Local licensing and feature copy in language production

Roland Pfau

In the last 30 years, psycholinguists have developed language production models based on speech error evidence. In particular, it has been shown that different processing levels have to be distinguished between a preverbal message and the articulation of an utterance. However, only few attempts have been made to relate the processing models to a particular grammar theory. In this paper, I am going to show that the Distributed Morphology framework allows for a straightforward explanation of certain intricate error data that involve the manipulation of morphosyntactic features and/or the application of context-sensitive phonological and morphological rules.

1. Introduction

Historically, errors in spontaneous speech, i.e. slips of the tongue, 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 (Sturtevant 1917; Jespersen 1922). A second motivation for studying errors - and probably the most familiar one outside of linguistic circles - was to gain insight into psychological repressions. Sigmund Freud (1901/1954), for instance, was convinced that speech errors reveal our suppressed emotions and desires.

Thirdly, spontaneous errors also played an increasingly important role in psycholinguistic attempts to construct linguistic performance models (Fromkin 1971; Garrett 1975, 1980a,b; Dell 1986; Berg 1988; Levelt 1989). The crucial questions are: What kinds of (possibly ordered) processes mediate between a communicative intention and the articulation of an utterance? And, closely related: What role do grammatical units and rules play in the generation of an utterance?

In the following, 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. 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, [...] 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.

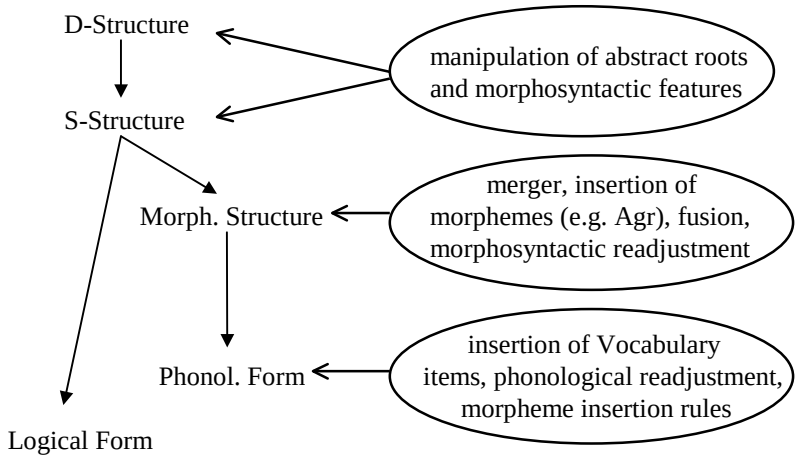
In this paper, I will try to supply an analysis of spontaneous error data in the light of a particular theory of grammar. Please note that I adopt the assumptions of weak mentalism (Katz 1964; Ringen 1975; Chomsky 1980). I am going to investigate whether a particular theory of grammar - the Distributed Morphology framework - is successful in providing explanations for a certain kind of speech error data. In doing so, however, I am not going to claim that every detail of the theory - theoretical constructs like e.g. V-to-I movement - must be isomorphic to some psychological counterpart. Rather, I will demonstrate that Distributed Morphology makes for a psychologically real theory of grammar in the sense that it is accurate for the data under investigation. That is, it explains the available evidence and moreover, it makes correct predictions about possible and impossible errors.

2. Distributed Morphology

Below, I can only give a brief summary of the basic assumptions of Distributed Morphology (Halle & Marantz 1993, 1994; Harley & Noyer 1998, 1999). I will highlight those aspects of the theory that are relevant for the subsequent discussion of speech errors while neglecting those details that are not of direct importance in the present context.

The theory of Distributed Morphology (DM) is separationistic in nature in that it adopts the idea that the mechanisms which are responsible for producing the form of syntactically complex expressions are separate from the mechanisms which produce the form of the corresponding phonological expressions. That is, the computational system is taken to manipulate nothing but abstract roots and morphosyntactic features. Phonological features are assigned to terminal nodes in a syntactic structure only after syntax at the level of Phonological Form by means of Vocabulary insertion. The structure at PF, however, is not necessarily isomorphic to the syntactic structure. At the level of Morphological Structure which is taken to be the interface between syntax and phonology, various operations may change the structure and number of terminal nodes. Agreement nodes, for instance, are taken to be implemented at this level and agreement features are copied onto these nodes.

