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Stress preservation in German loan-words

1. Introduction

It has been a well known fact from the very beginning of generative phonology that morphologically complex forms often inherit characteristics of related, morphologically less complex forms (Chomsky & Halle 1968). Take for example the contrast in stress pattern of the English words *Tatamagouchi* and *originality*, both consisting of the same number of (light) syllables preceding main stress.[1] Secondary stress falls on the first syllable of the underived

(1) Tà.ta.ma.góu.chi

but on the second syllable of

(2) o.rì.gi.ná.li.ty

due to the fact that a main stress is assigned to the second syllable of the morphologically simpler

(3) o.rí.gi.nal

In other words, the main stress of *o.rí.gi.nal* is preserved as a secondary stress in *o.rì.gi.ná.li.ty*.

Traditionally the phenomenon of stress preservation has been analyzed in terms of cyclic rule application or, in the model of lexical phonology, as the result of interleaving morphological and phonological processes. More recently, the similarities between morphologically related forms have been reanalyzed within the framework of optimality theory (Prince & Smolensky 1993) as being the result of faithfulness constraints targeting related output forms (cf. Benua 1995, McCarthy 1995, Kenstowicz 1996). Specifically, in Kenstowicz (1995), Pater (1995), Benua (1997) and Kager (forthcoming a), (forthcoming b) the preser vation of stress is interpreted as the effect of constraints requiring identity between the distribution of stress in morphologically related forms.[2]

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[1] cf. Liberman & Prince (1977).

[2] Faithfulness constraints referring to stress can also be found in Alderete (1995).

In this paper I offer a contribution to the discussion on stress preservation from the domain of German loan-word stress. This case study provides a straightforward illustration of the advantages of an approach in terms of optimality theory to this phenomenon. As Pater and Benua (for English stress) and Kager (for stress in Dutch, Palestinian Arabic and Tripoli Arabic) show, if we view stress preservation as the result of a faithfulness con straint, this constraint can interact in various ways with the set of constraints regulating the overall stress pattern of a language. In other words, the stress pattern of the base of affixation may not be preserved as a whole, in all its details, in the affixed form, or - on the contrary - be disregarded completely. Rather, we expect there to be languages where single, high-ranked, stress pattern constraints may be observed, while other, lower-ranked ones, may be violated, if dominated by the constraint requiring faithfulness between morphologic ally related forms. As a result, the stress pattern of the stem might be preserved only in part. For example, let X and Y be stress pattern constraints of a certain language, where X dominates Y, a ranking which can be established by the behavior of underived words. We may then have a constraint F, requiring morphologically related words to be identical, which is ranked below X, but above Y:

(4) X >> F >> Y

As a result, stress will be preserved at the cost of violating the constraint Y, but stress preservation will not occur when the satisfaction of X is at stake. Note that an approach in these terms makes more restrictive predictions about the possibilities of stress preservation than an approach in terms of cyclic rule application. Given the ranking X >> Y of metrical constraints in a language, stress preservation may occur across the board, if F is top-ranked in the language under discussion, or it may never occur, if F is bottom-ranked. Finally, we can have a language with stress preservation only in certain contexts, if the ranking is as in (4). But we should not find a language with X >> Y where F is satisfied at the cost of X while stress preservation does not occur when Y is at stake.[3] Another advantage of viewing stress preservation as the result of a faithfulness constraint is that it can give us additional evidence for the hierarchy of stress pattern constraints, in that we can check the position of F in the constraint hierarchy against the position of the metrical constraints established on independent grounds for underived words. For example, if the hierarchy of metrical constraints of a language can be established as being

(5) V >> ... X >> Y >> ... >> Z

and we can establish that X dominates F, which in turn dominates Y, as in (4), then we predict also that stress preservation can occur only at the cost of the constraints lower-ranked than Y

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[3] At least, if we assume that we do not have any reranking of constraints when we are dealing with morphologically complex forms. This is the most restrictive claim and thus it should be pursued, if possible. It means that there is only one grammar, valid for morphologically simple and morphologically complex forms.

(e.g. Z), but never when this would cause the violation of the constraints higher ranked than X (e.g. V). Thus the position of F in the constraint hierarchy provides a testing ground also for the correctness of the hierarchy of constraints determining the stress pattern of underived words. This point was stated first by Pater (1995) who observed that it is striking that the cases of stress preservation in the metrical system of English require the same constraints to be high ranked, and the same constraints to be low ranked, as the analysis of words where stress preservation is not at stake.

In what follows, I will first present a case where stress preservation occurs in certain contexts, but not in others, in the domain of German loan-words. These facts will be analyzed as being the result of a constraint requiring correspondence between morphologically related forms which is ranked above certain stress pattern constraints, but below others. The analysis will then be compared to a derivational analysis, to show that an analysis in terms of violable constraints is more restrictive. Moreover, placing a faithfulness constraint responsible for stress preservation in the middle of the constraint hierarchy of stress pattern constraints leads to a set of implications about the interaction between F and the stress pattern constraints. Basing myself on previous work on secondary stress in underived words (Alber 1997b) I will discuss some of these implications and show that they are indeed borne out.

2. Preservation of stress in German loan-words

In this paper I will concentrate on the stress pattern of German loan-words. This subpart of the lexicon has been chosen because loan-words are longer than native words, thus a rich pattern of secondary stress can be observed. Morphologically simple native words generally consist of a single heavy syllable (cf. Golston & Wiese 1998) and hence cannot display any alternating rhythm.

In what follows I will be mainly concerned with the distribution of secondary stress, the distribution of main stress will not be discussed in any detail. Unlike secondary stress, main stress is not completely predictable in German loan-words. Main stress is assigned close to the right edge of the prosodic word to one of the last three syllables of the word (cf. Wurzel 1970, 1980a, 1980b; Benware 1980; Giegerich 1985; Hayes 1986; Eisenberg 1991; Vennemann 1990; Féry 1995; Wiese 1996; Alber 1997a for a discussion of main stress assignment in loan-words). A possible analysis of main stress assignment is to say that in one class of words stress is placed on the head of the rightmost trochee, for another class of words it must be assumed that constraints of the NONFINALITY type (cf. Prince & Smolensky 1993) prevent main stress from being final (cf. Alber 1997a). A typical example of the idiosyncratic nature of main stress assignment in loan-words are words with similar segmental make-up but different main stress placement such as *Pén.sum,* with penultimate stress vs. *Kon.súm,* with final stress. The distribution of secondary stress in the examples given throughout the text are based on the

judgment of 12 native speakers of German, including myself. I am following Giegerich (1985) and Ramers (1992) in assuming that syllables containing a long vowel or a diphthong and syllables closed with a consonant are heavy, while open syllables containing a short vowel are light. Long vowels are shortened in the domain of secondary stress (cf. Wurzel 1980b: 930), hence the only heavy syllables that can influence the pattern of secondary stress either contain a diphthong or are of the CVC type. To facilitate concentration on secondary stress in the examples only the quantity of the syllables preceding main stress has been noted.

