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Feature spreading as dealignment : the distribution of [ç] *and* [x] *in German**

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1 Introduction

Prosodification processes like syllabification and foot parsing are often limited to a particular morphological constituent; i.e. they do not apply across a morpheme boundary. Prince & Smolensky (1993) present a new interpretation of this phenomenon which identifies the edge of a morphological constituent, rather than the morphological constituent as such, as opaque to prosodification. On their view, the morphological boundedness of processes that erect metrical structure reflects the desire for a grammatical constituent edge to coincide with the edge of a prosodic constituent, formalised as ALIGN(GCat-Edge 1, PCat-Edge 1) in their theory. Since prosodification across a morpheme boundary results in a mismatch between the edges of a prosodic and a morphological constituent, it is blocked whenever alignment is obeyed.

In this paper I claim that not only prosodification processes but also feature spreading is subject to pressure from an alignment constraint, and so is avoided. The case in point is dorsal fricative assimilation in Modern Standard German. Dorsal fricative assimilation does not apply across a compound boundary or to the dorsal fricative of the diminutive suffix *-chen*, which, though morphologically a suffix, is prosodically a separate phonological word of German (Noske 1990, Iverson & Salmons 1992, Borowsky 1993, Wiese 1996). Bringing Itô & Mester's (in press) notion of crisp alignment to bear on the analysis, I argue that the application of fricative assimilation is constrained by CRISPEDGE(PrWd), which requires the prosodic word to have sharply defined boundaries. Since spreading from a word-final back vowel to the initial dorsal of the following word results in a blurred word edge, it is ruled out, because CRISPEDGE(PrWd) is ranked higher than the constraint governing spreading.

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2 Fricative assimilation in German

The dorsal fricatives [ç] and [x] are in complementary distribution in Modern Standard German: the velar fricative [x] occurs after back vowels,[1] the palatal fricative [ç] after front vowels, glides and sonorant consonants (Bloomfield 1930, Moulton 1947, Leopold 1948, Wurzel 1970, Hall 1989, among many others). More importantly, [ç] is also found word-initially, where it is in variation with either [ʃ] or [k] before a front vowel, and with [k] before a back vowel, as shown in (1b) (Hall 1992, Wiese 1996). These examples demonstrate further that syllable structure is immaterial for the distribution of these segments, since the affected dorsal can either be in the coda or form the onset of the following syllable:

(1) a. [x] *after a back vowel*

Buche	[buː.xə]	'beech tree'
suchte	[zuːx.tə]	'(s/he) searched'
Knochen	[knɔ.xən]	'bone'
lochte	[lɔx.tə]	'(s/he) made a hole'
Sprache	[ʃpʀaː.xə]	'language'
machte	[max.tə]	'(s/he) made'

[ç] *elsewhere*

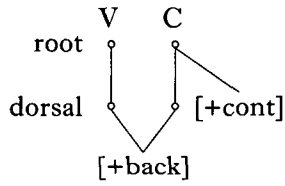
riechen	[ʀiː.çən]	'to smell'
Nichte	[nɪç.tə]	'niece'
sprechen	[ʃpʀɛ.çən]	'to speak'
Rechte	[ʀɛç.tə]	'rights'
durch	[dʊʀç]	'through'
Dolche	[dɔl.çə]	'swords'
manch	[manç]	'some'
München	[mʏn.çən]	'Munich'

b. Chirurg [çiː.ʀʊʀk] ~ [kiː.ʀʊʀk] ~ [ʃiː.ʀʊʀk] 'surgeon'
Chemie [çe.miː] ~ [ke.miː] ~ [ʃe.miː] 'chemistry'
China [çiː.na] ~ [kiː.na] ~ [ʃiː.na] 'China'
Cholesterin [çoː.lɛs.te.ʀiːn] ~ [koː.lɛs.te.ʀiːn] 'cholesterol'
Charisma [ça.ʀɪs.ma] ~ [ka.ʀɪs.ma] 'charisma'

I assume that dorsal fricatives in German are specified as [−back] in the input[2] and that [x] results from assimilation to a preceding back vowel.[3] Invoking the important insight of autosegmental phonology that assimilation is feature spreading (Hayes 1986), I posit the constraint in (2), which requires a back vowel and a following dorsal consonant to share a single specification [+back] (Itô & Mester 1995).[4] Since CVLINKAGE requires double linking of the feature value [+back], a VC sequence whose individual segments are specified as [+back] violates this constraint.