(1)



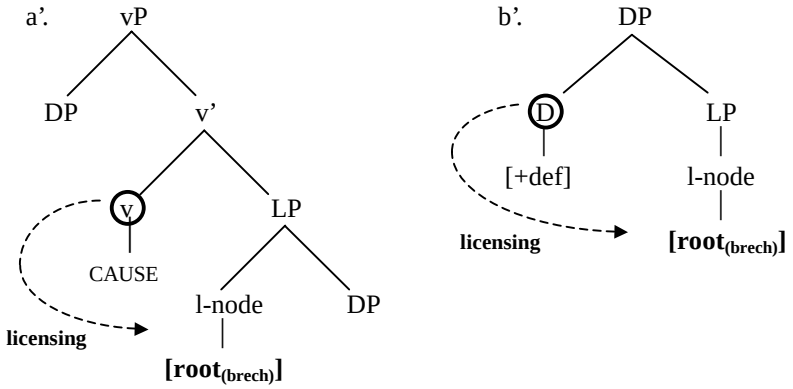
At PF, readjustment rules may apply that change the phonological form of already inserted Vocabulary items in certain syntactic contexts (the verb *sing*, for example, will be subject to ablaut in the context of a [+past] feature). Moreover, morphemes may be supplied by means of morpheme insertion rules. I will come back to these rules shortly.

One particular important assumption of Distributed Morphology is that the traditional terms for sentence elements (such as noun, verb, and adjective) are taken to have no universal significance and are essentially derivative from more basic morpheme types (Marantz 1997, Harley & Noyer 1998). That is, there is only one type of lexical node (l-node) whose categorial status is defined by its context. A noun, for instance, is a root whose nearest c-commanding functional node is a determiner: that is, a noun is a root which is locally licensed by a determiner. In contrast, a verb is a root that is locally licensed by a light verb.

Consider the following two examples:

(2) a. Peter bricht den Stock
Peter breaks the stick

b. der Bruch
the breaking



Since the l-nodes lack a categorial specification, the phrase they project is

labeled LP. In both structures in (2), the l-node hosts the same root. In (2a), the verbal status of [root$_{(brech)}$] 'break' is created by inserting a Vocabulary item into a terminal node that is governed by a light verb. The l-node will be combined with the CAUSE morpheme in v to yield the transitive verb in a sentence like 'Peter breaks a stick'. In (2b), the nominalization of the same root is the result of inserting a Vocabulary item into a node that is governed by a determiner. In both structures, the Vocabulary item that is inserted will be the same. Depending on the context of insertion, however, different phonological readjustment rules will apply after insertion of the Vocabulary items. The stem change in (2a) is due to the agreement feature 3rd person singular, while the stem change in (2b) is due to the licensing environment.

Let me repeat the following crucial facts: According to DM, only categorially nonspecified abstract roots and morphosyntactic features are manipulated in the syntax. At the level of Morphological Structure, certain structure-changing operations may apply and agreement nodes are implemented. At PF, Vocabulary items are inserted, some of which are subject to phonological readjustment. Phonological readjustment rules may either be triggered by morphosyntactic features or in certain licensing environments.

3. Reconciliation of processing conflicts in speech errors

I shall now introduce some of the error data that I will be dealing with in the remainder of this talk. All of the errors have in common that in the erroneous utterance, a conflict between two elements has been reconciled by means of a process of post-error adaptation. Consequently, the utterances that surface may be awkward but still, they are fully grammatical. Consider, for instance, the examples given in (3).[1]

(3) a. irgendwie habe ich heute <u>eine</u> **Zunge** <u>im</u> **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(f.)
[⇒ not: *irgendwie habe ich heute einen **Zunge** in der **Knoten**]

[1] Note that I always give the erroneous utterance first and then, on the right hand side of the arrow, the intended utterance. Whenever there is no arrow in an example, the error was self-corrected by the speaker. The error elements are in bold type while the elements that undergo post-error adaptation are underlined. Moreover, below each example, you will find the utterance that would have surfaced if adaptation had not taken place. Also note that whenever no source is given, the slip is taken from my own corpus.

