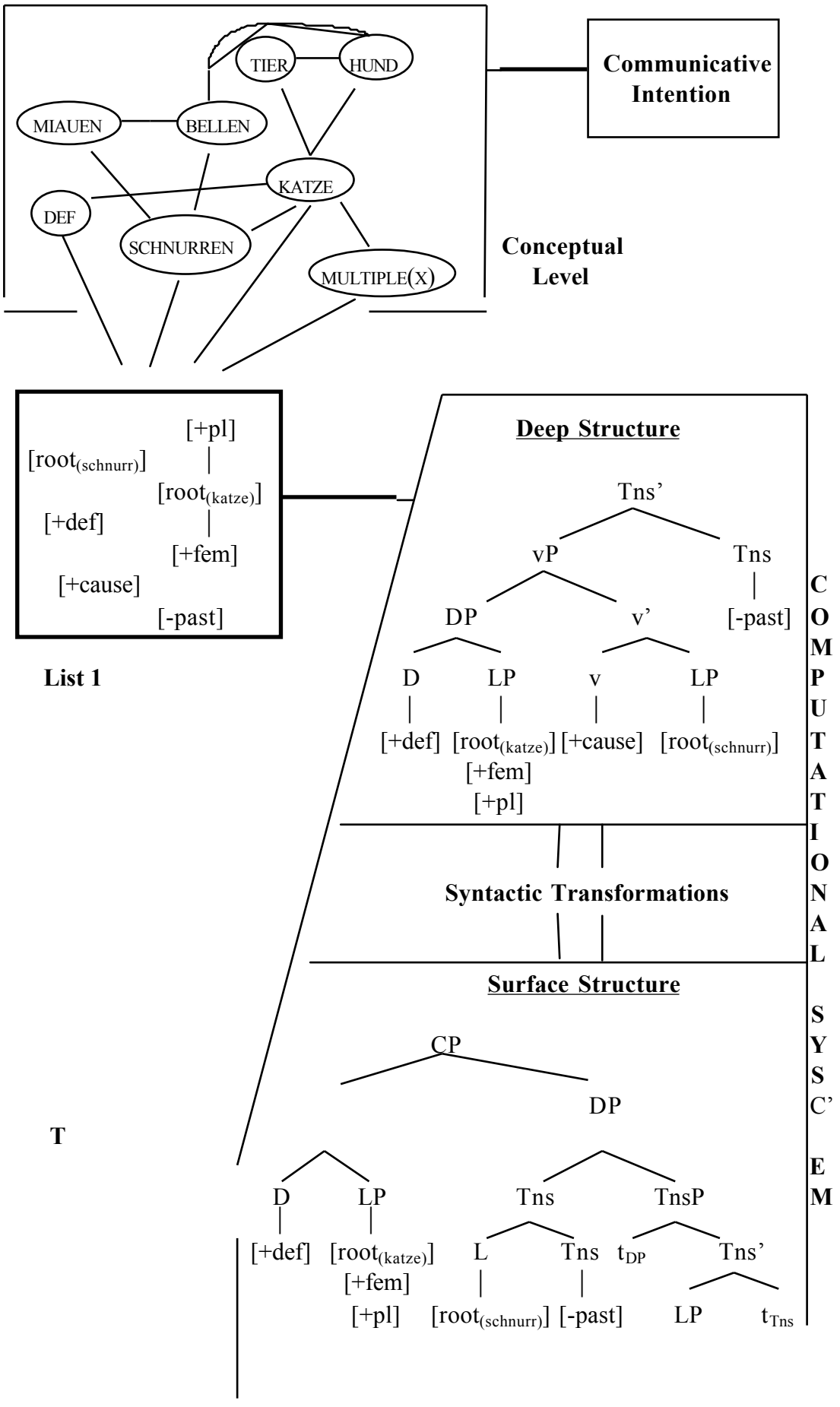
Activated concept nodes spread activation to corresponding roots and features in List 1. Note that the conceptual level must also supply information about the temporal setting of the message to be conveyed (activating the feature [-past] in the present example) and about the type of action (activating the feature [+cause]). [$root_{(katze)}$] is inherently linked to

a gender feature (see the discussion of the identical gender effect in meaning-based substitutions in subsection 4.3.2) and due to conceptual activation also to a number feature.

