Fast Speech in a Monostratal Model of Postlexical Phonology*

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1 Introduction

Fast speech has largely been ignored by theoretical linguists. The literature is scant. In this paper, however, I will argue that fast speech has some properties phonology has to account for: first, the differences between the formal style (which is the speech level that is taken as the basis of phonological descriptions) and the fast speech level are systematic. Second, the phonology has to deal with is the large amount of variation within fast speech.

The general idea I propose is that the differences in speech rate or style do not result from different rule orderings, but from different *domain* sizes, on which one single block of rules applies. By comparing fast speech phonology to the phonology of (simple) cliticization, I will show that postlexical phonology provides further evidence for the prosodic view of cliticization (see Booij (ms); Lahiri et al. (1990)).

This paper is organized as follows: first, I will give an overview of the data this paper will deal with. Thereafter, I will apply the standard models of the phonology-syntax interface to the German fast speech data and will demonstrate their shortcomings w.r.t. fast speech. Then I will apply the model I will use instead. Finally, I will point out some difficulties that might arise under an Optimality-Theoretical (OT)-analysis concerning constraints on non-surface forms.

1.1 The data

The data I will present in this paper are of two different kinds: The first type is the "standard speech level". It is easy to gather data of this type, since this is the level phonologists usually talk about. Sources on standard speech come from recent phonologial descriptions of German, such as Hall (1992), or the judgments of native speakers.

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* I would like to thank T.A. Hall and Paul Law for their helpful comments.

The fast speech data I have taken from my own tape-recordings of speakers of both standard German and a variety spoken in the Rhineland, which has additional rules showing the domain boundaries I will deal with.

Also, in these varieties it is easier to distinguish between a single speaker's standard and fast speech utterances. As I observed, speakers were aware of some of their dialectal characterics, which they suppressed when speaking slowly. One was the *g*-spirantization and other was the allomorphy of the neuter pronoun *das* 'that'. One and the same speaker switched from varieties such as those in (1.a) to those in (1.b), when using fast speech.

(1) Alternations between standard speech and fast speech

	(a) standard speech	(b) fast speech
geschichten 'stories'	[geʃɪçtən]	[jeʃɪçtən]
das/ dat 'this' - alternation	[das]	[dat]

The forms in (1.b) cooccur with other properties of fast speech, such as assimilation rules. In (2), some examples of data, this paper will deal with, are given.

(2) Nasal assimilation

(a) Standard speech

i	ii	iii	iv
in Köln	kommt man	kommt Markus	Rennbahn
[ɪnkœln] [ɪŋkœln]	[kɔmtman] [kɔmpman]	[kɔmtmɐkʊos] *[kɔmpmɐkʊos]	[ʀɛnba:n]*[ʀɛmba:n]
in Cologne	come3SG one	come3SG Markus	race+course
in Cologne	*does one come*	*does Markus come?*	*racecourse*

(b) Fast Speech

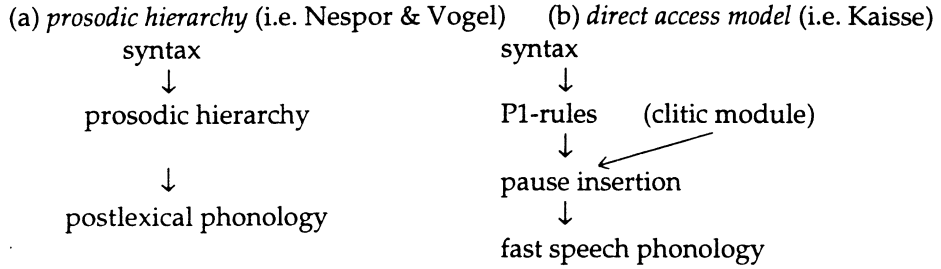
in Köln	kommt man	kommt Markus	Rennbahn
[ɪŋkœln]	[kɔmpman]	[kɔmpmɐkʊos]	[ʀɛmba:n]
in Cologne	come3SG one	come3SG Markus	race+course
in Cologne	*does one come*	*does Markus come?*	*racecourse*

One purpose of this paper is to explain the difference between the standard speech forms in (2.a) and the fast speech forms in (2.b). The forms in (2.i) and (2.ii) are function words. They can always be subject to postlexical assimilation rules. Contrary to that, the forms in (2.iii) and (2.iv) are lexical units, members of compounds, etc. In this paper I will argue that they form a boundary to phonology in standard speech, but not in fast speech. I will introduce a model of postlexical phonology that is based on different input environments for standard speech and fast speech.