To illustrate the preservation of stem stress in German loan-words, words have been chosen which have been affixed with the stress attracting suffix ***-ität***. The reason for this choice is that *-ität,* along with - *ion* and *-ie,* is one of the most frequent noun-forming loan-suffixes (cf. Fleischer & Barz 1995). Differently from *-ion* and *-ie,* however, the stress bearing final syllable in ***-ität*** is always preceded by an unstressed syllable, which creates a buffer against a possible stress clash with the stress inherited from the stem. Stress preservation is not possible when it would create a stress clash among adjacent syllables and therefore choosing a suffix like ***-ität*** increases the possibilities of stress preservation considerably. The suffix ***-ität*** attaches to adjectives and, less frequently, to nouns. The stems may themselves be derived via suffixation (e.g. *Kontinent* 'continent' → *kontinent-al* 'continental' → *Kontinent-al-ität* 'continentality') or not be analyzable morphologically (e.g. *naiv* 'naive' → *Naiv-ität* 'naiveté'). The suffix *-ität* consistently attracts main stress, but there are cases where the main stress of the stem is preserved as a secondary stress in the derived word, and other cases where this does not happen.

For instance, stress preservation takes place in words where the main stress of the stem falls on the fourth syllable. Note that it is of no importance whether the third syllable is heavy or not. A secondary stress will inevitably fall on the fourth syllable in the suffixed form: [4]

(6)	ù.ni.ver.**sál**	→	[[Ù.	ni.	ver.	**s à** .	l]i.	t´ät]	'universal',	'universality'
			'L	L	H	'L	L			
	kòn.ti.nen.**tál**	→	[[Kòn.	ti.	nen.	**tà** .	l]i.	t´ät]	'continental',	'continentality'
			'H	L	H	'L	L			
	Ò.ri.gi.**nál**	→	[[Ò.	ri.	gi.	**nà**.	l]i.	t´ät]	'original',	'originality'
			'L	L	L	'L	L			
	ì.rra.tio.**nál**	→	[[Ì.	rra.	tio.	**nà**.	l]i.	t´ät]	'irrational',	'irrationality'
			'L	L	L	'L				

[4] From now on the syllable which is the potential target of stress preservation will be noted in bold face, also in the cases where eventually no stress preservation occurs. Light syllables are indicated by "L", heavy syllables by "H".

è.mo.tio.**nál**	→	[[È.	mo.	tio.	**nà**.	l]i.	t´ät]	'emotional',	'emotionality'
		'L	L	L	'L				
ì.lle.gi.**tím**	→	[[Ì.	lle.	gi.	**tì** .	m]i.	t´ät]	'illegitimate',	'illegitimacy'
		L	L	L	L	L			
hè.te.ro.**gén**	→	[[Hè.	te.	ro.	**gè**.	n]i.	t´ät]	'heterogeneous',	'heterogeneity'
		L	L	L	L	L			

It is clear that stress preservation is indeed at play here, when we compare the pattern of the examples above with the distribution of stress in otherwise comparable words where preservation of stress from a morphologically simpler form cannot be at stake (cf. Alber 1997b for an analysis of secondary stress in German loan-words). For example, take words with a sequence of five light syllables preceding main stress.

(7)	Là.	ti.	tù.	di.	na.	rís.	mus	'latitudinarianism'
	'L	L	'L	L	L			

Notwithstanding the same syllabic make-up of the pretonic string as in *Ò.ri.gi.nà.li.t´ät*, in *Là.ti.tù.di.na.rís.mus* secondary stress falls on every odd-numbered syllable, counting from the left. In this case, stress cannot be inherited from a morphologically simpler stem, *latitudinar* is not attested as a word. In fact, most speakers will not even know the word *Latitudinarismus*,[5] nevertheless the stress pattern is clear. The same is true for

(8)	Lè.	pi.	dòp.	te.	ro.	ló.	ge	'butterfly expert'
	'L	L	'H	L	L			

with an LLHLL sequence before main stress, just as in *Ù.ni.ver.sà.li.t´ät*, but with stress on the third, instead of the fourth syllable. Again, the connection to the scientific name *lepi**dóp**tera*, used in zoological classification for the order of insects comprising the butter flies is arguably not transparent for most speakers and even when it is, there might remain some doubt as to whether the main stress should fall on the antepenultimate or the penultimate syllable of the word.[6] Nevertheless, the pattern of secondary stress in *Lè.pi.dòp.te.ro.ló.ge* is clearly alternating, from the left to the right.

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[5] According to the *Duden* (1994), *Latitudinarismus* is "a tendency originated in the 17th century in the Anglican church, characterized by confessional tolerance and openness towards the findings of modern science" [my translation].

[6] The Brockhaus encyclopedia destroys any hope of treating stress on *-dòp-* as inherited by giving the germanized form *Lepidop**té**ren*, with stress noted on the syllable following *-dop-*

Below, more examples are given which show that secondary stress falls on every odd-numbered syllable counting from the left when stress preservation is not at stake:[7]

(9)	ò. no. mà. to. po. é. tisch[8] 'L L 'L L L		'onomatopoetic'
	È. pi. dè. mio. lo. gíe[9] 'L L' L L L		'epidemiology'
	È. o. sì. no. phi. líe 'L L 'L L L		'eosinophilia'
	Kò. le. òp. te. ro. ló. ge 'L L 'H L L		'beetle expert'
	Sì. pho. nàp. te. ro. ló. ge 'L L 'H L L		'flea expert'

In conclusion, the stress pattern of these words shows us that the examples in (6) must be cases of stress preservation, while those in (7), (8) and (9) reflect the regular stress pattern. If the examples in (6) were not cases of stress preservation, secondary stress in German loan-words would have to be described in the following way: 'place stress on the first syl lable of the word and on the second syllable to the left of the main stressed syllable' but this would leave the examples in (7) through (9) unaccounted for.

In parallel to the cases just discussed, we have words with a very similar morphological structure, where the main stress of the stem is not preserved as a secondary stress in the derived form. These words are shorter and the main stress of the underived word falls on the second syllable. As before, different sequences of heavy and light syllables before main stress give the same results.

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[7] But see below for cases where the alternating pattern of secondary stress can be disrupted by an even-numbered heavy syllable in examples such as *Àu.to.de.tèr.mi.nís.mus.*

[8] This word could of course be analyzed as being morphologically complex, i.e., [[onomato]poetisch], but there is no loan-word *onomato*, from which the secondary accents on the first and third syllable could be inherited.

[9] I disregard here an alternative pronunciation, preferred by some speakers, where the high vowel in the fourth syllable is not pronounced as a glide and hence the word is syllabified as *E.pi.de.mi.o.lo.gie.* The stress pattern *È.pi.dè.mio.lo.gíe* 'epidemiology' could in principle be connected to *È.pi.de.**míe*** 'epidemic', but if the stress pattern of this word was preserved in *È.pi.dè.mio.lo.gíe* we should have stress on the fourth, not on the third syllable in the derived word.

(10)	lo.**yál**	→**[[**Lò**. ya** . l]i. t´ät**]** 'L L L	'loyal',	'loyalty'
	Ri.**vá** .le	→**[[**Rì**. va** . l]i. t´ät**]** 'L L L	'rival',	'rivalry'
	la.**bíl**	→**[[**Là**. bi**. l]i. t´ät**]** 'L L L	'weak',	'weakness'
	sta.**bíl**	→[[Stà**. bi**. l]i. t´ät**]** 'L L L	'stable',	'stability'
	ku.**riós**	→[[Kù**. rio** .s]i. t´ät**]**[10] 'L L L	'odd',	'something odd'
	per.**vérs**	→[[Pèr.**ver**. s]i. t´ät 'H H L	'perverse',	'perversity'
	ab.**súrd**	→[[Àb**. sur**. d]i. t´ät**]** 'H H L	'absurd',	'absurdity'
	ner.**v´ös**	→[[Nèr**. vo** . s]i. t´ät**]** 'H L L	'nervous',	'nervousness'
	mo.**dérn**	→[[Mò**.der** . n]i. t´ät**]** 'L H L	'modern',	'modernness'

No stress preservation occurs in these cases. Instead the derived forms behave exactly as loan-words where stress cannot be treated as inherited by a morphologically simpler form: a secondary stress falls on the first syllable of the word, if more than one syllable precedes main stress, as we can see in the following examples.[11]

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[10] As for *Epidemiologie* , also for *Kuriosität* some speakers prefer a pronunciation without a glide where the word is syllabified as *Ku.ri.o.si.tät*.