The most highly activated roots and features enter the computational system. In the present context, I shall not go into the details of how a deep structure is generated from these elements. We must assume that roots and features trigger specialized syntactic procedures in some orderly fashion. Firstly, all roots are inserted into l-nodes and automatically project LPs. Secondly, on the basis of the underlying communicative intention, these LPs appear in different functional environments. In the above example, [$root_{(schnurr)}$] e.g. is dominated by a light verb phrase. The head of vP contains the feature [+cause] which in turn locally licenses the l-node. Remember that the [+cause] feature requires the specifier of vP to be filled by a DP. This DP is constructed from [$root_{(katze)}$] (also projecting an LP) and the feature [+def] which heads the DP.[130]

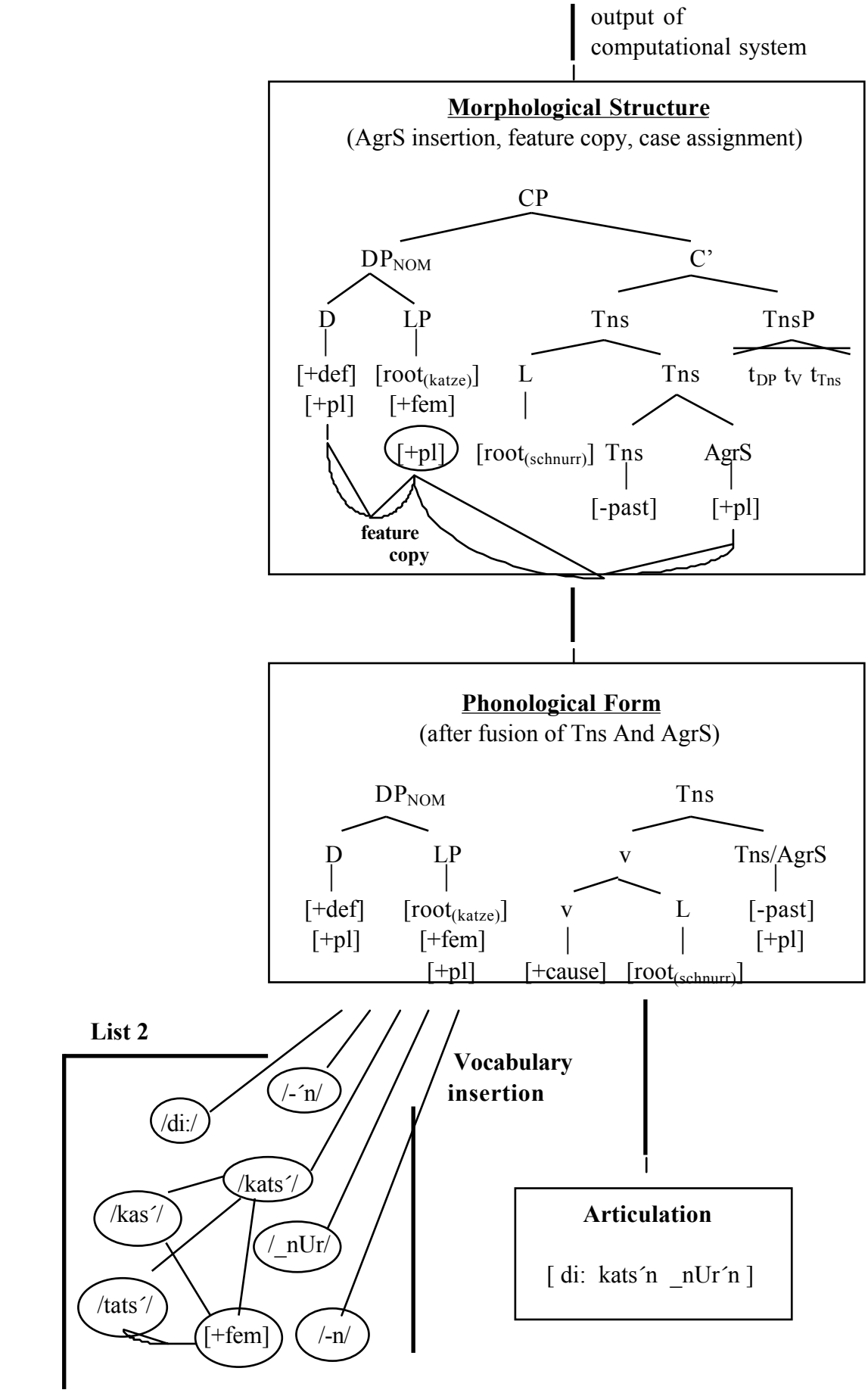
[130] The example discussed here is, of course, a very simple one. Whenever more roots are selected from List 1, the conceptual level must supply further information which guarantees that roots are inserted into appropriate slots (e.g. one concept node being marked as the actor, the other as theme or goal). See Kempen & Hoenkamp (1987) for various categorial and functional procedures that are responsible for syntactic tree formation (cf. Levelt (1989:236ff) for an illuminating illustration of the basic operations). Following DM assumptions, categorial procedures (i.e. building instructions for categorially specified phrases) do, however, not play any role.