1.2 The interface between phonology and syntax

Two models of postlexical phonology coexist for about ten years. One was proposed by Nespor & Vogel (1986), who assume a prosodic hierarchy providing rule domains, and the other was first proposed by Kaisse (1985), which assumes two different kinds of postlexical rules (P1 and P2-rules), among which the P1-type has access to some syntactic information.

(3) Two models of the phonology-syntax interface



The model in (3.b) has to assume two different levels of postlexical phonology in order to provide a separate level of rules that may refer to syntax. One reason for this is that postlexical phonology has to account for the different speech rates. P1-rules alone would only create a fairly elaborated speech level. The P2 rules (also called "fast speech rules") then can refer to nonsyntactic information, because this is overwritten by the intervening pause insertion rule.

The prosodic hierarchy model assumes that phonology does not refer directly to syntax. Instead, an algorithm derives a prosodic hierarchy, considering the syntax whose constituents are "restructured" for the purposes of phonology. This prosodic hierarchy is shown under (4).

(4) prosodic hierarchy (above the word) (Nespor & Vogel 1986)

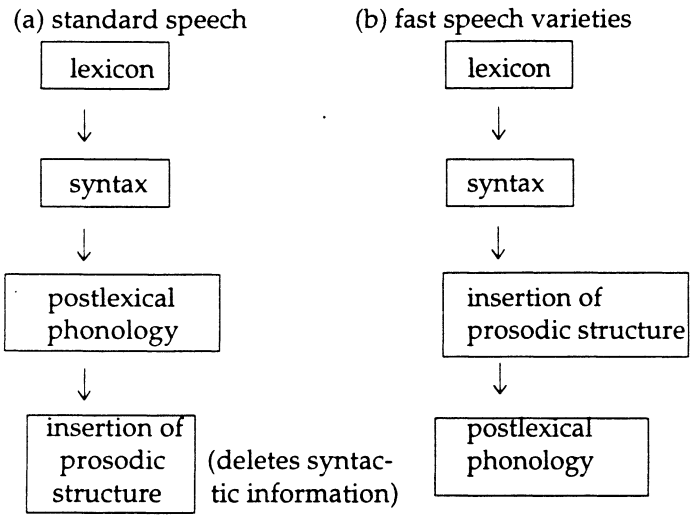
utterance (U)
intonation phrase (I)
phonological phrase (PhP)
clitic group (CG)
phonological word (Pwd)

These two models are not completely incompatible: Some of the properties of the direct syntax model are reflected in the prosodic hierarchy, i.e. the clitic group. Fast speech phonology, however, cannot be derived directly within this model, since the

large rule domains of fast speech cannot be derived by a prosodic algorithm (see section 2.3).

In this paper I will propose a model which combines some assumptions of these two models with some new observations from fast speech, in order to derive postlexical alternations in speech and style without requiring two or more levels.

(5) A monostratal model of postlexical phonology



The crucial idea behind this model is that variation in style and speed is not the result of the application of various rule blocks (as in the direct access model) but a result of the same rules applying on different domains. There are no type 1 and type 2 rules, but "standard" and "fast speech" domains, depending on the timing of the insertion of the prosodic structure. This algorithm marks boundaries prosodically. It can either apply after the postlexical phonology, creating large domains by inserting boundaries only after stressed constituents, or else it applies directly on the syntactic output, thereby considering major syntactic boundaries and transforming them into prosodic ones. In this case, the postlexical phonology can only apply on relatively small domains, creating a standard speech style.