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(2) CVLINKAGE



In addition, I assume the constraint IDENT-IO([bk]), which requires corresponding segments of the input and output to have identical values for the feature [back], and which thus penalises any change in the underlying backness specification of a dorsal fricative (McCarthy & Prince 1995). Tableau (3) shows that CVLINKAGE ranks higher than IDENT-IO([bk]).[5]

(3) / k u: ç n / 'cake'

[+bk] [−bk]

	CVLINKAGE	IDENT-IO([bk])
☞ a. k u: x ə n (+bk)		*
b. k u: ç ə n (+bk −bk)	*!	
c. k u: x ə n (+bk +bk)	*!	*

3 Alignment and crisp edges

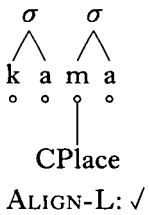
Fricative assimilation does not apply across a compound boundary or to the dorsal fricative of the diminutive suffix *-chen*. In this section I appeal to the notion of 'crisp alignment' to account for these restrictions (Itô & Mester in press). I argue that CVLINKAGE is dominated by CRISP EDGE(PrWd), which rules out any linking across a prosodic word boundary.

The notion of alignment introduced by Prince & Smolensky (1993) requires that a specified edge of a morphological constituent (a root, stem or affix) coincide with a specified edge of a prosodic constituent (a syllable, foot or prosodic word). The relationship between these categories is exclusive; i.e. no multiple linking of a feature across a boundary may occur. Itô & Mester (in press) propose a revision of alignment theory which distinguishes alignment proper from the requirement of prosodic

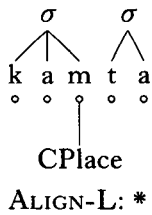
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constituents to have 'crisp edges'. The development of a family of crisp-edge constraints is motivated by the extension of alignment from the morphology–phonology interface to the mapping between two prosodic categories, an idea that is first explored in McCarthy & Prince (1993). They claim that the syllable structure constraints ONSET and NOCODA can be understood as alignment constraints which require the left and right edges of every syllable to coincide with some consonant and vowel respectively (ALIGN-L(σ, C) and ALIGN-R(σ, V)).

Itô & Mester (1994) take this approach one step further; they suggest that restrictions on coda consonants (which are expressed by CODACOND in earlier works in Optimality Theory) can be cast in alignment-theoretic terms as well by positing a set of segment-to-syllable alignment constraints (ALIGN(seg, PCat)). For example, coda consonants cannot bear a place specification if the left edge of every consonantal place feature has to coincide with the left edge of a syllable (ALIGN-L(CPlace, σ)). While the place feature in the Japanese example *kama* 'kettle' in (4a) satisfies this constraint, the hypothetical example in (4b) violates it, because it contains a place specification that is associated with a coda consonant.

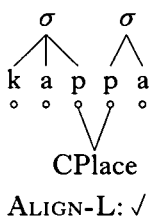
(4) a. 

ALIGN-L: ✓

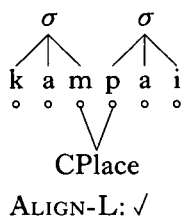
b. 

ALIGN-L: *

It is well known, however, that geminates and place-linked clusters are exempt from the coda condition. This fact can only be accounted for if we assume, contrary to Prince & Smolensky (1993) and McCarthy & Prince (1993), that linking across a constituent boundary is possible without violating ALIGN. Itô & Mester (in press) therefore propose a revision of alignment theory which treats multiply linked structures as coincidental. Under their interpretation the geminate in (5a) *kappa* 'cheers' and the cluster in (5b) *kampai* 'water (IMP)' fulfil ALIGN-L(CPlace, σ), despite the fact that CPlace is associated with the coda consonant in these examples.

(5) a. 

ALIGN-L: ✓

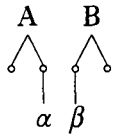
b. 