(5-1) *From intention to articulation: An integrated model of language production*




t_V

(5-1) *From intention to articulation (continued)*



Within the computational system, movement operations apply. The root that is licensed by the light verb raises to v (this movement being neglected in the surface structure above), Tns, and finally to C. Moreover, the agent DP moves from SpecvP to SpecTnsP and finally to SpecCP. The resulting modified structure is the output of the computational system and is handed over to the level of MS.

At MS, an AgrS node is inserted as sister of the Tns node and the relevant features of the subject DP are copied onto AgrS. In the above example, the only relevant feature is the plural feature. The same feature is also transmitted to D (possibly along with the [+fem] feature which, however, does not have any impact on the insertion of a Vocabulary item in combination with a plural feature). Moreover, a case feature will be assigned to the subject DP. As mentioned earlier, Tns and AgrS will probably fuse in the German present tense.

The structure resulting from these operations is the input for the level of PF. In (5-1), I only give details of the PF structure, namely the structure of the subject DP and the structure below Tns. I assume that Vocabulary insertion need not have at its disposal the complete syntactic structure. It must, however, have access to the licensing environments of terminal nodes, since possible contexts for insertion are part of the Vocabulary entries of items. At PF, Vocabulary items that match the roots and/or the features contained in terminal nodes are drawn from List 2, the Vocabulary, in order to be inserted into the respective terminal nodes.

For space reasons, in List 2 in (5-1) above, only the phonological forms of Vocabulary items are mentioned. I have, however, already pointed out that a Vocabulary item is a relation between a phonological string and information about where that string may be inserted. The full structures for those items which are finally inserted at PF are given in (5-2).

(5-2) *Vocabulary items to be inserted at PF*

a. $[root_{(katze)}]$ ⟷ /kats´/
(licensing environment: [-v], [-deg])

b. $[root_{(schnurr)}]$ ⟷ /_nUr/
(licensing environment: [±v], [±deg], [+cause])

c. [+def][+pl] ⟷ /di:/
[NOM]

d. [+pl] ⟷ /-n/ / X + [-v][-deg]

(where X = [root$_{(katze)}$], ...)

e. [+pl] ←→ /-´n/ / Y + [+v]

The Vocabulary item realizing [root$_{(katze)}$] can only be inserted in a [-v][-deg] environment, i.e. only in a position that is licensed by a determiner. In the presence of a plural feature, the phonological string /kats´/ will be combined with the suffix /-n/.[131] In contrast, the Vocabulary item for [root$_{(schnurr)}$] can be inserted in every licensing environment (with no morpheme insertion rule being triggered in a [+v] environment). The plural feature in AgrS causes the insertion of the suffix /-´n/. Finally, the feature combination in D is spelled out by the Vocabulary item /di:/.

Note that List 2 is organized in a network fashion, too. That is, Vocabulary items are connected to phonological neighbors. Therefore, the item /kats´/ which is the best match for the terminal node sends activation to items such as /tats´/ "paw" and /kas´/ "cash register/cash desk". Moreover, as argued for in subsection 4.3.2 (identical gender effect in form-based substitutions), Vocabulary items are also linked to gender features.

In the present example, no readjustment or morpheme insertion rules apply. After the insertion of Vocabulary items, the PF structure is converted into an instruction to the articulatory apparatus and the phonetic sequence [di: kats´n _nUr´n] is uttered (or possibly [di: katsn _nU:ån] which involves schwa deletion and r-vocalisation).

In Levelt's (1989) model of language production processes, three processing components are differentiated, the conceptualizer, the formulator, and the articulator. In figure (5-1), the DM model of grammar is equated with the formulator component. In Levelt's model, the formulator accepts conceptual information as characteristic input from the conceptualizer. On the basis of this information, lemmas are accessed in the speaker's mental lexicon and syntactic building procedures are set off, both of these operations happening in parallel. Figure (5-1) illustrates that I do not assume that conceptual information enters the formulator (i.e. the computational system). Rather, the conceptualizer and the formulator are linked via List 1. That is, in a line with DM assumptions, lexical selection (selection of the most highly activated roots and features) takes place before entering the computational system and consequently, the building of syntactic structure (deep structure) is only indirectly controlled by conceptual information.

[131] Possibly, the insertion of the plural suffix /-n/ is also phonologically determined. Note that all German nouns ending in schwa take the /-n/-suffix.

This, of course, implies that the elements within List 1 that receive activation from the conceptual level and that are finally retrieved must somehow be marked for their syntactic role in order to guarantee their insertion into the appropriate node at deep structure.[132] The same condition, however, also holds within the Garrett/Levelt models of language production. In these, a predicative frame is assumed to be built independently of the lemmas that are retrieved from the lexicon. Still, some mechanism must ensure that selected lemmas (of the same syntactic category) are inserted into the appropriate slots in the frame (e.g. *the boy chased the dog* vs. *the dog chased the boy*).