[11] There is some variation among speakers in cases where the first syllable of the word is light and the second is heavy, as in *A.dap.ta.tion*. Some speakers, generally of northern extraction, tend to stress the second, heavy syllable. This tendency seems to be stronger in cases like *A.dap.ta.tion*, where the heavy syllable contains an [a] and less strong when it contains a non-low vowel, as in *De.ter.mi.nis.mus* . It could therefore be interpreted as a case of stress driven by sonority (cf. Kenstowicz 1994). For the purpose of this paper only judgments of speakers who consistently stress the first syllable of a word have been considered.

(11) Drè.pa. no. clá. dus 'a genus of moss'
'L L L

Ò. ri. gi. nál 'original'
'L L L

Àn.tho. lo. gíe 'anthology'
'H L L

Kà. lei. do. skóp 'kaleidoscope'
'L H L

Dè. ter. mi. nís. mus 'determinism'
'L H L

À. dap. ta. tíon 'adaptation'
'L H L

à. mor. ti. síe. ren 'to amortize'
'L H L

Descriptively, stem stress is preserved word-medially (and hence in words that are long enough to show rhythmic alternation in this context) but not at the left edge of the word (and hence not in short words, where the stem's main stress falls close to the left edge of the word).

We have now seen words with main stress falling on the fourth syllable, and others where main stress falls on the second syllable of the stem. When a suffix like *-ität* is added, stress is preserved in the former case, but not in the latter. The cases still missing from the paradigm are those where the stem stress falls on the first or the third syllable. They are less interesting for our purpose since preservation of the stem stress leads exactly to the pattern expected also for underived words. Hence no cases can be observed of stress preservation violating the pattern of underived words, or cases of failed stress preservation following the pattern of underived words. Thus, when stems with initial main stress are suffixed, the derived word will have an initial secondary stress, just as the underived examples in (9) and (11) above:

(12) **Plú** .ral → **Plù** .ra. li. t´ät 'plural', 'plurality'
'L L L

rár → **Rà** .ri. t´ät 'rare', 'rarity'
'L L

The same is true when the stem stress falls on the third syllable. A secondary stress falls on the third syllable of the derived word, just as in underived words with a pretonic string of light syllables (e.g. in (9)):

(13)	lè.gi.**tím**	→	Lè.	gi.	**tì** .	mi.	t´ät	'legitimate',	'legitimacy'
			'L	L	'L	L			
	rì.go.**rós**	→	Rì.	go.	**rò**.	si.	t´ät	'rigorous',	'rigorousness'
			'L	L	'L	L			

The challenge then is how to account for the fact that stress is preserved in cases like *Ù.ni.ver.**sà**.li.t´ät*, while it is not preserved in cases like *Lò.**ya**.li.t´ät*. As a matter of fact, we have a triple puzzle. First, the suffix ***-ität*** is stress attracting: the main stress of the stem is not preserved as a main stress, but at most as a secondary stress, i.e., the stress pattern of the stem is never preserved in all its characteristics. Second, we do have stress preservation to some extent, if the main stress of the stem falls further to the right than the second syllable. Third, we do not have stress preservation, if the main stress of the stem falls on the second syllable. This nonuniformity of stress preservation is one of the central arguments that make Pater (1995) argue for an analysis in terms of violable constraints and against the cyclic application of rules.

3. Analysis

In my analysis I propose that the nonuniform behavior of stress preservation in German loan-words can be explained as the result of ranking the faithfulness constraint requiring identity to the stem's stress pattern below certain stress pattern constraints and above others. I will first show that the faithfulness constraint is ranked below a constraint ALIGN (PRWD, L, FT, L), requiring every prosodic word to begin with a foot, but above the *weight-to-stress principle* (WSP, henceforth) which militates against unstressed heavy syllables. Basing myself on the constraint hierarchy worked out for German loan-words in previous work (Alber 1997b), I will then verify whether the interaction between the faithfulness constraint and other stress pattern constraints is as we would predict it to be. All constraints dominating ALIGN (PRWD, L, FT, L) should be observed even if this means that main stress is not preserved. All constraints ranked below the WSP should be violated when stress preservation is at stake. But first of all it is necessary to define what is meant by "faithfulness to the stress pattern of the stem".

3.1. Faithfulness to stem stress

In principle there are several different ways of thinking about a constraint requiring faithful ness to the stress pattern of the stem of affixation. We can treat stress preservation as being the result either of a faithfulness constraint requiring identity between two output forms (O/O-faithfulness) or of a faithfulness constraint targeting an input and an output form (I/O-faithfulness). The case of stress preservation presented here cannot add anything new to the discussion about this topic, but I want to make clear the reasons that make me follow an analysis like Kager's (forthcoming a), where faithfulness to stem stress is defined as an O/O-faithfulness constraint.[12]

If we do not want to distinguish between I/O-faithfulness and O/O-faithfulness in the domain of affixation[13] we could try to maintain the model of lexical phonology, assuming that affixation proceeds cyclically and that each cycle of affixation forms the input for the next cycle of affixation. Candidates will then be evaluated at each level by the constraint hierarchy and since the output of one cycle forms the input for the next the faithfulness constraint which links the two cycles could be conceived of as being an input-output faith fulness constraint. An approach along similar lines, with a cyclic evaluation of candidates, is argued for in Booij (1996). Booij also points out that there is no straightforward contradiction between a cyclic candidate evaluation and an approach in terms of violable con straints, since the former reflects a specific position taken with respect to the theory about the organization of the grammar (in this case the interaction between morphology and phonology) while the latter makes a claim about the form phonological generalizations take.

Nevertheless, I will follow here the proposal of Kager (forthcoming a) who analyzes stress preservation as the result of a requirement of identity between surface forms. As Kager points out, this approach has the immediate advantage that it predicts that only characteristics of surface forms (but not, e.g., of bound roots) can be transferred, a fact that an analysis in terms of cyclic suffixation has to stipulate. Kager discusses a striking case - the distribution of the adjectival suffixes *-ig* and *-lijk* in Dutch - where stress preservation cannot be seen as satisfying a requirement of identity to the output of the preceding cycle. These suffixes require stress to fall on the preceding syllable, a requirement which induces stress shift, when they are attached to compounds. So we have

(14) nóod-lot 'fate' → [[nood-lót]-ig] 'fatal'

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[12] Pater (1995) does not distinguish between an I/O-faithfulness constraint responsible for lexical stress and an O/O-faithfulness constraint responsible for stem stress preservation. However, he mentions in the appendix that such a distinction might indeed be necessary for English secondary stress. Cf. also Benua (1997) for an analysis of stress preservation in terms of O/O-faithfulness.

[13] But see McCarthy & Prince (1995), McCarthy (1995), Benua (1995), Kenstowicz (1996), Kager (forthcoming b) for cases outside of the domain of affixation where constraints requiring identity between output forms seem to be required in any case.