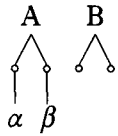
ALIGN-L: ✓

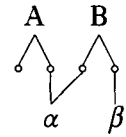
This revision of alignment theory also has repercussions for constraints of the GCat-PCat type. Consider the structures in (6) below, where A and B

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represent two morphological constituents, and α and β two prosodic constituents. Assuming that the right edge of A has to coincide with the right edge of α, then on Itô & Mester's view neither the structure in (6a) nor the one in (6c) violates ALIGN-R.

(6) a. 

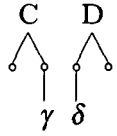
b. 

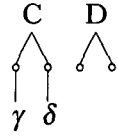
c. 

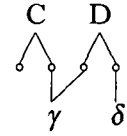
Even under this new interpretation of alignment, however, there remains the need to distinguish between the sharply defined edges in (6a) and (6b) and the blurred edge in (6c). This distinction is achieved by invoking the notion of 'crisp edge'. CRISPEDGE constraints require that all prosodic elements are incorporated into a single higher prosodic unit and so rule out any cross-junctural linkage.

(7) CRISPEDGE(PCat) (Itô & Mester in press)
Let /A/ be a terminal substring in a phonological representation, **B** a category of type PCat and /A/ = |**B**| (*the-content-of* **B**). Then **B** is crisp (has crisp edges) if and only if A *is-a* **B**: $\forall$ A(/A/ = |**B**| $\supset$ /A/ $\equiv$ **B**)

Assuming that C and D and γ and δ are prosodic categories, then the constraint CRISPEDGE(C) is violated in (8c), because element γ is linked to both prosodic categories C and D.

(8) a. 

b. 

c. 

CRISPEDGE(PrWd) plays a crucial role in accounting for the non-application of dorsal fricative assimilation in German compound and diminutive constructions. This constraint is independently motivated in the analysis of syllabification in German.

It has frequently been observed that no syllabification takes place across the left stem boundary in German. The examples in (9a) and (9b) demonstrate that the final consonant of a prefix or of the first constituent of a compound syllabifies into the coda, rather than into the onset of the next syllable. The final stem consonant in (9c), by contrast, forms the onset of the following syllable. Taken together, these data suggest that the left stem boundary in German is opaque to syllabification. Assuming with Wiese (1996) that prefixes[6] and stems form independent phonological

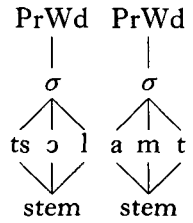
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words of German, we can posit the constraint ALIGN-L(Stem, PrWd), which demands coincidence of the left stem and word boundary (McCarthy & Prince 1993). (The insertion of a glottal stop before the second vowel-initial morpheme is a consequence of the dominant position of ONSET in German.)[7]

(9) a. auf+essen [ʔauf.ʔɛ.sən] 'to eat up'
ver+irren [fʌ.ʔɪ.ʀən] 'to lose one's way'
b. Zoll+amt [tsɔl.ʔamt] 'customs-house'
berg+ab [bɛʀk.ʔap] 'downhill'
c. kind+isch [kɪn.dɪʃ] 'childish'
farb+ig [faʀ.bɪk] 'colourful'

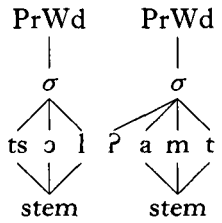
Consider the candidates in (10), all of which are built on the same input *Zollamt* /tsɔl+amt/:

(10) a.



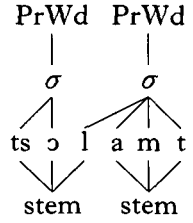
ONSET: *
ALIGN-L: √

b.



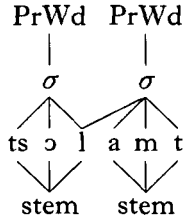
ONSET: √
ALIGN-L: *

c.



ONSET: √
ALIGN-L: *

d.