Garrett (1975ff) as well as Levelt (1989) assume that the translation of a conceptual structure into a linguistic structure proceeds in two steps. The first step is called "functional level" or "grammatical encoding" while the second step is called "positional level" or "phonological encoding". This crucial distinction - grammatical encoding taking place before phonological encoding - is also assumed in the DM model and it is therefore maintained in the processing model in figure (5-1). Grammatical encoding is carried out within the computational system (generating surface structure from deep structure) as well as at the level of MS (where further structure-changing operations may apply), while phonological encoding takes place at the level of PF by means of Vocabulary insertion and phonological readjustment.

Above, I have exemplified the time course of language production with a simple, non-erroneous utterance. I shall now come back to the different kinds of speech errors. Basically, errors may occur at every stage in the generation of an utterance.

Due to the network character of the conceptual level, concept nodes that are semantically related to a target concept may also send activation to List 1. Whenever a competing root receives more activation than the target root, it will be selected from List 1 and handed over to the computational system, thereby giving rise to a meaning-based substitution (5-3a). Since in German, roots are specified for grammatical gender, this kind of substitution is facilitated when two competing roots share the same gender feature. Sometimes a competing root is not substituted for the meaning-related target root but rather for another root in the utterance, thereby causing a semantic anticipation (as in (5-3b) where the concept WING sends activation to the concept FLY at the conceptual level) or a

[132] Note that this is true even for an intransitive sentence like the one discussed above. Since according to DM, the activated roots in List 1 are not linked to categorial information, the insertion of [$root_{(schnurr)}$] into SpecvP
- due to the presence of the [+cause] feature - would otherwise be as likely as the insertion of [$root_{(katze)}$].

semantic perseveration. Blends also have their origin at this early processing stage but they will be discussed separately below (in the headers of the following examples, I first mention the error site(s) and then the cited error types that occur at this site).

(5-3) *List 1: Meaning-based substitutions and anticipations*

a. he got hot under the **belt** ← under the collar (Fromkin 1973b:262)
b. they even **fly** on the wing ← sleep on the wing (Harley 1984:201)

Within the computational system, only roots and morphosyntactic features are manipulated. At this stage of the derivation, root exchanges (5-3cd), root anticipations, and root perseverations may occur. As pointed out in subsection 4.5.3, all kinds of errors involving roots are constrained by two interacting factors: firstly, by the licensing environments of the affected roots and secondly, by root adjacency. That is, whenever another root intervenes between the original position of a given root and its landing site in the error, this intervening root appears in a different licensing environment. Due to subsequent operations such as feature copy, readjustment and/or morpheme insertion, all of these errors will result in grammatical - albeit possibly awkward - utterances. For errors that affect the number or tense feature, i.e. feature anticipations, perseverations (5-3e), exchanges (5-3f), or shifts, it can not be decided whether they occur within the computational system or at MS, since the number and tense features are present at both levels (the same is true for errors involving the Neg feature; see subsection 4.2.4).[133] For the most part, these errors give rise to ungrammaticality.

(5-3) *Computational System: Root exchanges, feature perseverations and exchanges*

c. ich weiß nicht, wie man eine **Nadel** in den **Faden** kriegt
I know not how one a.f needle(f.) in the.m thread(m.) gets
← wie man einen Faden in die Nadel kriegt
← *how one a.m thread(m.) in the.f needle(f.) gets*

d. people still see Libya as a **nation**-al **danger**, as a danger-ous nation

e. er hatte fünf Punkt-e Vorsprüng-**e** ← fünf Punkt-e Vorsprung
he had five point-PL lead-PL ← *five point-PL lead*

f. I **wind** up **rewrot**-ing twelve pages
← I wound up rewriting (Stemberger 1985:163)

[133] Gender features are also present within the computational system and at MS. Remember, however, that I have argued in section 4.6 that gender features - due to the fact that they are inherent features of roots - can not be exchanged, anticipated, or perseverated (and neither can they be subject to stranding in root exchanges). Gender features may only be involved in copy errors at the level of MS.

At MS, all errors involving feature copy occur, in particular, SVA-errors (5-3g) but also gender copy errors. Errors of case assignment also occur at this stage (e.g. the case reversal in (5-3h)). Moreover, as argued for in subsection 4.7.2, some few root exchanges and anticipations take place at MS after gender features have been copied onto other material within DP (5-3i), thereby giving rise to a feature conflict.