But the same strategy of stress shift is not available for affixed forms: here, instead of shifting stress to the affix, no suffixation of *-ig* and *-lijk* is possible at all:

(15) schóon-heid 'beauty' → *[[schoon-heid]-ig]

Leaving aside the details of constraint ranking, in Kager's analysis the fact that compounds allow for stress-shift, and therefore for suffixation with *-ig/-lijk*, is due to the fact that stress shift in this case does not violate a constraint requiring that the stress peak of the derived word have a correspondent stress peak in some base. [14] The stress peak in *[[nood-lót]-ig]* matches the stress peak of an indirect base of *[[nood-lót]-ig]*, the output form *[lót]*. A word like **[[schoon-héid]-ig]* would violate this constraint, since the affix *-heid* is not a possible output form, therefore *-ig* cannot be attached to words of this kind. What is interesting about this case is that the stress peak of an output form becomes relevant which, in derivational terms, is not present at the moment of suffixation. In other words, if *[nóod-lot]* was the input for *[[nood-lót]-ig]*, we could not make reference to I/O-faithfulness to explain the different behavior of the suffixes *-ig* and *-lijk* with respect to compounds versus affixed words. Kager's analysis therefore shows that an O/O-faithfulness constraint targeting stress peaks is needed in any case.

There is one additional consideration which makes an approach in terms of O/O-constraints more desirable. If we assume that there is just one faithfulness constraint that links input to output as well as the output of one cycle to the output of the next, we make predictions about the behavior of lexical stress systems that are by no means borne out. We would have to say that languages that do not preserve stress specified already at the level of underlying representation also do not have instances of cyclic stress preservation. In fact, if a language does not have any lexical stress, this means that the faithfulness constraint under discussion is bottom-ranked: even if there should be some stress peak specified under lyingly, it could never surface, because other constraints that regulate the distribution of stress would prohibit it. [15] The constraint therefore should be bottom-ranked also at subsequent levels, if we do not want to postulate that the grammar of a language can change at every level of affixation. [16] Hence, no stress preservation could ever occur. Likewise, in a language where lexical stress surfaces to some extent cyclic stress preservation should occur to exactly the same extent: when the constraints dominating faithfulness to stress peaks are not violated. [17] Clearly, to settle the issue

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[14] For Kager, the base of a derived word is " ... a fully prosodized, independently occurring *word*, which is also *compositionally related* to the output". The 'base-of-the-base' is referred to as 'indirect base' (Kager forthcoming a).

[15] This consideration holds, if we assume with Prince & Smolensky (1993) that there are no constraints on the input (cf. their concept of *richness of the base*).

[16] But see Benua (1997) for the indexation of affix classes to different O/O-faithfulness constraints.

[17] This observation may not be so important for secondary stress, since arguably secondary stress is never specified underlyingly (Paul Kiparsky, p.c.), although the question remains why this should be so. However, it has consequences for the assignment and preservation of main stress.

more work on lexical stress systems is needed and, in general, on the question of what and at what levels can be preserved.

For the purpose of this paper I will adopt the definition of faithfulness to stress peaks given in Kager (forthcoming a)[18], formulated in terms of correspondence theory (McCarthy & Prince 1995):[19]

(16) PK-MAX (B/O)
Let α be a segment in B and β be its correspondent in O
If α is the stress peak of B, then β is the stress peak of O
(from Kager (forthcoming a))

where O stands for output and B for a base[20] of the output.

3.2. Nonuniform stress preservation in German loan-words

The examples in (11) showed us that German loan-words have a secondary stress on the initial syllable,[21] a fact that I interpret as the effect of a constraint requiring that prosodic words begin with a foot:

(17) Align (PrWd, L, Ft, L):
∀ prosodic word ∃ foot such that the left edge of the prosodic word and the left edge of the foot coincide. (McCarthy & Prince 1993)

This constraint holds even when the second syllable is heavy, as, e.g., in

(18) Dè.ter. mi. nís. mus 'determinism'
'L H L

Thus, ALIGN (PRWD, L, FT, L) dominates a constraint requiring heavy syllables to be stressed:

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[18] But see also the constraint HEAD-MAX in McCarthy (1995) and Alderete (1996) requiring faithfulness to the prosodic head of a word.

[19] Kager proposes also a faithfulness constraint P K-DEP (B/O) which requires that a stress peak in an output form have a correspondent in some base. This constraint is not relevant for the case discussed below.

[20] cf. fn. 14.

[21] This requirement is violated just in case main stress falls on the second syllable of the word and the initial syllable would form a degenerate foot consisting of a single light syllable, as, e.g., in *E.lán* 'spirit' (cf. discussion below).

(19) WSP = weight-to-stress principle: heavy syllables are prominent
(cf. Prince 1990; Prince & Smolensky 1993)

The competition of the two constraints is shown in the following tableau:

Candidates	ALIGN (PRWD, L, FT, L)	WSP
☞ (a) (Dè.ter).mi.nís.mus		*
(b) De.(tèr).mi.nís.mus[22]	σ!	

Tableau 1

Candidate (a) has a trochaic ('LH) foot aligned with the left edge of the prosodic word. Therefore it wins against candidate (b), which would satisfy the WSP by stressing the second, heavy syllable. There are other candidates, which would satisfy both ALIGN (PRWD, L, FT, L) and the WSP, but which would violate constraints that turn out to be higher ranked than ALIGN (PRWD, L, FT, L).[23] This is the case for the following parsing:

(20) (De.tèr). mi. nís. mus → violates TROCH
(L 'H) L

An (L'H) iamb violates TROCH, a constraint requiring left-headed feet:

(21) TROCH = ALIGN (FT, L, HEAD(FT), L)
∀ foot ∃ head of the foot such that the left edge of the foot and the left edge of the head of the foot coincide.
(cf. RHTYPE=T in Prince & Smolensky 1993; McCarthy & Prince 1993)

On the other hand, the following candidate, with stress on both the first and the second syllable creates a stress clash and parses the initial syllable into a degenerate monomoraic foot:

---

[22] I am assuming that ('HL) trochees are banned in German, due to the influence of a constraint ITL (for *I*ambic-*T*rochaic-*L*aw, cf. Hayes 1985, 1995) banning uneven trochees (cf. Alber 1997b for a discussion of this constraint). Thus candidate (b) is parsed here as *De.(tèr).mi.nís.mus* and not as *De.(tér.mi).nís.mus*. But nothing in the analysis of stress preservation hinges crucially on this assumption. Uneven ('LH) trochees are allowed at the beginning of a word, as in the winning candidate (a), because ALIGN (PRWD, L, FT, L) dominates the ITL.

[23] As a matter of fact, the three constraints mentioned below seem to be undominated in German loan-words: there are no cases where an iambic foot would have to be posited, there are no observable cases of stress clash in loan-words and there are no cases where a foot consisting of a single light syllable must be assumed (cf. Alber 1997b).

(22) (Dè).(tèr).mi. nís. mus → violates *CLASH and FT-BIN
('L) ('H) L

Thus it violates *CLASH, a constraint militating against adjacent, stress bearing syllables:

(23) *CLASH: adjacent syllables must not bear stress
(used as a violable constraint in Kager 1994; Pater 1995)

and, with its initial degenerate foot, FT-BIN, requiring feet to be either bimoraic or disyllabic.