ONSET: √
ALIGN-L: √

The ranking of ONSET above ALIGN-L rules out the properly aligned but onsetless candidate (10a). Under Itô & Mester's revision of alignment the ambisyllabic candidate (10d) is the only one that satisfies ALIGN-L, and so would be given preference over the correct output form (10b), if no constraints other than ONSET and ALIGN-L were taken into consideration.[8] There is, however, an important difference between the optimal candidate (10b) and the sub-optimal candidate (10d): only the former has crisp word edges, which justifies an appeal to the constraint CRISPEDGE(PrWd). If

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CRISPEDGE(PrWd) is ranked above ALIGN-L, candidate (10b) emerges as the winner.

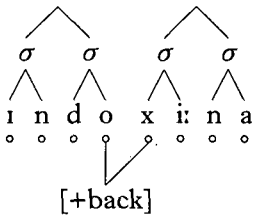
That it is indeed the prosodic word and not the syllable that is required to have crisp edges follows from the fact that multiple linking across a syllable boundary is not generally excluded in German. There is evidence from the distribution of long and short vowels that medial consonants in forms like *Hölle* [hœlə] 'hell' or the name *Otto* [ɔto] are ambisyllabic (Vennemann 1972, 1982, Benware 1986, Ramers 1992, Féry 1995, Wiese 1996). Short lax vowels cannot occur in word-final position in German. Assuming that there is a single template for both word-internal and word-final syllables, German syllables are at least bimoraic. Word-medial consonants that are preceded by a short lax vowel must therefore be ambisyllabic to satisfy the bimoraic requirement. That ambisyllabification is inhibited across a compound boundary is therefore not motivated by a restriction on German syllable structure, but must be rooted in the more specific requirement of prosodic words to have crisp edges.

Let us now consider the process of dorsal fricative assimilation in greater detail. Dorsal fricative assimilation applies only within the phonological word and so fails to take effect between words at the phrase level (11a) and between the two halves of the stem compounds in (11b), which I assume to form separate phonological words of German.[9]

(11) a. weil [duː çeːmi] studierst 'because you study chemistry'
[zoː çiːneːziʃə] Augen 'such Chinese eyes'
b. Biochemiker [biːoçeːmikʌ] 'biochemist'
Indo-China [ɪndoçiːna] 'Indo-China'
Neurochirurg [nɔʏʀoçiʀʊʀk] 'neuro-surgeon'

Since assimilation applies freely across a syllable boundary, as demonstrated earlier by the form *Kuchen* [kuː.xən] 'cake', we cannot call upon a syllable structure requirement of German to explain why it does not take place in these forms. I suggest that the constraint CRISPEDGE(PrWd) is responsible for the non-application of fricative assimilation. Assuming that assimilation is feature spreading, the propagation of [+back] from the stem vowel in (12) to the following dorsal results in a multiply linked structure and consequently a non-crisp word edge.

(12) PrWd PrWd *[ɪndoxiːna] 'Indo-China'



Provided CRISPEDGE(PrWd) ranks higher than CVLINKAGE, the initial

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dorsal fricative of the second stem fails to undergo assimilation and so surfaces as front.

(13) / ɪ n d o + ç iː n a / 'Indo-China'
[+bk] [−bk]

	CRISPEDGE	CVLINKAGE	IDENT-IO([bk])
a. ɪ n d o x [iː n a (+bk)	*!		*
☞ b. ɪ n d o [ç iː n a (+bk −bk)		*	
c. ɪ n d o [x iː n a (+bk +bk)		*	*!

There is another exception to the operation of fricative assimilation in German that at first sight does not follow from the constraint CRISP EDGE(PrWd): the dorsal fricative of the diminutive suffix *-chen* always surfaces as front, even if preceded by a back vowel.

(14) a. Auto [aoto] 'car' Auto + chen [aotoçən] 'car (DIM)'
b. Oma [oːma] 'grandma' Oma + chen [oːmaçən] 'grandma (DIM)'
c. Mama [mama] 'mom' Mama + chen [mamaçən] 'mom (DIM)'

Bloomfield (1930) pointed out that the forms in (14) resemble compounds in not undergoing fricative assimilation and so could be analysed as a sequence of two phonological words: $_{\omega}$[$_{\omega}$[oːma] $_{\omega}$[çən]]. A similar claim has been made in more recent times by Iverson & Salmons (1992), and is also at the heart of Noske's (1990), Borowsky's (1993) and Wiese's (1996) analysis of this phenomenon.[10] If we assume that the suffix *-chen* is a prosodic word of German, then CRISPEDGE(PrWd) accounts for the fact that no assimilation takes place across the stem–suffix boundary: assimilation is blocked in this environment, because it results in a non-crisp word edge.