As in the direct-syntax approach, this model provides access to syntax. But this model is more constrained: the syntactic boundaries are only mapped into the phonological representation if necessary, namely in slow speech, where phonological domains correspond to syntactic ones. In fast speech rate, syntax is only indirectly

involved. Instead, bigger units are the domains of phonology, which I here call "superwords". [1]

The latter part of this proposal is in a way contained in papers such as the ones by Hayes & Lahiri (1989) or Kenesei & Vogel (1993), who all propose restructuring algorithms in the prosodic phonology framework.

The most important aspect in (5) is that in infinite number of speech rates and varieties can be created, depending on the following two factors: first, the *timing of pause insertion*.[2] Prosodic boundaries are inserted either before or after the postlexical phonological rules apply.

Note that the motivation behind this is a functional one: elaborated speech has a different function than fast speech: speakers want to make things as clear as possible. This is the level of disambiguation forms and else. Fast speech, however, is the level of economy.

The prediction I make is that only at this formal level of speech speakers need to refer to syntax. The consequence is that only at this level, grammatically conditioned phonological processes are possible, i.e. cliticization. At fast speech, clitic pronouns behave the same way as other forms in the same (unstressed) environment. The remnants of grammatical information are contained in the domain boundaries: they mark the most prominent elements of discourse.

1.3 Characteristics of Fast Speech

I already mentioned that fast speech has largely been ignored in theoretical phonology. One of the reasons for this is that fast speech ignores or overrides the very basic assumptions of phonology and its interfaces, such as the prosodic hierarchy, sentence boundaries, or the coincidence between phonological and morphological boundaries.

However, I will argue that fast speech is part of the grammar in that it is a level with its own systematic characteristics.

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[1] The term "superword" is more appropriate than the phonological phrase, because rules, which typically refer to the prosodic word apply to these entities as well.

[2] I have little to say about the insertion of prosodic boundaries. According to my observations, a prosodic boundary can (or must) be inserted after a focused constituent (obligatorily), after ellipsis, after coordination reduction, after a topicalized constituent, after enumerations, and so on.

2 Fast Speech is not Anarchy: Examples from Dialects

I discuss the data below in order to support the idea that there is a systematic distinction between two very basic patterns of speech, the formal one, i.e. the speech level to which the phonological descriptions of German refer and the fast speech level, which has attributes that make them an autonomous part of the speech system. Speakers kind of choose between the two levels by providing the postlexical phonology with different kinds of domains.

2.1 Prerequisites: Domains in Standard Speech

A derivation of the type (5.a) accounts for all phenomena in phonology which depend on syntax. In order to show which domains in phonology correspond to syntax and which do not, we first have to define the boundaries of phonological domains. Concerning Standard German, it is well known that there are at least two rules which indicate whether segments are separated by a syllable boundary: final devoicing and the insertion of a glottal stop.[3] In an example such as *Tag* 'day' the underlying *g* is realized as *[k]*, since is syllable-final, whereas in the plural form *Ta.ge* 'days' it remains *[g]*, since it is resyllabified to the onset of the following syllable. Postlexical resyllabification will be the most important indication that no boundaries intervene between the constituents involved, since a boundary would block resyllabification.

German, in contrast to other languages, has few rules of the syntax-sensitive type and they all have to do with cliticization. It has been doubted whether there are clitics in German at all (see Cardinaletti & Starke 1995). Showing that the so-called "simple" clitics[4] can be used in order to illustrate the difference between the two basic levels of speech, we can at the same time show that there is grammatically conditioned phonological reduction.

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[3] The latter rule is optional: it can only indicate that a syllable boundary is indeed there. If no glottal stop is inserted in a vowel-initial context, especially if this vowel is unstressed, this does not automaltically indicate cliticization.

[4] According to Zwicky's (1977) definition, only simple clitics can be related to their full forms by phonological rules.

2.2 *Cliticization*

In this paper I adopt the prosodic view of cliticization i.e. that a clitic is incorporated prosodically into the host word (see Booij (ms)). Since cliticization is not the main topic of this paper, I will ignore further details about proclitics and enclitics. In each case, the result of cliticization is that the clitic and its host form a single phonological word, which can be tested by applying the well-known criteria of phonological words to these forms: according to Booij, phonological words are the domain of syllabification, i.e., clitics have to resyllabify, if the environment requires so.