(24) FT-BIN: feet must be binary at some level of analysis (μ, σ)
(Prince 1980; McCarthy & Prince 1986; Prince & Smolensky 1993)

Although ALIGN (PRWD, L, FT, L) dominates the WSP, we can see effects of the latter constraint in words which contain a word medial heavy syllable. Although secondary stress generally falls on every odd-numbered syllable, counting from the left (see examples (7) through (9)), an even-numbered *heavy* syllable is stressed word-medially when this does not lead to a clash with the main stress: [24]

(25) Àu. to. de. tèr. mi. nís. mus 'self-determinism'
('H) L L ('H) L

Àn. te. ze. dèn. ta. lís. mus 'antecedentalism'
('H) L L ('H) L

Let us now see how the two constraints ALIGN (PRWD, L, FT, L) and WSP interact with P K-MAX (B/O), the constraint requiring identity between stress peaks of morphologically related forms. Compare a case of stress preservation as, e.g.,

(26) ù.ni.ver.**sál** → [[Ù. ni. ver. **sà**. l]i. t´ät] 'universal', 'universality'
('L L) H ('L L)

---

[24] As to the first example, for some speakers *Àu.to.dè.ter.mi.nís.mus*, with stress on the third syllable, is also a possible pronunciation. To me this pronunciation sounds somehow arti ficial, with a pause at the morphological boundary and I would suggest that this second pro-nunciation can be interpreted as two prosodic words, i.e., *[$_{PrWd}$Àu.to.][$_{PrWd}$dè.ter.mi.nís.mus]*, each with a stress falling on the initial syllable. On the other hand, the pronunciation in (25) would reflect a parsing in one prosodic word. Words with this sequence of syllables are hard to find, and in fact the second example is a nonexistent though possible word. Note that stress on the fourth syllable cannot be an effect of stress preservation in any of the two cases: ***Dè.ter.mi.nís.mus*** bears secondary stress on the first, not on the second syllable and the main stress of *Àn.te.z**é**.dens* 'antecedent' falls on the third, not the fourth syllable. Such examples are discussed at length in Alber (1997b).

with a case of failed stress preservation:

(27) lo.**yál** →**[[**Lò. **ya** . l]i. t´ät**]** vs.*[[Lo. **yà** . l]i. t´ät**]** 'loyal', 'loyalty'
('L L) L L ('L L)

The first example shows us that stress is preserved at the cost of leaving a heavy syllable unstressed, i.e., PK-MAX (B/O) dominates the WSP. In the second example stress is not preserved because satisfaction of PK-MAX (B/O) would violate the requirement to align the left edge of the prosodic word with the left edge of a foot, hence ALIGN (PRWD, L, FT, L) dominates PK-MAX (B/O). The constraint hierarchy that we obtain is the following:

(28) Align (PrWd, L, Ft, L) >> Pk-Max (B/O) >> WSP

The tableau below shows the interaction of PK-MAX (B/O) and the WSP:

Base: ù.ni.ver.**sál**	ALIGN (PRWD, L, FT, L)	PK-MAX (B/O)	WSP
☞ (a) (Ù.ni).ver.(**sà**.li).(t´ät)			*
(b) (Ù.ni).(vèr).**sa** .li.(t´ät)		*!	

Tableau 2

In cases of more than one secondary stress, the constraint PK-MAX (B/O) can show its force, once ALIGN (PRWD, L, FT, L) is satisfied by the first secondary stress . Therefore candidate (a) wins, where the stress peak of the stem on the fourth syllable is preserved, although candidate (b), with stress on the third, heavy syllable, would satisfy the WSP.

On the other hand, we do not have stress preservation when ALIGN (PRWD, L, FT, L) is challenged:

Base: lo.**yál**	ALIGN (PRWD, L, FT, L)	PK-MAX (B/O)	WSP
(a) Lo.(**yà**.li).(t´ät)	*!		
☞ (b) (Lò.**ya**).li.(t´ät)		*	

Tableau 3[25]

[25] See below for a discussion of the candidate *(Lo.yà).li.(t´ät),* which would satisfy all three constraints.

Here the unfaithful candidate (b) wins, because candidate (a), although satisfying PK-MAX (B/O), does not satisfy the higher ranked ALIGN (PRWD, L, FT, L).

3.3. Stress preservation under a derivational approach

Let us stop here for a moment before considering the interaction of PK-MAX (B/O) with other stress pattern constraints. We have just pinpointed the exact hierarchical position of the faithfulness constraint requiring correspondence between morphologically related forms: it is ranked below the constraint ALIGN (PRWD, L, FT, L), but above the WSP. Of course we could explain the data above also with an analysis in terms of cyclic rule application. For example, we could analyze the two examples that were discussed above by considering the assignment of main stress to be a cyclic rule, with stress assigned on a previous cycle being carried over to subsequent cycles. We would then have two postcyclic rules, one saying something like "assign stress to the initial syllable" and another that says "assign stress to heavy syllables". [26] At the end of the derivation we would need two destressing rules, one that - under clash - destresses the second, but not the initial syllable of the word (Destress I), and another one that eliminates the clash between two syllables by destressing the first of them (Destress II). [27] The two rules are crucially ordered with respect to each other. This would lead to the following Derivation of *Universalität:*

(29)	1st cycle:	"assign main stress"	→	univers**á l**
	2nd cycle:	"assign main stress"	→	Univers**à** lit´ät
	Postcyclic rules:			
		"assign initial stress"	→	Ùnivers**à** lit´ät
		"assign stress to heavy syllables"	→	Ùnivèrs**à** lit´ät
		Destress I	→	n.a.
		Destress II	→	Ùnivers**à** lit´ät
		output	→	Ùnivers**à** lit´ät

The derivation for *Loyalität* , on the other hand, would run as follows:

---

[26] Note that both rules are necessary to derive words where stress preservation is not at stake as, e.g., *Kà.lei.do.skóp* ("assign initial stress") and *Àu.to.de.tèr.mi.nís.mus* ("assign stress to heavy syllables", in this case the fourth, heavy syllable).

[27] Actually, we would need yet a third destressing rule destressing syllables preceding a syllable bearing main stress, in order to derive the correct output for *lo.yál*. This destressing rule should be ordered before Destress I, otherwise the generated output would be *ló.yal*.

(30)				
	1st cycle:	"assign main stress"	→	lo**yál**
	2nd cycle:	"assign main stress"	→	Lo**yà**lit´ät
	Postcyclic rules:			
		"assign initial stress"	→	Lò**yà**lit´ät
		"assign stress to heavy syllables"	→	n.a.
		Destress I	→	Lò**ya**lit´ät
		Destress II	→	n.a.
		output	→	Lò**ya**lit´ät

Destress I and Destress II must be ordered with respect to each other, so that in the case of *Loyalität* the first rule bleeds the application of the second rule, otherwise we would get the wrong output *Lo.**yà**.li.t´ät.*

The derivation proposed here is perhaps oversimplified, and a number of other possible derivational analyses are imaginable, but hopefully the main idea has become clear: the result of stress preservation in one case (*ù.ni.ver.**sál*** → *Ù.ni.ver.**sà**.li.t´ät*) vs. lack of stress preservation in the other (*lo.**yál*** → *Lò.**ya**.li.t´ät*) is attributed to the definition of two destressing rules and their ordering with respect to each other. The crucial point now is that we could equally well imagine a language minimally different from German, where the definition of the destressing rules diverges slightly from what we have just seen. Let us call this language German $_D$ and assume that the stress pattern for underived words is just the same as for German$_A$, that is, actual German. German$_D$ could have the destressing rules Destress I $_D$, saying "destress the initial syllable of the word under clash" and Destress II $_D$, saying "destress the second of two clashing syllables". The output of a derivation including these rules would then be the mirror-image of the derivation presented before: no stress preservation word-medially (*ù.ni.ver.**sál*** → *Ù.ni.vèr.**sa**.li.t´ät*), but on the second syllable instead (*lo.* ***yál*** → *Lo.**yà**.li.t´ät*):[28]

(31)				
	1st cycle:	"assign main stress"	→	univer**sál**
	2nd cycle:	"assign main stress"	→	Univer**sà**lit´ät

[28] Changing the destressing rules makes it also necessary to change the order of the rule "assign stress to heavy syllables" with respect to them: this rule must now be ordered after Destress I $_D$, otherwise we could not generate correctly the underived *Kà.lei.do.skóp,* where the second, heavy syllable does not bear any stress. But this move has no consequences for the examples under discussion.