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 et al. 1989:152)
[⇒ not: *una **duro** de veinte **moneda**-s]

c. **you**'re too good for **tha**t
← that's too good for you (Stemberger 1982:344)
[⇒ not: ***you** (i)s too good for **that**]

d. bis **er** es bei **dir** abhol-t,
until 3.SG.m.NOM it from 2.SG.DAT pick.up-3.SG
bis du es 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)
[⇒ not: *bis **ihm** es bei **du** abhol-st]

In the German slip in (3a), the two nouns *Knoten* 'knot' and *Zunge* 'tongue' are exchanged leaving behind their respective articles. The two nouns are of different gender (masculine and feminine, respectively) and after the error has taken place, both of the articles adapt to the gender feature of the intruding noun. The same is true for the Spanish exchange error in (3b). Again, the indefinite article surfaces in its appropriate masculine form. In (3c), a personal and a demonstrative pronoun are exchanged. The verb, however, appears with the feature specification of the new element in subject position, i.e. the ungrammatical string **you is too good for that* does not surface. The error in (3d) is similar but the consequences are more complex. In this slip, the exchanged pronouns land in positions with different case specifications and are spelled out accordingly. Moreover, as in the English example in (3c), the verb adapts to the person features of the new pronoun in subject position.

In these four errors, the adaptation process is of a morphosyntactic nature. That is, the adaptation is triggered by morphosyntactic features such as person and gender. A different kind of adaptation takes place in the following three slips of the tongue:

(4) a. I think it's **care**-ful to measure with **reason**
← it's reasonable to measure with care (Fromkin 1973:31)
[⇒ not: *I think it's **care**-able to measure with **reason**]

b. das ist wirklich eine **farb**-ig-e, äh, eine schön-e Farbe
that is really a.f coulour-ADJ-f, er, a.f nice-f colour(f.)
[⇒ not: *das ist wirklich eine **farb**-e, äh, eine schöne Farbe]

c. dass er mit dem **Zug** zieh-t
that he with the.m. procession(m.) move-3.SG
← mit der Masse zieh-t
← with the.f crowd(f.) move-3.SG
[⇒ not: *dass er mit der **Zieh** zieht]

In the English slip in (4a), two word stems are exchanged. In the erroneous utterance, the stem *care* appears with the appropriate adjectival suffix *-ful* which, however, was not part of the intended utterance; i.e. we don't get *I think it's careable to measure with reason*. Due to the self-repair, for the error in (4b), it cannot be decided if we are dealing with an anticipation or with an incomplete exchange. In any case, the error element *farb* 'colour' appears in its new slot with an adjectival suffix which, again, would not have appeared in the intended utterance. The anticipation in (4c) is more complex: In this particular slip, we observe two changes. Firstly, the stem *zieh* 'to move' lands in a noun position in which it is subject to stem-internal changes. Secondly, in the error, the definite article accommodates to the new stem. Note that in this particular error, the error element itself as well as the environment of the anticipated item are subject to a change.

In the psycholinguistic literature, errors like the ones presented here are referred to as accommodations. In multi-level language production models, such errors are taken to involve two distinct steps (Garrett 1980a,b; Levelt 1989). I do not wish to go into the details of language production models. I just want to point out that in these models, it is assumed that the actual error - be it an exchange or an anticipation - occurs at an early processing level. At a subsequent level, the adaptation of either the error element or of its environment to certain grammatical well-formedness restrictions takes place (e.g. agreement within DP, subject-verb agreement).