A simple example is shown in (6), where the devoicing of the stem-final */d/* is blocked, because the consonant was resyllabified. If there were a syllable-boundary after the stem-final *d* in *find-*, it would have become voiceless (see 2.1).

(6) Resyllabification of a clitic

[dat fɪn.dɪçəʊ'rɪçtɪç]
das **finde ich** auch richtig
this find I also ok
I think it's ok this way

Assuming the model in (5), one would expect that, in standard speech, phonology can treat units differently according to their syntactic properties, while in fast speech it cannot, because the phonological rules apply after the syntax.

Cliticization can be traced back to systematic processes which also apply in fast speech level. The difference is that, in fast speech, only phonological and prosodic information can constrain their application. I will try to show that the difference between speech styles really is a difference between domains of rule application. This difference is induced by a different timing of prosody. Prosody is either applied in the syntax, deleting the syntactic boundaries (thereby making them inaccessible for the phonology) or it is applied after postlexical phonology. In the latter case, phonology is constrained by syntax, which results in a formal speech style. In (2) and (7), this difference is illustrated, using nasal assimilation as an example. Nasal assimilation is another rule which is constrained by boundaries.

A phenomenon typical of the Rhineland area (and some other German dialects in the more southern parts) is the lenition of obstruents in intervocalic position. But as one can see from (7), voicing does not apply across the board to all intervocalic obstruents. Strikingly, it applies to the obstruents in (7.a) but not to the ones in (7.b),

although generally, any phonological interaction would be more likely in environments such as in (7.b) compared to (7.a). In (7.a), the VCV-context is interrupted by a morphological word boundary whereas in (7.b), the intervocalic obstruent is word-internal in one case and between stem and suffix in the other case.

(7) Intervocalic lenition across morphological boundaries

(a) [da'blɪgɪç] nicht durch
da blick ich nicht durch
there see I not through
I don't get this
[das mʊzɐ] noch machen
das muß er noch machen
this must he still do
he still has to do this

(b) Peter *[pedɐ]
Peter
arbeit+en *[ʔɐbaɪdən]
work+3SG

Intervocalic lenition seems to refer only to the boundary between clitic and host word.

2.2.1 Evidence for the Clitic Group?

In this section I will discuss some data from fast speech, which seem to suggest the need for the category clitic group as a rule domain. However, I will show that these data can be explained neither with the clitic group, nor with a prosodic incorporation rule (see Booij ms.) alone. There is evidence for an enriched prosodic representation, such as the prosodic subcategorization (Inkelas 1989), because rules such as in (7) refer to this representation.

Phonological generalizations such as the one in (7), referring explicitly to the boundary between a clitic and its host word, but nowhere else, seem to be evidence for the so-called clitic group (see (4)), which was introduced by Nespor & Vogel (1986: 154). The clitic group consists of a nonclitic phonological word plus adjacent clitic Pwds, depending on their directionality. Still, a look the data in (8) shows that the clitic group is not the environment of this rule, neither does it serve as its domain, nor as its domain boundary.

(8) Further intervocalic environments[5]

(a) [[arbeitet]$_{PW}$ [er]$_{PW}$]$_{CG}$ → arbeite[d]er *but not* *arbei[d]e[d]er
works he works he works he
does he work?

(b) [[eine]$_{CG}$ [Tat]$_{CG}$ [ohne]$_{CG}$ → *eine ta[d]ohne
*eine [d]a[d]ohne
an action without

In (8), I made up some contexts, in order to look at the clitic group as a rule domain. Both examples in (8) are clitic groups containing contexts, which should trigger lenition: intervocalic obstruents within a clitic group ('domain span') as well as at the edge of a clitic group ('domain limit'). In both cases, lenition does not apply. Therefore, we can conclude that lenition marks the boundary between host and clitic. This, however, cannot be expressed in terms of the clitic group.

The only way to describe the lenition rule is to refer to the special kind of boundary involved, in other words, to give up the notion of the clitic group and refer to the prosodic properties of function words instead. This can best be captured in terms of the prosodic subcategorization framework (see Inkelas (1989)) (see also (20)).