Postcyclic rules:

"assign initial stress"	→	Ùniver**sà**lit´ät
Destress I_D	→	n.a.
"assign stress to heavy syllables"	→	Ùnivèr**sà**lit´ät
Destress II_D	→	Ùnivèr**sa**lit´ät
output "German$_D$"	→	Ùnivèr**sa** lit´ät

(32)

1st cycle:	"assign main stress"	→	lo**yál**
2nd cycle:	"assign main stress"	→	Lo**yà**lit´ät

Postcyclic rules:

"assign initial stress"	→	Lò**yà**lit´ät
Destress I_D	→	Lo**yà**lit´ät
"assign stress to heavy syllables"	→	n.a.
Destress II_D	→	n.a.
output "German$_D$"	→	Lo**yà**lit´ät

These derivations show us, that a language like "German $_D$" is perfectly possible under a rule based approach. It is not a possible language, though, if we attribute stress preservation to the effects of a constraint like P K-MAX (B/O), a constraint that has a specific position in the constraint hierarchy. If we limit our attention for the moment to the three constraints discussed above, ALIGN (PRWD, L, FT, L), PK-MAX (B/O) and the WSP, there are exactly three positions, where PK-MAX (B/O) could be located in a language like German. It could be ranked in between the other two constraints, and in this case we would have a language like actual German, "German$_A$", where we have stress preservation in certain contexts, but not in others:

(33) German$_A$: ALIGN (PRWD, L, FT, L) >> PK-MAX (B/O) >> WSP

ù.ni.ver.**sál**	→	Ù.ni.ver.**sà**.li.t´ät
lo.**yál**	→	Lò.**ya** .li.t´ät

We could then have a language, "German $_B$" where stress preservation occurs in all cases. This would be a language where PK-MAX (B/O) is ranked above the other two constraints:

(34) German$_B$: PK-MAX (B/O) >> ALIGN (PRWD, L, FT, L) >> WSP

ù.ni.ver.**sál**	→	Ù.ni.ver.**sà**.li.t´ät
lo.**yál**	→	Lo.**y à**.li.t´ät

Finally, there could be a language, "German $_C$", where PK-MAX (B/O) is ranked lowest, with no stress preservation to be observed at all:

(35) German$_C$ ALIGN (PRWD, L, FT, L) >> WSP >> PK-MAX (B/O)

ù.ni.ver.**sál**	→	Ù.ni.vèr.**sa**.li.t´ät
lo.**yál**	→	Lò.**ya** .li.t´ät

But what we do predict not to exist, is a language like "German $_D$", where stress preservation occurs at the cost of ALIGN (PRWD, L, FT, L), but not when the WSP would be violated:

ù.ni.ver.**sál**	→	Ù.ni.vèr.**sa**.li.t´ät
lo.**yál**	→	Lo.**y à**.li.t´ät

In order to generate this language, we would have to invert the hierarchical order of the stress pattern constraints, leading to a hierarchy that is at odds with the hierarchy established for underived words:

(36) *German$_D$: WSP >> PK-MAX (B/O) >> ALIGN (PRWD, L, FT, L)

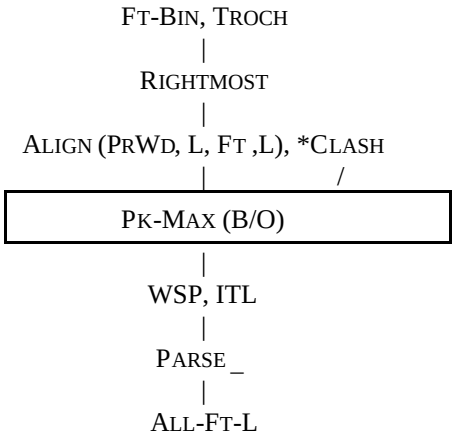
If we want to maintain that a language has one grammar, hence one constraint hierarchy without the possibility of reranking constraints, we predict that a language like "German $_D$" does not exist. On the other hand, a rule based approach as outlined above has no major problems in accommodating "German$_D$" in the general picture of stress preservation. The reason resides in the fact that destressing rules do not have to be linked in any way to the principles governing the general stress pattern of the language. If we want to give the derivational analysis the same restrictiveness that the constraint based analysis has, we would have to specify that destressing rules can resolve a clash only in such a way that the final output does not disturb "important" requirements on the stress pattern of the language (e.g. for German: initial syllables must be stressed). But this would just mean to introduce wellformedness constraints on the output into the rule system so that what we obtain at the end is a mixed system of rules and constraints. In conclusion we can say that an analysis of stress preservation in terms of violable constraints has the advantage of being more restrictive: its predictions can be falsified more easily, something every theory should aim at.

3.4. The interaction of PK-MAX (B/O) with other stress pattern constraints

In what follows, I want to illustrate yet another advantage of treating stress preservation as the result of a violable constraint, an advantage that becomes quite clear also in Pater's (1995) and Benua's (1997) work. In a language like German, where PK-MAX (B/O) is ranked above certain

stress pattern constraints, but below others, we can predict the interaction of this constraint with the other stress pattern constraints of the language. For example, if we can establish for German underived words that certain stress pattern constraints dominate ALIGN (PRWD, L, FT, L), then those constraints will also dominate PK-MAX (B/O): stress preservation will never occur if they would be violated. Conversely, all stress pattern constraints ranked below the WSP can be violated if it serves the selection of an output where stress is preserved. The insertion of a constraint responsible for stress preservation into the hierarchy of stress pattern constraints thus provides an excellent testing ground for the correctness both of the analysis of stress in underived words as well as for the position of PK-MAX (B/O). I will take as a starting point the hierarchy worked out in Alber (1997b) for stress in underived German loan-words. The constraint PK-MAX (B/O) is inserted in the position established above:

(37)



For reasons of space I will not discuss here all the aspects of this constraint hierarchy (see Alber 1997b for a detailed account of the ranking arguments), but just give a summary of the resulting stress pattern and then concentrate on single aspects of the ranking and its effects on stress preservation. The feet parsed in German loan-words are trochaic and at least bimoraic, a fact expressed by the high ranking of the constraints TROCH (requiring left-headed feet) and FT-BIN (requiring feet to be either bimoraic or disyllabic). There are no cases where the presence of iambs or degenerate feet consisting of a single light syllable must be assumed. The constraint RIGHTMOST summarizes the requirements of main stress assignment: [29] main stress is generally assigned close to the right edge of the prosodic word, precisely to one of the last three syllables. The high position of this constraint reflects the fact that the placement of main stress cannot be altered in order to satisfy one of the other stress pattern constraints which are ranked lower in the hierarchy. Secondary stress, all things being equal, is assigned from left to right to every