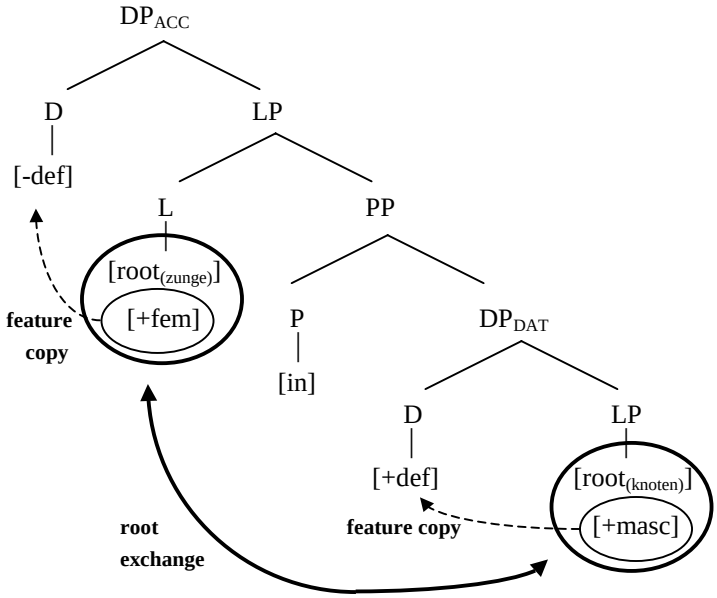
A typical definition of accommodation is given by Berg (1987:277). He states that an accommodation is 'a process whereby a processing conflict between the actual error and the context of the original utterance is reconciled'. Berg assumes that this is evidence for the fact 'that the processing system is sensitive to the eventual output' and that '[a]commodation can thus be viewed as a blind repair process which brings utterances in line with linguistic constraints'. Obviously, the rules of grammar are an essential factor in linguistic behavior, that is, the rules of grammar enter into the processing mechanism. Still, Berg - as well as many other psycholinguists - does not commit himself to a particular theory.

In the following, I am going to show that errors such as those in (3) and (4) receive a straightforward explanation within the Distributed Morphology framework. In contrast to Berg (1987), I am going to claim (i) that no processing conflict is reconciled in an accommodation, (ii) that therefore no repair strategy is involved, and (iii) that output oriented processing need not be assumed for accommodations.

4. Rethinking accommodation

Let us first have another look at the slip given in (3a). In DM, it is assumed that only abstract roots and features are manipulated in the syntax. In German, the roots that are selected must be specified for gender, i.e. they must be linked to a gender feature. In (5), you will find a partial tree structure for this error after the root exchange has taken place.

(5)



After the root exchange has taken place, the gender features of the exchanged roots are copied onto the respective determiner positions. At PF, the Vocabulary items that best match the feature bundles in these terminal nodes will be inserted. The Vocabulary items for the two determiner positions are given in (6). Please note that a Vocabulary item is not merely a phonological string; rather, it also contains information about where that particular string may be inserted.