(9) Subcategorization frame of an enclitic element (Inkelas 1989: 81)

[[ ]$_{PW}$ __]$_{PW}$

In this model, the idiosyncratic properties of clitics result from their lexical subcategorization frame which requires them to take a host word in order to be prosodically licensed. If we incorporate the idea of prosodic subcategorization into the model of postlexical phonology described here, it would be part of the lexical information, which is only accessible to phonology at the standard speech level. In other words, only in standard speech, clitics are expected to behave differently from other unstressed forms. The lenition rule can thus be stated as follows:

(10) Intervocalic lenition

$$\begin{bmatrix} +\text{obstr} \\ -\text{voice} \end{bmatrix} \rightarrow [+\text{voice}] \; / \; [[[-cons]\_]_{PW} [-\text{cons}]]_{PW}$$

[5] These restrictions refer to all speech levels.

According to (10), intervocalic obstruents con only be voiced if a prosodically weak form follows.[6] This can be seen in (11): only the boldprinted obstruents can be devoiced.

(11) Application of lenition according to (10)

da ['blɪg]$_{PW}$ ɪç]$_{PW}$ nicht durch
da blick ich nicht durch
there see I not through
I don't get this
das [mʊz]$_{PW}$ ɐ]$_{PW}$ noch machen
das muß er noch machen
this must he still do
he still has to do this
[Peter]$_{PW}$
Peter
[arbeit+en]$_{PW}$
work+3SG
[[arbeitet]$_{PW}$ [er]$_{PW}$
works he
does he work?
[[eine]$_{PW}$ [Tat]$_{PW}$ [ohne]$_{PW}$
an action without

2.3 *Domains at Fast Speech*

In this section I will apply the proposals I have made so far to fast speech data.

I will show that fast speech phonology has some properties which make it differ from the standard speech level in a systematic way. Therefore, phonology has to account for this.

Besides, I will show that the treatment of fast speech does not imply a new separate level of grammar. Instead, fast speech is the result of an application of the average postlexical phonology. The difference is that the rules apply in different domains.

Standard speech phonology applies on grammatical domains, its rules primarily have the function of supporting the grammatical boundaries (i.e. disambiguation etc.)

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[6] The environment [[-cons] $_{PW}$ __ [-cons] $_{PW}$ cannot be tested, since there are no function words beginning with a voiceless obstruent in German.

Fast speech phonology applies in domains which are basically conditioned by the *direction* of speech processing. This means, as much material as possible is moved to the preceding phonological domain.

As a consequence, the diagnostics for fast speech versus standard speech is the directionality of rules. While in standard speech, rules which apply across word boundaries, such as assimilation, may either apply progressively or regressively, depending on the grammatical relationship of the words involved. At fast speech, however, the very same rules apply across all word boundaries, ignoring the grammatical restrictions at slower speech (see (7) to (11))

(12) voicing of obstruents in fast speech
(a)
[dat.zʊgər'i:ɐdətɔx]
das suggeriert es doch
this suggests it well
this does it well suggest
(b)
in EInem Geschoß ist [nɔɣ'aʊʃɛlʊŋ]
in einem Geschoß ist noch Ausstellung
at one floor is also exhibition
at one floor, there is also an exhibition

Another question of interest is why the second t in (12.a) doesn't voice. We will return to that question later (see example (24)).

In (12.b), we can see that the voicing rule is not restricted to plosives: the final *x* in *noch* 'still' becomes *ɣ*, the voiced velar fricative, which does not exist in standard German.

2.3.1 Resyllabification and Domain Boundaries

Ignoring syntactic information as well as categorial information is a well-known property of fast speech. Nespor & Vogel have proposed the Utterance (*U*)-restructuring algorithm to account for phonological rules across large domains

(13) *U*-Restructuring (Nespor & Vogel 1986: 244)

> Adjacent Us may be joined into a single *U* when the basic pragmatic and phonological conditions are met and when there exists a syntactic relation (ellipsis, anaphora) and/ or a positive semantic relation (*and, therefore, because*) between the *U*s in question.