(5-3) *MS: Feature copy and case assignment errors, root exchanges*

g. membership in theses unions **were** voluntary
   ← membership ... was voluntary (Bock & Eberhard 1993:59)

h. (er/sie) stellte **mich** **ihm** vor,
   (he/she) introduced 1.SG.ACC 3.SG.m.DAT PARTICLE
   mir ihn vor
   1.SG.DAT 3.SG.m.ACC PARTICLE
   "(He/she) introduced him to me." (Berg 1987:283)

i. ich hab' ein **Nase** auf der **Haar**, äh,
   I have a.SG.n.ACC nose(f.) on the.SG.f.DAT hair(n.), er,
   ein Haar auf der Nase
   a.SG.n.ACC hair(n.) on the.SG.f.DAT nose(f.)

Since the phonological form of elements is neither available within the computational system nor at MS, we must assume that all errors that involve phonological information occur at PF. First of all, phonologically specified Vocabulary items are retrieved from List 2. At this point, form-based substitutions may happen whenever a phonological neighbor of an intended item receives too much activation and is erroneously selected for insertion (5-3jk). As with meaning-based substitutions, erroneous selection of items from the Vocabulary is facilitated by identical gender features of the competing items.

(5-3) *List 2: Form-based substitutions*

j. das kann man getrennt einstellen, das **Mikroskop**
   that can one separately adjust the.n. microscope(n.)
   ← das Mikrophon
   ← *the.n microphone(n.)*

k. white Anglo-saxon **prostitute** ← protestant (Fromkin 1973b:262)

After the insertion of Vocabulary items into terminal nodes, all errors that involve the exchange, anticipation, perseveration, or shift of phonological material take place, no matter if a phonological feature (e.g. a voicing reversal in (5-3l)), a single segment (m), a segment cluster, a syllable or morpheme (n), or a word (o) is affected by the slip.

(5-3) *PF: Exchanges of phonological features, segments, syllables, and words*

l. **p**ig and **v**at ← big and fat (Fromkin 1973a:17)

m. he **c**aught **t**orses ← he taught courses (Fromkin 1973b:245)

n. ein Film von einem **er**wegenen **Ver**finder ← verwegenen Erfinder
a movie by a (error) (error) ← *bold inventor*

o. es ist nicht alles **glänz-t**, was **Gold** ← Gold, was glänz-t
it is not all glitter-3.SG that gold ← *gold that glitter-3.SG*

Remember that I have argued in subsection 4.5.3 that exchanges like the one cited in (5-3o) must occur at PF. In this error, two elements from different licensing environments are affected but adaptation to the new licensing environments is not observed. In addition to that, the verb is moved in its inflected form, a fact that unambiguously indicates that the error takes place following feature copy at MS (and following phonological readjustment at PF, i.e. umlaut formation). Therefore, the slip in (5-3o) is a word exchange, not a root exchange.

As is well-known, blends are a particularly diverse and intricate matter. They shall therefore receive a more detailed treatment (for extensive discussions of blends see e.g. Leuninger 1987; Gies 1993; Wiegand 1996). Let us first have a look at word blends (5-3pq). In word blends, two related concepts are activated at the conceptual level. In contrast to meaning-based substitutions, however, no decision between the two competing roots is achieved in List 1 and consequently, both roots enter the computational system where they occupy a single terminal node. In case the competing roots occupy a position that is licensed by a determiner, the gender feature of one of them is copied onto other elements within DP at MS (in (5-3p), the competing roots have the same gender feature). At PF, two Vocabulary items are selected for insertion from List 2 and the two phonological forms are fused in the terminal node.

(5-3) *List 1 & List 2: Word blends*

p. Hattest du einen guten **Plitz**
had you a.m.ACC good.m.ACC (error)
← einen guten Platz // einen guten Sitz
← *a.m.ACC good.m.ACC place(m.)* // *a.m.ACC good.m.ACC seat(m.)*

q. **smever** ← smart // clever (Fromkin 1973b:261)

As already pointed out in subsection 4.7.2, phrasal blends may have different etiologies. They all have in common that in List 1, a number of roots that belong to two different speech plans receive activation. Whenever a phrasal blend results in a grammatical

utterance, we must assume that at this early stage, a root belonging to one plan is erroneously retrieved and takes the place of a root belonging to the other plan. At MS, features of the intruding root are passed on to other elements and at PF, the corresponding Vocabulary item is inserted. In (5-3r) below, for instance, several roots and features are activated in List 1 (e.g. [root$_{(flieg)}$] "fly", [root$_{(trüb)}$] "cloud", and [root$_{(wasser)}$] "water", amongst others). Instead of [root$_{(wasser)}$], however, [root$_{(flieg)}$] is selected from List 1.[134] At MS, the gender feature of [root$_{(flieg)}$] is copied onto D and consequently, the Vocabulary items /kain´/ and /fli:g´/ are inserted at PF. For that blend, the only error site is within List 1; the resulting utterance is fully grammatical. In that, the slip in (5-3r) resembles a meaning-based substitution (like the one in (5-3a)), the only difference being that the concept FLIEGE does not receive activation from the concept WASSER at the conceptual level.