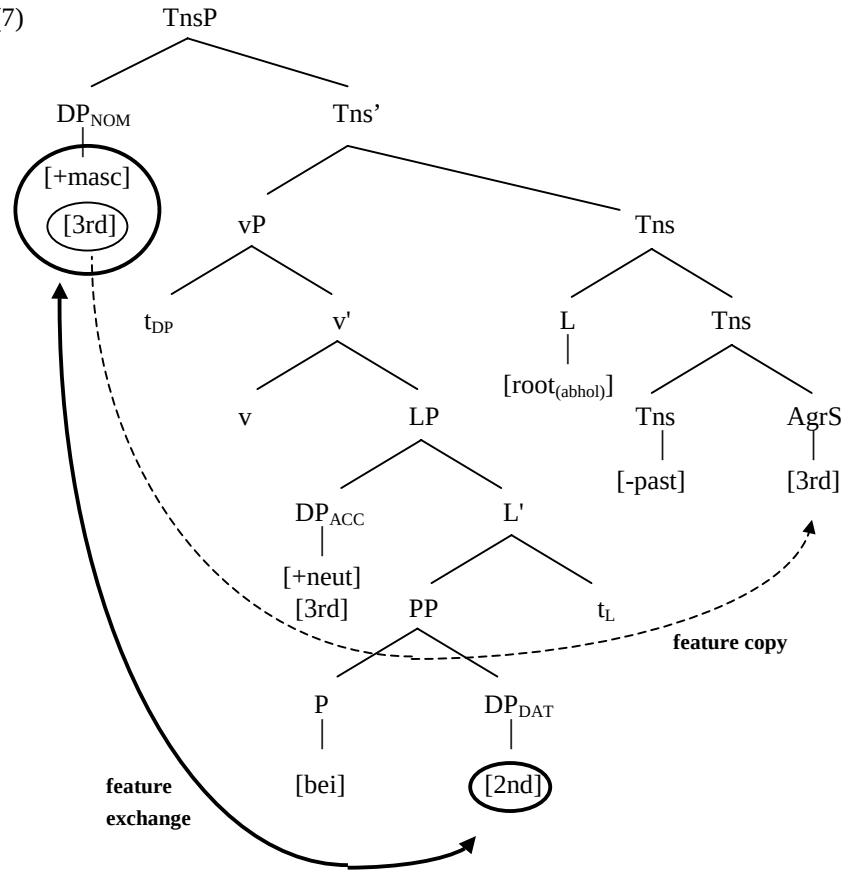
(6) a. [-def] [+fem] [ACC] ←→ /ainə/
b. [+def] [+masc] [DAT] ←→ /de:m/

The fact that a grammatical utterance surfaces indicates that the error must have occurred before gender features are copied from the roots onto the determiners. The same is true for the Spanish error in (3b).

A similar phenomenon can be held responsible for the adaptation of the verbs in (3c) and (3d). What is exchanged in those errors are not roots but rather feature bundles. Remember that in DM, agreement nodes are only implemented after syntax at the level of MS and subsequently, features from the

subject are copied onto the agreement node. The post-error structure for the exchange in (3d) is given in (7).

(7)



At the level of Morphological Structure, case will be assigned to the DPs and the person feature [3rd] will be copied onto the agreement node. Again, the Vocabulary items that best match the feature bundles contained in the terminal nodes will be inserted at PF. The Vocabulary items that will be inserted into the relevant nodes are given in (8).

(8) a. [3rd] [+masc] [NOM] ⟷ /e:ʁ/
b. [2nd] [DAT] ⟷ /di:ʁ/
c. [3rd] ⟷ /-t/

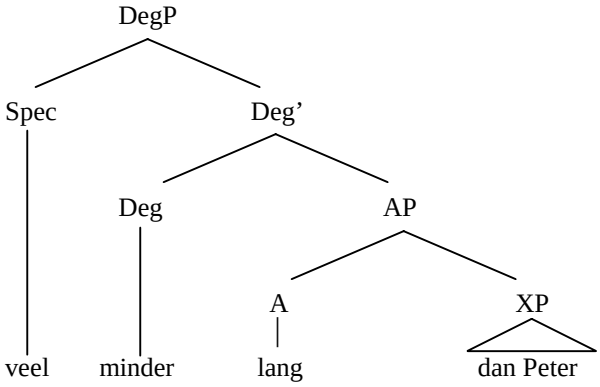
Consequently, the grammaticality of the examples discussed so far is due to feature copy at MS and to the insertion of the appropriate Vocabulary items at PF. However, these are the simple cases. We have not yet considered the role of phonological readjustment and morpheme insertion rules. Such rules come into play when we analyze the errors in (4).