The problem about this algorithm is that it is not restrictive enough to account for the standard speech data which typically respect these boundaries, but at the same time too restrictive to explain what really happens in fast speech. Below, I have listed some cases, where the phonological utterance just not seem to be relevant at all. The domain of obstruent voicing is the word. The cases listed in (14) require a domain even larger than an utterance would be.

(14) Obstruent voicing

diese linie. die ['ge:dybrɪgəns] hier durch diese türme da
geht übrigens
this line it goes by the way here through these towers there
you may have noticed that this line crosses the towers over there

(15) Reyllabification across major syntactic breaks

(a) embedded clauses
das letzte woranɐ sich **[ɐʔinɐdɐ]** is annɐ deutzer brücke
das letzte woran er sich erinnert: er ist an der deutzer brücke
the last thing to what REFL recalls, he is at the bridge of Deutz (place name)
the last thing he remembers was that he was at the bridge of Deutz (when it happened)

(b) relative clauses
ich **fintas** richt nich nach firsisch
ich finde, das riecht nicht nach pfirsisch
I thinks this smells not like peach
to me, this doesn't smell like peach

(c) main clause boundaries
is das ok wenn der hausmeister zwischen dem müll und dem wc **sitzich** mein jetz ma so
is that ok if the caretaker between the garbage and the toilet sits? I mean just...
do you think it is ok that the cartaker's office is located between the garbage and the toilet? I just wanted to know...

(d)
da is die ganze verwaltung [drɪnənzovaɪtɐ]
drin und so weiter
there is the whole administration there inand so on
the whole administration is in there, and so on.

3 Postlexical rules

In this section I will discuss the postlexical rules which derive the fast speech forms. According to the model in (5), the same set of rules should account for all postlexical rules, the different speech rates being a result of different rule domains.

Generally, the postlexical rules apply whenever their description is met. This means that they are blocked by boundaries of any kind. In the next sections, this will be demonstrated.

(16) resyllabification

C.V → .CV

Resyllabification has different outputs at different speech levels, because it only applies to adjacent segments. If a C.V-sequence is separated either by a syntactic or by a prosodic boundary, the consonant cannot be resyllabified.

3.1 Variation

At fast speech, we find lots of varying forms, such as the ones in (17.b).

(17)

(a) standard speech *sind* *aber* 'but they are'	['zɪnt.a:bɐ]	*['zɪn.da:bɐ]
be3SG but		
(b) fast speech	['zɪnt.a:bɐ] / ['zɪn.da:bɐ]	

The varations are due to two factors. First, one and the same utterance can be split up into different domains, depending on speech and style. Second, most postlexical rules are not ordered, so that their application may result in different varieties.

Below, I will introduce the most important rules, which interact in the postlexical component.

(18) Final devoicing (FD) (Hall 1992: 52)

[-son] → [-voice] / __]$_\sigma$

(19) r-vocalization (r-Voc.) (Hall 1992: 57)

$$\begin{bmatrix} +son \\ +cons \\ +cont \end{bmatrix} \rightarrow [\text{-cons}] \; / \; \overset{C}{\underset{}{|}} \; \underset{—}{} \; X$$

optional after short vowel

(19) vocalizes an r in a syllable-coda, obligatorily after a long vowel, optionally after a short one. For example, *fährt er* 'does he drive' is realized as [fe:ɐtɐ].

(20) Obstruent voicing (OV) ("feeding"-relation to (19))

$[\text{-son}] \rightarrow [\text{+sth}] / [[\text{-cons}] \_]_{PW} V]_{PW}$

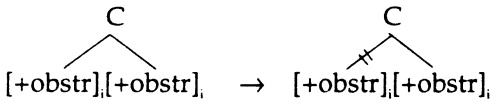
For example, *fährt er* 'does he drive?' reduces to fäh[ɐtɐ] (according to (19)) and then to fäh[ɐdɐ], according to OV. In standard German, this rule only occurs at the boundary between clitic and host word. This can only be expressed in terms of its prosodic subcategorization frame. This formal description rules out all other environments and ensures that the rule only applies in this environment and not on other forms (such as those in (8))

(21) voicing assimilation (VA)

$[\text{-son}] \rightarrow [\text{-sth}] / [\text{-sth}] \_\_$

I.e., fährt der 'does this one drive' assimilates to *fährt[t]er*. Subsequently, the geminate gets reduced by (22): *fähr[t.t]er* → *fähr[t]er*.