(5-3) *List 1 (& List 2): Phrasal blends*

r. der keine **Fliege** trübt ← keiner Fliege etwas zuleide tut //
who no.f.ACC fly(f.) clouds ← no.f.DAT fly(f.) sth. harm does //
kein Wässerchen trübt
no.n.ACC water.DIM(n.) clouds
"who doesn't hurt a fly // in whose mouth butter wouldn't melt"

s. **mich** **macht** das nichts
1.SG.ACC makes that nothing
← mich stört das nicht // mir macht das nichts
← *1.SG.ACC bothers that not // 1.SG.DAT makes that nothing*
"That doesn't bother me."

The phrasal blend in (5-3s) has different characteristics. Most importantly, it gives rise to an ungrammatical utterance. For this error, we must assume that within List 1, no decision is made between [root$_{(mach)}$] "make" and [root$_{(stör)}$] "bother" and that therefore, both enter the computational system (sharing one position in the syntactic structure, as in word blends). At MS, [root$_{(stör)}$] assigns accusative case to the pronoun but at PF, the Vocabulary item /max/ corresponding to the competing root is retrieved from the Vocabulary. Consequently, a subcategorization error arises. In this error, we are dealing with two error sites: first, List 1 where two roots are retrieved, and second, PF where the Vocabulary item that did not assign case is selected.

[134] Note that the two roots both have the same thematic role (theme) in the competing speech plans, a fact that most probably constrains the interaction of two elements in a blend. Consequently, a (hypothetical)

Some ‘blends’ fall between all categories. In these, two related concepts send activation to List 1 from which two roots are retrieved and handed over to the computational system. At MS, the gender feature of one root is copied but in contrast to (5-3p), the other root is selected for insertion into the terminal node at PF. In (5-3t), the two competing roots are [root$_{(kanzlei)}$] “chambers” and [root$_{(büro)}$] “office”. At MS, the gender feature of the former root is copied onto D but at PF, the Vocabulary item /byro:/ is selected for insertion. Once again, we are dealing with two error sites, List 1 and List 2.

(5-3) *List 1 & List 2: Substitution blend*

t. da sind süße Jungs in dieser **Büro**, in diesem Büro
there are cute boys in this.f.DAT office(n.) in this.n.DAT office(n.)
← in dieser Kanzlei // in diesem Büro
← *in this.f.DAT chambers(f.) // in this.n.DAT office(n.)*

This error is not to be treated as a meaning-based substitution (although KANZLEI and BÜRO are of course linked at the conceptual level), since no decision between two competing roots is made within List 1 (remember that meaning-based substitutions are not expected to result in a DP agreement error). The slip in (5-3t) is not a word blend either, since it is not the case that two Vocabulary items fuse in one terminal node. And neither is it a real phrasal blend, since we are not dealing with a competition between two different phrases (as e.g. in (5-3r)). Therefore, I term this type of blend “substitution blend”.[135]

All types of blends mentioned above (except (5-3r)) involve two error sites. Two roots in List 1 receive activation from the conceptual level and both enter the computational system. At PF, either the two matching Vocabulary items are inserted in one terminal node and fuse or the item which has not passed on its gender or case feature at MS is erroneously selected for insertion. Figure (5-4) presents a synopsis of what error types occur at what processing level.