Let us first consider the error in (4b). In this slip, a noun is anticipated into an adjective slot. I have already mentioned that in DM, it is assumed that roots are acategorial in nature. A noun is taken to be a root that is locally licenced by a determiner while a verb is a root that is locally licensed by a light verb. But what about adjectives? As far as adjectives are concerned, I follow Corver (1991, 1997) who argues that the functional head analysis which has been applied to the verbal and nominal domain should be extended to the adjectival system. He proposes that degree words which traditionally have been analyzed as occupying the specifier of an adjective phrase (Jackendoff 1977) should rather be interpreted as heading a functional degree phrase (DegP). The specifier position of DegP can host various elements qualifying the degree word. An exemplary DegP structure for the Dutch phrase in (9a) is given in (9b). In this structure, the degree word *minder* 'less' heads the DegP while the modifying element *veel* 'much' occupies SpecDegP (Corver 1997:292).

(9) a.

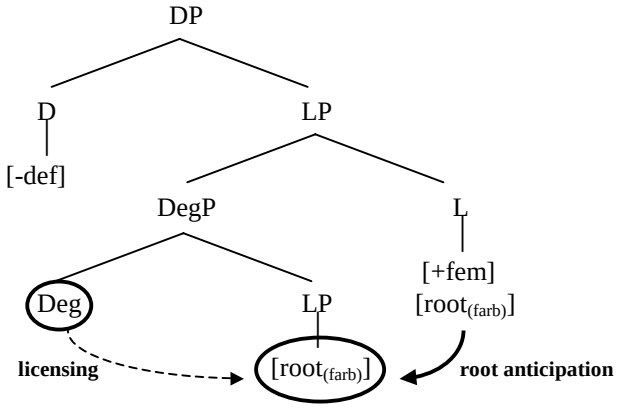
veel	minder	lang	dan	Peter
much	less	tall	than	Peter

b.



Consequently, we may assume that in the slip (4b), the root is anticipated into a position that is licensed by an empty degree element, as indicated in (10).

(10)



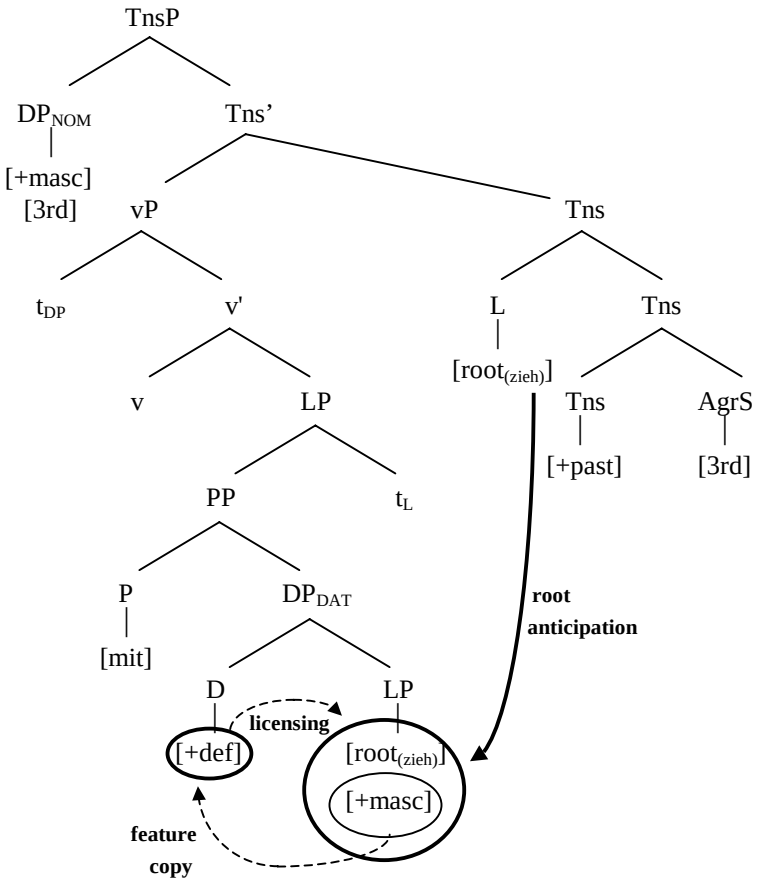
At the level of Phonological Form, the anticipated root will be spelled out by the Vocabulary item given in (11). This, however, is not yet the end of the story, since for this particular root, a morpheme insertion rule is triggered in an environment in which it is licensed by a degree element. The morpheme insertion rule that inserts the suffix *-ig* - formerly known as an adjectival suffix - is given in (12).