(15) PrWd PrWd *[oːmaxən] 'grandma (DIM)'
σ σ σ
oː m a x ə n
[+back]

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(16) / o: m a + ç ə n / 'grandma (DIM)'
[+bk] [−bk]

	CRISPEDGE	CVLINKAGE	IDENT-IO([bk])
a. o: m a x [ə n (+bk)	*!		*
☞ b. o: m a [ç ə n (+bk−bk)		*	
c. o: m a [x ə n (+bk+bk)		*	*!

Note that a unified account of dorsal fricative assimilation in compounds and *-chen* diminutive constructions is only possible if we invoke the constraint CRISPEDGE(PrWd), but not if we appeal to ALIGN-L(Stem, PrWd), because *-chen* is not a stem of German and so ALIGN-L does not apply to it.

4 Fricative assimilation and syllable structure

Merchant (1996) has recently proposed a different solution to fricative assimilation within Optimality Theory. He argues that assimilation is limited to tautosyllabic segments. A dorsal fricative in the syllable onset does not assimilate to a preceding back vowel, but surfaces as [ç]. On his view, it is forms like *rauchen* [ʀao.xən] 'to smoke' that warrant explanation, while words like *Frauchen* [fʀao.çən] 'woman (DIM)' (which are considered exceptional here) exemplify the regular pattern. Merchant's solution is bipartite: first, he assumes a constraint ALIGN-R(Stem, σ) which requires the right edge of every stem to coincide with the right edge of some syllable. Second, stem-final consonants that are followed by a vowel are ambisyllabic on his account. In the case of the consonant-final stem in *rauch+en* [ʀao.xən], ALIGN-R forces the intervocalic consonant to be placed into the coda, where it assimilates in backness to the preceding vowel and so is realised as [x]. ONSET, on the other hand, ensures that it is syllabified into the onset of the next syllable, resulting in an ambisyllabic consonant.[11] Ambisyllabic consonants are interpreted as singletons phonetically.

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(17) / ʀ a o ç + ə n / 'to smoke'

	Onset	Align-R	NoCoda
a. σ σ ʀ a o x | ə n	*!		**
b. σ σ ʀ a o ç | ə n		*!	*
☞ c. σ σ ʀ a o x | ə n			**

The dorsal fricative in the form *Frau+chen* [fʀao.çən], by contrast, does not form part of the stem and so is uniquely syllabified into the onset, where it surfaces as [ç].

(18) / f ʀ a o + ç ə n / 'woman (DIM)'

	Onset	Align-R	NoCoda
a. σ σ f ʀ a o | x ə n	*!	*	**
☞ b. σ σ f ʀ a o | ç ə n			*
c. σ σ f ʀ a o | x ə n		*!	**

There are two problems with Merchant's approach. First, what is the morphological structure of words like *Kuchen* [kuː.xən] or the proper nouns *Bochum* [boːxum] and *Aachen* [aːxən]? If these words are monomorphemic, as common sense would dictate, then Align-R has no jurisdiction over their realisation and the intervocalic dorsal should be uniquely syllabified into the onset, where it is expected to surface as [ç]. The occurrence of a velar in these and other words remains unexplained under Merchant's approach and so there is a class of lexical items in German that needs to be considered as exceptions to the general distribution of [x] and [ç]. However, if we admit a class of lexical items as exceptions, then dorsal fricative assimilation is no longer the classical and celebrated case of non-exceptional allophony.