[29] But see below for a definition of this constraint for a specific class of words.

odd-numbered syllable, as we have already seen in the examples in (9) . Exhaustive left-to-right parsing is analyzed as the ranking of the constraint PARSEσ over ALL-FT-L. The two constraints are defined as follows:

(38) PARSEσ: syllables must be parsed into feet
(Prince & Smolensky 1993)

(39) ALL-FT-L = ALIGN (FT, L, PRWD, L):
∀ foot ∃ prosodic word such that the left edge of the pro sodic word and the left edge of the foot coincide.
(McCarthy & Prince 1993)

This alternating pattern is interrupted in words where a word-medial heavy syllable attracts stress (as, e.g., in example (25)). The stress attracting force of heavy syllables is accounted for by the ranking of the WSP over PARSEσ and ALL-FT-L. The WSP itself can be violated when higher constraints are at stake. Thus we have seen in example (11) that it can be violated to satisfy ALIGN (PRWD, L, FT, L), requiring a trochee at the left edge of the prosodic word. The WSP can also be violated when assigning stress to a heavy syllable would create a stress clash as, e.g., in sequences of heavy syllables, where alternating stress is preferred to stress on every heavy syllable, as, e.g., in the word

(40) Pèr.ver. si. t´ät 'perversity'
'H H L

The constraint *CLASH, militating against adjacent stress bearing syllables, is undominated in the hierarchy, reflecting the fact that no cases of stress clash can be observed in this part of the lexicon. Finally, there is the constraint ITL that bans uneven trochees from the foot repertory (cf. fn. 22), but which will not play any role in what follows.

If the constraint hierarchy as proposed here is correct, then certain implications with respect to stress preservation must hold. Let us first consider the constraint ALL-FT-L. If it is true that the WSP dominates ALL-FT-L, then also PK-MAX (B/O) must dominate this constraint. Hence stress preservation will be possible even at the cost of violating this bottom-ranked constraint. Schematically we can express the predicted implication as below:

(41) If PK-MAX (B/O) >> WSP and WSP >> ALL-FT-L
then PK-MAX (B/O) >> ALL-FT-L

We have already shown in Tableau 2 that PK-MAX (B/O) dominates the WSP. The follow ing tableau illustrates that the WSP dominates ALL-FT-L. The crucial examples have already been discussed in (25):[30]

(42) Àu. to. de. tèr. mi. nís. mus 'self-determinism'
('H) L L ('H) L

Àn. te. ze. dèn. ta. lís. mus 'antecedentalism'
('H) L L ('H) L

The tableau shows us, how the WSP can force a disruption of the alternating pattern.

Candidates	WSP	PARSE_	ALL-FT-L
☞ (a) (Àu).to.de.(tèr).mi.(nís.mus)		***	σσσ
(b) (Àu).to.(dè.ter).mi.(nís.mus)	*!	**	σσ
(c) (Àu).to.de.ter.mi.(nís.mus)	*!	****	

Tableau 4

Since McCarthy & Prince (1993) exhaustive parsing of feet has been analyzed as the ranking of PARSEσ above such constraints as ALL-FT-L, requiring all feet to be left-aligned. If the ranking were the inverse, candidate (d) should win, with a single foot,[31] which is perfectly aligned to the left edge of the prosodic word. But even with the ranking of PARSEσ over ALL-FT-L, all things being equal, candidate (b) should win, since this candidate counts fewer violations than (a) on both constraints. It is the WSP that makes this candidate fail and (a) win, where the fourth, heavy syllable is stressed.

If the WSP is ranked above PARSEσ and hence above ALL-FT-L, and PK-MAX (B/O) is ranked above the WSP, by transitivity PK-MAX (B/O) should also be ranked above ALL-FT-L. In examples consisting of a pretonic string of light syllables we see that this is indeed the case:

(43) Ò. ri. gi. **nál** → Ò. ri. gi. **nà**. li. t´ät 'original', 'originality'
('L L) L ('L L) L ('L L)

[30] Candidates which parse ('HL) feet, as, e.g., *(Àu.to).de.(tèr.mi)(.nís.mus)* have not been considered here, since they violate the ITL, the constraint against uneven trochees, which is assumed to be ranked above PARSEσ. Note, however, that even if we allowed for ('HL) feet, this would not change the general argument that in this context heavy syllables do attract stress in spite of violating left alignment of all feet.

[31] ALL-FT-L violations of the main stress foot are not counted here.

The main stress of *Ò.ri.gi.**nál*** is preserved as a secondary stress in *Ò.ri.gi.**nà**.li.t´ät*, although this means that the second foot is aligned worse to the left edge of the prosodic word than it would be in a word of similar structure where stress preservation is not at stake (cf. (9)). The tableau shows the interaction between PK-MAX (B/O) and ALL-FT-L:

Base: Ò.ri.gi.**ná l**	PK-MAX (B/O)	PARSE σ	ALL-FT-L
☞ (a) (Ò.ri).gi.(**nà**.li).(t´ät)		*	σσσ
(b) (Ò.ri).(gì.**na**).li.(t´ät)	*!	*	σσ

Tableau 5

Both candidates rate equally well on PARSEσ, but only (a) satisfies the constraint requiring that a stress peak of the base be also a stress peak in the derived word. (b), who fails on this requirement, must lose, although its second foot misses left alignment only by two syllables.

We see that the predicted implication is borne out: when constraints lower ranked than the WSP are at stake stress preservation can be enforced at the cost of violating them.

Now let us consider an implication involving constraints higher ranked than PK-MAX (B/O):

(44) If ALIGN (PRWD, L, FT, L) >> PK-MAX (B/O)
and RIGHTMOST >> ALIGN (PRWD, L, FT, L)
then RIGHTMOST >> PK-MAX (B/O)

If this implication holds, then stress preservation should not occur at the cost of violating the regularities of main stress assignment. Tableau 3 has made clear that ALIGN (PRWD, L, FT, L) dominates PK-MAX (B/O). Examples with an initial light syllable followed by main stress show that ALIGN (PRWD, L, F T, L) itself can be violated when the requirements of main stress assignment make it necessary:

(45) E. lán 'spirit'
L ('H)

As mentioned before, main stress placement is not entirely predictable in German loanwords, it can fall on one of the last three syllables of the word. I take *Elan* to belong to the class of loan-words where main stress falls on the head of a final trochee, that is a class of words where the requirement of main stress to be final is not dominated by any constraint requiring final

syllables to be unstressed.[32] Thus, in this case the constraint RIGHTMOST can be defined without further provisions as an alignment constraint requiring the right edge of a prosodic word to be aligned with the right edge of its head.