(11) $[root_{(farb)}]$ ⟷ /farb/

(12) Insert /-ig/ / X / [+deg]
(where X = *farb*, *wind*, *krach* ‚noise' ...)

The last slip, I want to discuss in some detail is the root anticipation in (4c). For this error, the fact that a grammatical utterance surfaces is due to copy of the gender feature onto the determiner at MS and to the application of a phonological readjustment rule at PF. In (13), you will find the structure for this error after anticipation of the root.

(13)



Once again, the root anticipation must have taken place before the level of Morphological Structure, since at this level, the gender feature of the intruding root is copied onto the determiner. At PF, the Vocabulary items that best match the features and roots contained in the terminal nodes will be selected for insertion. The two Vocabulary items relevant for the error (4c) are given in (14).

(14) a. [+def] [+masc] [DAT] ←→ /de:m/
b. [$root_{(zieh)}$] ←→ /tsi:/

Moreover, a phonological readjustment rule will change the phonological form of the Vocabulary item that spells out the root in case this root is locally licensed by a determiner. The relevant readjustment rule is given in (15).[2]

(15) /tsi:/ → /tsu:g/ / [+d]

The four errors I have discussed in some detail illustrate how DM mechanisms - feature copy, phonological readjustment, and morpheme insertion rules - allow us to account for the surface form of the erroneous utterances in a straightforward way (cf. Pfau (2000) for more examples that involve the application of such mechanisms in slips of the tongue).

Please note that all the mechanisms involved in the emergence of these errors are mechanisms which according to DM apply in the derivation of an utterance anyway. That is, agreement features must be copied before Vocabulary insertion takes place in order to facilitate selection of the appropriate Vocabulary items. Moreover, at PF, phonological readjustment rules may change the phonological form of already inserted Vocabulary items and morpheme insertion rules may insert morphemes in certain licensing environments. Once again: all these operations apply anyway and consequently, we need not assume repair strategies of any kind in order to explain errors such as those in (3) and (4) above. For the same reason, output-oriented processing need not be assumed. Rather, we may maintain the idea that the processor is blind to the eventual output. I therefore conclude that the psycholinguistic concept of accommodation is superfluous and should be abandoned.

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[2] Things get more complicated when we take into account that *Zug* is not the only possible surface form of [$root_{(zieh)}$] in a [+deg]-environment, another common form being *Ziehung* 'draw', for example, which does not involve the application of a phonological readjustment rule but the insertion of a morpheme.

A possible way to account for such problematic cases might be to assume that light verb heads also play a role in certain nominalizations. Therefore, these nominalizations do not only contain a nominalizing environment (D) but also a verbalizing environment (v) (Marantz 1997). Consequently, the crucial difference between, for instance, *Zug* and *Ziehung* – both derived from [$root_{(zieh)}$] – might be that in the first, a BE (or CAUSE) morpheme occupies the light verb head within the DP while in the latter, the light verb head within DP hosts a BECOME morpheme.

5. When adaptation fails

All of the slips presented so far must occur at a processing stage at which features were not yet copied and readjustment and insertion rules have not yet applied. That is, they must occur before (or possibly at) the level of Morphological Structure. Otherwise, the grammatical outcome could not be explained.

However, errors may also occur at PF, i.e. after the insertion of Vocabulary items. Sound errors, for instance, can only occur at this level, since no phonological material is available before PF (e.g. the sound exchange *with this **w**ing I do **r**ed* ← *with this ring I do wed* (Fromkin 1971:31)). Now, consider the exchange errors in (16). At first sight, these slips look very similar to the ones presented before. Still, they have different characteristics. Most importantly, they both result in ungrammatical utterances. I assume that this is due to the fact that they occur at PF. This implies that it is not roots what is exchanged here but rather words or morphemes, i.e. phonologically spelled out forms.