Another problem arises from Merchant's treatment of schwa. Merchant seems to assume that schwa is included in the underlying representation of the infinitival ending. As is well known, however, the occurrence of schwa in German is largely predictable. Although analyses of schwa epenthesis vary, most authors agree that schwa does not form part of the underlying representation of this suffix, which is therefore either /-n/ or

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/-N/ in the input (Wiese 1986, Giegerich 1987). If schwa is not underlying, but inserted, then there is another candidate that better complies with Merchant's constraint hierarchy. Consider tableau (19) below. Both candidates (19c) and (19d) satisfy ONSET and ALIGN-R. But candidate (19d) shows fewer violations of NOCODA, and so would wrongly emerge as the optimal form under Merchant's approach. (I use the schwa itself to mark an epenthetic segment. Each schwa registers for one DEP-IO violation, the correspondence-theoretic equivalent of FILL (McCarthy & Prince 1995).)

(19) / R a o ç + n / 'to smoke'

	ONSET	ALIGN-R	NOCODA	DEP-IO
a. σ σ R a o x | ə n	*!		**	*
b. σ σ R a o ç | ə n		*!	*	*
c. σ σ R a o x | ə n			**!	*
☞ d. σ σ R a o x | n ə			*	*

A treatment of German schwa insertion is far beyond the scope of this paper. For present purposes it suffices to say that Merchant's proposal depends on an ill-motivated assumption about the underlying representation of the infinitival morpheme. It remains to be seen whether further amendments can reconcile his analysis with the well-founded assumption that schwa is absent underlyingly.

5 Conclusion

This paper has extended the use of ALIGN and CRISPEDGE constraints from prosodification processes to feature spreading. Instead of limiting feature spreading directly by requiring the right or left edge of a feature to align with a given grammatical or prosodic constituent (Kirchner 1993), spreading can be constrained indirectly, i.e. it can be limited to a certain domain, when governed by the principles of Generalised Alignment.

NOTES

* I would like to thank John Goldsmith, Tracy Alan Hall, Caroline Féry, Lise Dobrin and three anonymous reviewers for comments on this and earlier versions of this paper.

[1] According to Kohler (1977), the velar variant [x] is found after the back tense vowels [u:] and [o:] and the uvular fricative [χ] after the low vowel [a]. Either [x]

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or [χ] can occur after the non-low back lax vowels [ʊ] and [ɔ]. This distinction will be ignored here.

[2] This assumption is of no consequence to the topic discussed in this paper. Alternatively we could assume that dorsal fricatives are unspecified for backness in the input and that there is a constraint *[x] banning the cooccurrence of the features [+continuant] and [+back] in dorsal obstruents (Merchant 1996). If *[x] ranks higher than IDENT-IO, but lower than CVLINKAGE, [x] is ruled out in word-initial position, for example.

[3] There is a handful of unassimilated loanwords like *Kolchose* [kɔlxo:zə] 'collective farm' or *Junta* [xʊnta] 'junta' which form exceptions to this claim. These words also have the nativised pronunciation [kɔlço:zə] and [hʊnta], however, and so follow the general rules of German.

[4] Alternatively, we could formulate a constraint ALIGN-R([+back], dorsal C) which requires the feature value [+back] to align with a dorsal consonant on its right (Kirchner 1993). However, since the domain of alignment is not a prosodic constituent, but simply the linear string VC, an analysis in terms of a linked VC domain appears more appropriate.

[5] I assume that schwa is absent underlyingly and inserted by Gen. The constraints governing schwa insertion are ignored in this paper.

[6] Wiese (1996: 66) notes that the prefixes *her-*, *hin-* and *vor-* form exceptions to this claim if they occur in combination with prepositions, as for example in *he.r-an*, *hi.n-aus* and *vo.r-an*.

[7] To account for the contrastive pattern of epenthesis in the monomorphemic forms below, Hall (1992), Yu (1992), Féry (1995) and Wiese (1996) suggest that the *foot* and not the prosodic word boundary is the location for glottal stop insertion. While the examples in (a) consist of two feet, the examples in (b) contain a single foot.