(22) Degemination



4 Comparing Standard Speech and Fast Speech

Below, I will demonstrate how these rules may account for the variations at the different speech levels. In the end of the section, I will discuss briefly some cases, which would be a problem for an analysis in an Optimality-Theoretical framework.[7] The postlexical rules apply in different ways, depending on the input they get. At a formal speech level, the input corresponds to the major syntactic breaks and does also consider information contained in the lexical subcategorization of the forms.

In fast speech, the syntactic and the categorial information are overwritten by the insertion of prosodic boundaries. These boundaries create domains in which the postlexical rules apply. The size of these domains again varies according to speech rate. The postlexical rules cannot cross boundaries.

[7] For overviews on OT see the other papers in this volume.

4.1 Examples

The following examples show some of the problematic cases, variation in fast speech as well as counterfeeding relations among rules. In a *d.d* - sequence as in (23), the first (syllable-final) consonant voices optionally, depending on the interaction of degemination and final devoicing.

(23) fast speech variation

	(a) *und.dann* 'and then'		(b) *und.dann* 'and then'
FD	unt.dan	Deg.	un.dan
Deg.	---	FD	---
vc.ass.	unt.tan		
Deg.	[un.tan]		[un.dan]

(23) shows how the nonordered application of rules accounts for the different realizations of the sequence und dann. In (23.a), final devoicng bleeds degmination, whereas in (23.b), it is the other way round. In (24), I contrast two cases, intervocalic *t* in *fährt er* 'does he drive' and the environment *t.d* in *fährt der* does this one drive?', in order to show the interdependencies of rules.

Note that the form *[feɐdɐ] in (24.b) is not a possible realization of *fährt er*.

(24) extrinsic rule ordering

(a) *fährt der*	(b) *fährt der* /fɛ:Rt.deR/		(c) *fährt er*	(d) /fe:Rt eR/			
VA.	fɛ:Rt.teR	*VA*	fɛ:Rt.teR	*VA*	---	r-voc	feɐtɐ
OV	---	*Degem.*	fɛ:R.teR	*OV*	---	OV	feɐdɐ
Degem.	fɛ:R.teR	*r-Voc.*	fɛ:ɐ.tɐ	*r-Voc*	feɐtɐ		
r-Voc.	fɛ:ɐ.tɐ	OV	* fɛ:ɐ.dɐ				

In (24.c) and (24.d) the rule-based explanation for the alternating forms [feɐdɐ] and [feɐtɐ] is given: r-vocalization feeds OV, since it creates the intervocalic environment required. These alternations could easily be explained in an OT-framework as unordered constraints. Forms such as in (24.a) and (24.b), however, would be a problem in an OT-based analysis (see below).

4.2 Problems with an OT-analysis

(24.a) and (24.b) are examples of a problem an OT-analysis would have to deal with. On the surface, the form *[feɐdɐ] should be in free variation with [feɐtɐ]. Since

the constraints blocking the deletion of one of the input consonants are violated anyway, both forms should be equally optimal (which can be seen from the surface forms in (24.c) and (24.d)).

The reason why the form *[feɐdɐ] is still ungrammatical is, I suppose, due to a constraint, which operates holds the derivation on the non-surface form [feɐt.tɐ], the *Linking Constraint*.

(25) Linking Constraint (Hayes 1986)

Association lines are interpreted as exhaustive

In order to explain why data such as the ones in (24)(b) do not exist, we must say that the linking constraint blocks them at one intermediate level of the derivation. After voicing assimilation, the two consonants in consideration form a linked structure. Thereafter, they cannot be input to rules treating them as single consonants, such as obstruent voicing.

The possible alternative explanations, such as extrinsic rule ordering, could not be explained in terms of OT, either. I conclude that, at the fast speech level, we have to deal with a certain amount of derivation.

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