(16) a. der Mann hat mich **Straf**-en *ge-**lügt**-t
the man has me punish-PL lie-PART
← Lüg-en ge-straf-t
← lie-PL punish-PART
'The man has given the lie to me.'
[⇒ not: der Mann hat mich **Straf**-en ge-**log**-en]

b. mein ***Stirb**-chen **bäum**-t ← mein Bäum-chen stirb-t
my die-DIM tree-3.SG ← my tree-DIM die-3.Sg
[⇒ not: mein **Sterb**-chen **bäum**-t]

In (16a), the verb stem does not appear in its participial form. If two roots had been exchanged before MS, then a phonological readjustment rule would have changed the vowel quality of the stem in the context of a participial feature and the appropriate participial suffix would have been inserted. In the error, however, no such change is affected. The German verb *sterben* 'to die' is subject to a phonological readjustment rule in the 3rd person singular. In (16b), this verb is obviously shifted in its readjusted form. We must therefore assume that the error occurs after readjustment has applied at PF. Once again, phonological forms were exchanged and not roots.

Further interesting evidence for the possible occurrence of slips at different stages in the derivation of an utterance comes from noun substitution errors. These are of two different kinds: the target and the intruding noun are either meaning- or form-related. We may assume that meaning-related substitutions occur when roots are selected which enter the computational system, while form-based substitutions occur at the point of Vocabulary insertion. That is, roots are organized in a network-like fashion on semantic grounds while Vocabulary items are arranged on the basis of phonological similarity (a similar assumption is made in psycholinguistic production models).

We therefore predict that adaptation of determiners and/or adjectives to the gender feature of the intruding noun should only be observed following meaning-based substitutions but not following form-based substitutions. The reason for this is that at the point at which form-based substitutions occur (that is, at PF), it is simply too late for adaptation to take place, since feature copy has already been executed. This prediction is in fact borne out. In my corpus, meaning-based noun substitutions are always followed by a process of adaptation (cf. the fully grammatical slips in (17ab)) while form-based substitutions always result in an ungrammatical utterance whenever target and intruding noun are of different gender (cf. the ungrammatical examples given in (17cd); also see Berg 1992; Marx 1999).

(17) a. aber du musst die **Tür** dann festhalten, Quatsch,
but you must the.f door(f.) then hold, rubbish,
das Fenster
the.n window(n.)

b. eine überzeugend-e **Niederlage** gegen Portugal
a.f convincing-f defeat(f.) by Portugal
← ein überzeugend-er Sieg
← a.m convincing-m victory(m.)

c. Wer zieht neben Nigeria *ins **Filiale** ein
who enters besides Nigeria in.the.n branch(f.) PARTICLE
← ins Finale
← in.the.n. final(n.)

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

I therefore conclude that the mechanisms assumed in the Distributed Morphology framework - feature copy, licensing, phonological readjustment, and morpheme insertion - allow for a straightforward explanation of the spontaneous speech error data I have presented. The theory explains the available data and makes correct predictions about possible and impossible errors. Whenever an error occurs before the level of MS, a grammatical outcome is guaranteed. This, however, is not the case for errors that occur at a later point in the derivation of an utterance.[3] What I take to be another welcome result is the fact that no costly repair strategies have to be assumed in order to account for the so-called accommodations, that is for post-error adaptation processes.

[3] Errors may not only occur before or after MS, but also at MS. For instance, the feature copy processes that are executed at MS may be defective in that an agreement feature is copied from a wrong NP source. For the most part, such errors occur when another NP with a different feature specification intervenes between the agreement controller and the agreeing element. This is true, for example, for the English slip ***the cause*** *of layoffs such as these* ***are*** *not the taxes* ← *the cause of layoffs … is not the taxes* (Francis 1986:315) in which the verb erroneously agrees with a more local (or proximal) plural NP contained in a PP complement (see Pfau 2000, 2001 for an extensive discussion of local and long-distance agreement errors in language production).

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