(i) a. Ruin [(ʀu:.)$_{Ft}$(ʔí:n)$_{Ft}$] 'ruin'
Theater [(te:.)$_{Ft}$(ʔá:tʌ)$_{Ft}$] 'theatre'
b. Fluor [(flú:.ɔʀ)$_{Ft}$] 'fluorine'
Boa [(bó:.a)$_{Ft}$] 'boa'

Hence, on this account it is the left edge of the foot that needs to align with the left edge of the syllable, ALIGN-L(Ft, σ). It could be argued that the constraint ALIGN-L(Stem, PrWd) is needed independently to account for glottal stop insertion in compounds like *Zollamt* [tsɔ́l.ʔamt] 'customs-house' or *Bauamt* [báu.ʔamt] 'building office'. According to Giegerich (1985) these forms consist of two feet, motivating the insertion of a glottal stop before the vowel of the second morpheme. The argument that the second stem in *Zollamt* [tsɔ́l.ʔamt] forms a metrical foot of its own is in part based on the assumption that it carries a strong secondary stress. It contrasts in this respect with the second syllable in words like *Hering* [hé.ʀɪŋ] 'herring' or *König* [kó.niç] 'king', which is unstressed. As Wiese (1996: 275) points out, however, speakers of German have no clear intuition about the stress patterns of bisyllabic words with a strong–weak pattern, making a distinction between syllables with secondary stress and unstressed syllables doubtful. This in turn removes some of the motivation for assuming that the second syllable in *Zollamt* [tsɔ́l.ʔamt] forms an independent foot in German, leaving this issue unsettled.

[8] Candidate (10b) is ultimately chosen over (10c), because ALIGN-L is evaluated gradiently. The insertion of an empty position, which is filled out by a glottal stop in German, constitutes a less severe violation of ALIGN-L than syllabifying the liquid into the onset of the second syllable.

[9] Alternatively, we could assume that assimilation applies only between tautomorphemic segments. On this account, the dorsal fricative in a form like *Biochemiker* [bi:oçe:mikʌ] surfaces as [ç] because it is at the beginning of a morpheme and not because it is word-initial. This line of argumentation is defended by Hall (1989, 1992).

[10] Wiese (1996) provides interesting evidence from a class of 'gapping' phenomena

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in favour of the assumption that *-chen* is an independent phonological word of Modern Standard German. He observes that the suffix *-chen* can be deleted from conjoined expressions such as *Väter- und Mütter**chen*** 'father (DIM) and mother (DIM)' or *Brüder- und Schwester**chen*** 'brother (DIM) and sister (DIM)'. A comparison with ill-formed examples like ****Komponist- und Lehrer**in*** 'composer (FEM) and teacher (FEM)' or ****Versicher- und Verwalt**ung*** 'insurance and administration' shows that this is by no means a property of all derivational suffixes in German. One condition on deletion is that the suffix must be coextensive with a syllable. Not just any syllable can be deleted, however, as evidenced by ****male-oder wähler**isch*** 'picturesque or choosy'. Wiese (1996) concludes that only suffixes that form independent words undergo gapping and that *-chen* is one of them.

One criticism that might be levelled at the claim that *-chen* is a prosodic word of German is that it can cause fronting (umlaut) of a back stem vowel, as in *Schuh* [ʃu:] 'shoe' *vs.* *Schühchen* [ʃy:çən] 'shoe (DIM)' and *Mann* [man] 'man' *vs.* *Männchen* [mɛnçən] 'man (DIM)'. Umlaut suggests that *-chen* is a cohering suffix and so forms a single phonological word with the preceding base. However, the claim that the diminutive suffix is a separate prosodic word of German can be maintained despite the fact that it interacts in this way with the base of affixation. Since umlaut consists of the anchoring of an underlyingly floating feature value [−back] with a back root vowel in the output (Klein 1995), it violates neither ALIGN-L nor CRISPEDGE(PrWd). As a matter of fact, the advantage of the present alignment approach over an approach within prosodic lexical phonology (Booij & Rubach 1984, 1987) emerges most clearly in the analysis of the interaction of dorsal fricative assimilation and umlaut in Modern Standard German. By focusing on the edge of the prosodic word, alignment theory is able to make use of a qualitative difference between these two processes to explain why assimilation fails to apply between two prosodic words, while umlaut can take place in this context: fricative assimilation is a spreading operation, which results in blurred word edges; umlaut is a feature-insertion process. Note that I am not claiming that umlaut can apply between words; I am claiming that umlaut simply does not bear on the question of what a phonological word is.

[11] Merchant also assumes that multiple linking across a juncture does not violate ALIGN-R and so presupposes Itô & Mester's (in press) version of alignment.

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