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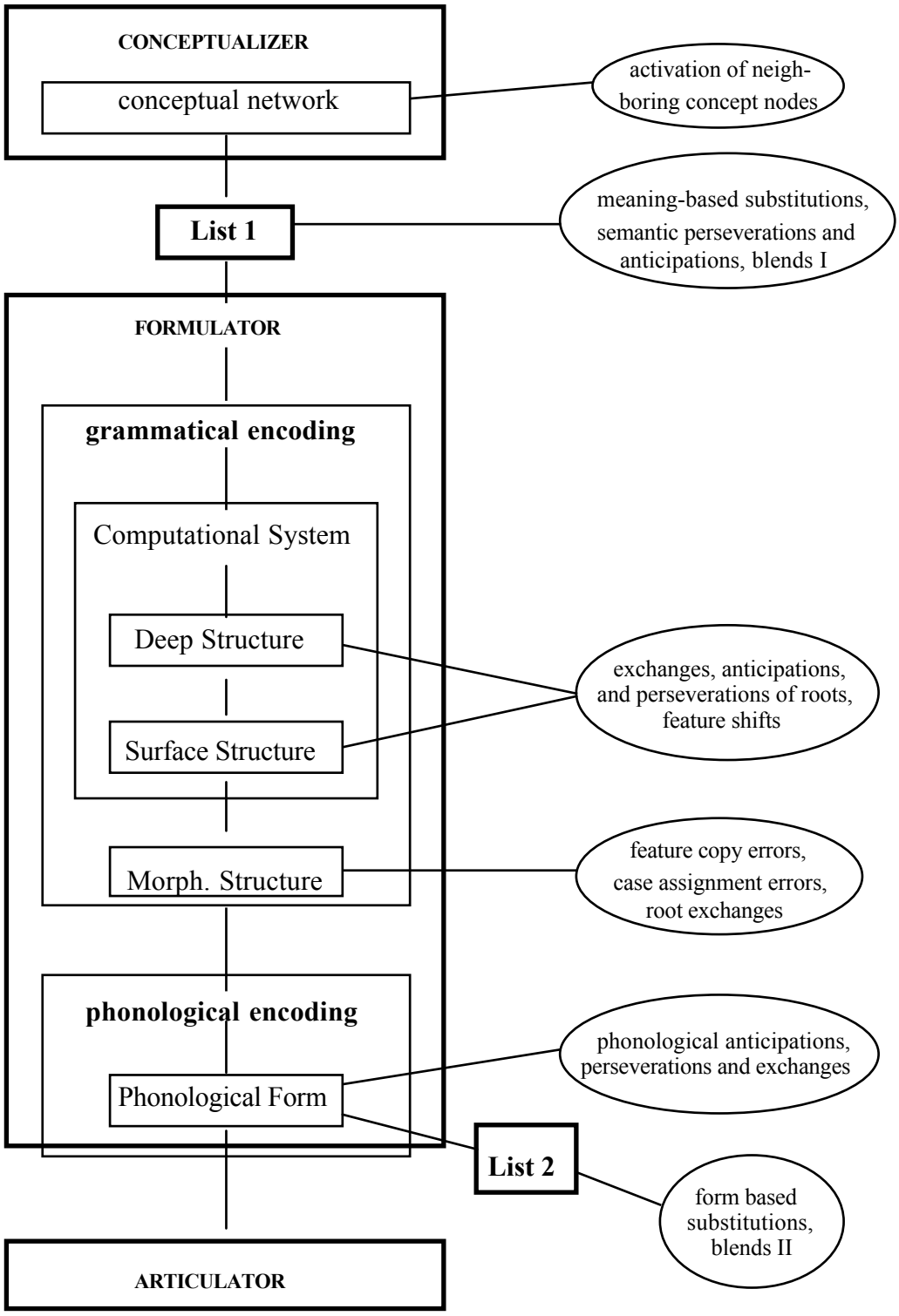
blend like e.g. *der kein Wässerchen fliegt* ‘who no water.DIM flies’ in which [root$_{(flieg)}$] is substituted for [root$_{(trüb)}$] is much less likely.

[135] The following substitution blend is more complicated: *ich hab hier eine blondes Haar* ← *eine blonde Locke* // *ein blondes Haar* ‘I have here a.f.ACC blond.n.ACC hair(n.) ← a.f.ACC blond.f.ACC curl(f.) // a.n.ACC blond.n.ACC hair(n.). At the conceptual level, LOCKE “curl” and HAAR “hair” receive activation and both corresponding roots are retrieved from List 1. Obviously, at MS, the gender feature [+fem] of [root$_{(locke)}$] is copied onto D, while the gender feature [+neut] of [root$_{(haar)}$] is copied onto [root$_{(blond)}$].

(5-4) *Possible sites of error occurence in the model*



For the following reasons, I take the implementation of the grammar model into the psycholinguistic model of language production, i.e. the equation of the grammar model with the formulator component, as sketched in (5-2) and (5-4), to be very promising:[136]

First of all, the course of processing is the same in the psycholinguistic and in the DM model. In subsection 4.2.1, I have argued that the retrieval of roots and features from List 1 must be determined by activation of concept nodes at a conceptual level in order to prevent random insertion of Vocabulary items at PF. Consequently, the flow of information in the DM model is from the conceptual level to grammatical encoding (building and modifying syntactic structure within the computational system and at MS) to phonological encoding (insertion and possibly modification of Vocabulary items) and finally to articulation. This is exactly what is assumed in the language production models. Most importantly, both models endorse a late insertion of phonological forms.

Secondly, the attested spontaneous speech errors can be accounted for within the combined model without further stipulation. In the present thesis, I focused on errors that involve the manipulation of morphosyntactic (and compositional semantic) features and/or categorial information, viz. agreement errors, errors of subcategorization, accommodations, and stranding errors. As it turns out, the combined model makes a number of interesting predictions about possible influences on speech errors; morevoer it allows us to explain why certain error types are not attested:

- I have shown that morphosyntactic features are of major importance in the derivation of an utterance. The features which are drawn from List 1 and which are present within the computational system (except for the gender feature) may be accessed separately in an error, i.e. stranded or moved (see section 4.6).
- Moreover, the operations that take place at MS - feature copy and case assignment - may be defective. This allows for a straightforward explanation of a number of errors that have only received little attention in the literature on language production so far. In particular, the characteristics of SVA-errors support the idea that agreement nodes are only implemented after movement operations have taken place (see section 4.4).

[136] See Phillips (1996) for a similar view of the comprehension side of language processing. His work is an attempt to abandon the parser-grammar distinction. The PIG (Parser Is Grammar) model he proposes has two components: a grammar (containing language universals, a lexicon, structure building procedures, etc.) and a finite set of resources (like working memory and world knowledge). Phillips, drawing on earlier analysis-by-synthesis models, claims that we perceive sentences by generating them for ourselves. That is, parsing is an active process, in which the grammar tries to generate a sentence whose phonetic form matches the incoming sentence, using the normal structures and operations of the grammar (see Garrett (1982, 2000) on the relation of production models to comprehension models).

- In section 4.5, I have demonstrated that the formulator can do without categorial information, i.e. categorial features are not amongst those features which are drawn from List 1 (remember that in the Levelt model, lemmas are assumed to bear a category label). Consequently, the DM assumption that roots are acategorial in nature can be maintained. However, what has an impact on the error occurrence, is the licensing environment of roots that interact in an error.
- The fact that the identical gender effect is observed in meaning- and form-based substitutions indicates that the grammatical gender feature is specified throughout. That is, the gender specification constrains the interaction of two roots in a substitution (see section 4.3). Since roots are selected from List 1 independently of their number feature, this observation also holds for plural nouns.
- Only errors that occur before the level of MS (i.e. errors within List 1 and within the computational system) can be followed by morphosyntactic or morphological adaptation processes (e.g. choice of appropriate determiner, insertion of appropriate derivational affix).[137] This fact allows for a number of predictions concerning the grammatical well-formedness of erroneous utterances. For instance, only meaning-based but not form-based substitutions can be followed by morphosyntactic adaptation (i.e. copy of the gender feature; see subsection 4.3.3). Moreover, no phonological errors can be accompanied by morphological or morphosyntactic adaptations.
- Except for very few instances of lexical construal, the notion of accommodation (in the sense of a repair strategy or a control mechanism) can be abandoned in the DM model. In fact, the adaptation processes (as mentioned in) that seem to take place are the result of the application of a number of operations that apply anyway in the derivation of an utterance (feature copy, readjustment, and morpheme insertion; see section 4.7).

The overall picture that emerges is that the DM architecture does very well in accounting for the observed error patterns: on the one hand, it makes the right predictions about possible influences on errors; on the other hand, it allows for an explanation why certain error types are not attested.

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[137] Strictly speaking, errors that involve morphosyntactic adaptation (as in *I thought you **were** finishing my beer* ← *I was finishing your beer* (Garrett 1980b:267)) must occur before the level of MS while errors that involve morphological adaptation (as e.g. the root exchange in (5-3d) above) could in principle also occur at the level of MS, since morpheme insertion applies only at PF.

I wish to emphasize that not all of the observations made above are new (see e.g. Levelt (1989) for the role of morphosyntactic features in grammatical encoding, Leuninger & Keller (1994) for discussion of various spell-out phenomena, and Marx (1999) on gender accommodations). However, to the best of my knowledge, these observations have not yet been explicitly related to a particular model of grammar. Since the grammar directly determines and constrains the generation of possible utterances, it is desirable to contemplate if and how the grammar influences the translation of a preverbal communicative intention into an articulated string of sounds.

Merrill Garrett puts this requirement into the following words:

> "When we contemplate language processing questions, there are multiple sources that we draw on to constrain theoretical claims. These begin with formal grammars, and should in a quite real sense, end with formal grammars. When we ask how words are learned, recognized, pronounced, integrated in utterance, or interpreted in their discourse ensembles, we pose those questions in terms of structural features that grammars associate with words as a function of their embedding in grammatical rule systems." (Garrett 2000:31f)

In the model sketched above, I have taken this view seriously. Above all, I have argued that grammatical operations in a real sense constrain language processing - here: language production. In the modified model I propose, the grammar interacts with the processing component as directly as possible in that it takes over the job of the processor (or formulator, respectively). That is, the grammar and the processor are the same system.

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