(46) RIGHTMOST = ALIGN (PRWD, R, HEAD (PRWD), R)
∀ prosodic word ∃ head of the prosodic word such that the right edge of the prosodic word and the right edge of the head coincide (cf. EDGEMOST, Prince & Smolensky 1993)

In example (45), a secondary stress on the first syllable (candidate (d) in the following tableau) would violate all the high ranked stress pattern constraints. Building a degenerate foot out of the initial syllable would violate FT-BIN and creating a clash with the main stress would violate the constraint *CLASH. There would, however, be a possibility to build a trochee at the left edge of the prosodic word without violating these constraints: main stress could be assigned directly to the first syllable of the word. Since this option is not chosen we must conclude that main stress assignment overrides the requirement of aligning a trochee to the left edge of the prosodic word. In tableau 6 below, candidate (a) wins because it is the only one that satisfies the high-ranked stress pattern constraints, including RIGHTMOST. (b) would satisfy the requirement of a trochee at the left edge of the prosodic word but fails because of misalignment of the main stress with the right edge of the prosodic word. There would be another possibility of satisfying all the constraints discussed so far, illustrated by candidate (c) that parses an iamb, a parsing that would be compatible with the observed output form. If this was the correct foot structure of the word, the constraint TROCH would have to be ranked below RIGHTMOST and ALIGN (PRWD, L, FT, L). But such a ranking would leave open the possibility to create iambs whenever RIGHTMOST wants to be satisfied, for example also by placing main stress on final light syllables, a case unattested in German (cf. Alber 1997b).

Candidates	*CLASH	FT-BIN	TROCH	RIGHT-MOST	ALIGN (PRWD, L, FT , L)
☞ (a) E.(lán)					σ
(b) (É.lan)				σ!	
(c) (E.lán)			*!		
(d) (È).(lán)					

Tableau 6

[32] The word *Bál.kan*, with stress on the first syllable would be an example for the class of words where it is more important to satisfy a constraint of the NONFINALITY type, requiring final syllables to be unstressed, than to assign stress to the rightmost syllable.

In order to see if the implication in (44) holds, we must show that stress preservation does not occur at the cost of a RIGHTMOST violation. Up to now we have not distinguished between preservation of a main stress of the base as secondary stress and preservation of the main stress as main stress. Pater (1995) discusses this problem of weak versus strong stress preservation and proposes for English to treat the constraint responsible for stress preservation as a gradient constraint. In his analysis the stress preservation constraint is violated twice if stem stress is preserved neither as main stress nor as secondary stress, but only once if the main stress of the base is preserved as a secondary stress. We can then see that perfect stress preservation is not possible in stems suffixed by *-ität* because this would mean to shift main stress away from the final syllable. We can take as an example a case of weak stress preservation such as

(47) ù.ni.ver.**sál** → Ù. ni. ver. **sà** . li. t´ät 'universal', 'universality'
'L L H 'L L

Base: ù.ni.ver.**sál**	RIGHT-MOST	ALIGN (PRWD, L, FT, L)	PK-MAX (B/O)	WSP
☞ (a) (Ù.ni).ver.(**sà**.li).(t´ät)				*
(b) (Ù.ni).(vèr).**sa** .li.(t´ät)				
(c) (Ù.ni).ver.(**sá**.li).(t`ät)	σσ!			*

Tableau 7

If we treat PK-MAX (B/O) as a gradient constraint, the winning candidate (a) incurs one violation, because it preserves stem stress only as secondary stress. However, this is better than not preserving stress at all, as in (b). Candidate (c), finally, would be a case of perfect stress preservation, where main stress is preserved as main stress in the derived word. This is no option, though, because it would mean that the syllable bearing main stress is misaligned by two syllables with respect to the right edge of the prosodic word. Thus the implication in (44) holds: no stress preservation is possible at the cost of a constraint like RIGHTMOST that is higher ranked than ALIGN (PRWD, L, FT, L).[33]

We find more evidence for the correctness of this implication, if we turn to another type of suffixes which, like - *ität*, attract main stress, but consist only of one syllable as, e.g., the verb

[33] Note, though, that the argument outlined here holds only, if we attribute strong and weak stress preservation to the effects of the same constraint. Ultimately, it could be necessary to postulate two separate constraints, one requiring the identity between stress peaks in general and one for the preservation of the role that a stress peak plays in the prosodic structure of a word, i.e., the status of head of the prosodic word in the case of main stress. But for the English cases Pater discusses and for the examples here there is no evidence for this distinction and therefore this alternative has not been pursued.

forming suffix *-ier*. The interesting case is the one where *- ier* attaches to a stem bearing final main stress, as, e.g., in

(48) Kà. ta. **púlt** → kà. ta. **pul**. tíert 'catapult', 'launched with a catapult'
('L L) ('L L) H

An elegant means to preserve stress without creating a clash with the final main stress would be to simply assign main stress to the third, instead of the final syllable as in

(49) *kà.ta. **púl**. tiert

This would even preserve the prosodic head of the base as such. But again stress preservation is no option here, because of the ranking of RIGHTMOST over PK-MAX (B/O).

As a last example I will consider the interaction between the constraint TROCH and stress preservation. In the hierarchy proposed for German TROCH is ranked above RIGHTMOST. Thus the following implication must hold:

(50) If TROCH >> RIGHTMOST and RIGHTMOST >> PK-MAX (B/O)
then TROCH >> PK-MAX (B/O)

We have just shown that RIGHTMOST dominates the constraint responsible for stress preservation. The domination relation between TROCH and RIGHTMOST can be seen in words with a final light syllable and stress on the penult:

(51) Ès. pe. rán. to 'esperanto'
('H) L ('H) L

In principle, the best way to satisfy RIGHTMOST would be to assign stress to the final syllable in these cases. But main stress never falls on a final light syllable in German. This means that main stress must be assigned close to the right edge of the prosodic word, but not at the cost of parsing a final iamb (candidate (c)) or a degenerate foot (candidate (b)). Hence both FT-BIN and TROCH must be ranked above the constraint determining the assignment of main stress, as we can see in the following tableau:

Candidates	FT-BIN	TROCH	RIGHTMOST
☞ (a) Es.pe.(rán).to			σ
(b) Es.pe.ran.(tó)	*!		
(c) Es.pe.(ran.tó)		*!	

Tableau 8

Now let us consider what the high ranking of TROCH means for stress preservation. Above I discussed the lack of stress preservation in the case of

(52) lo.yál → Lò. ya. li. t´ät 'loyal', 'loyalty'

In tableau 3 we showed that ALIGN (PRWD, L, FT, L) dominates PK-MAX (B/O). But we did not consider a dangerous candidate which could satisfy both ALIGN (PRWD, L, FT, L) and PK-MAX (B/O), the candidate where an initial iamb is parsed, as in (c) below:

Base: lo.**yál**	TROCH	ALIGN (PRWD, L, FT, L)	PK-MAX (B/O)
(a) Lo.(**y à.**li).(t´ät)		*!	
☞ (b) (Lò.**ya**).li.(t´ät)			*
(c) (Lo.**y á**).li.(t´ät)	*!		

Tableau 9

The fact that this candidate fails as well shows us, that stress preservation cannot be obtained at the cost of a TROCH violation.

In sum, the implications above show how the constraint responsible for stress preservation interacts with some of the stress pattern constraints of the language. We have shown that it is dominated by such constraints as ALIGN (PRWD, L, FT, L), RIGHTMOST and TROCH and hence can be violated when it conflicts with them. On the other hand stress preservation takes place even when this leads to violation of lower ranked constraints such as the WSP and ALL-FT-L.

This analysis thus predicts a precise pattern of stress preservation with stress attracting suffixes like *-ität*. Stress preservation will be of the weak type, i.e., main stress, if preserved, will be preserved as secondary stress. Feet will be trochaic and consist of either two moras or two syllables also in morphologically complex words. Provided that no stress clash with the attaching suffix arises, the predicted cases of stress preservation are as follows:

- stress preservation will not take place when the stem's main stress falls on the second syllable. (Align (PrWd, L, Ft, L) is satisfied at the cost of Pk-Max (B/O))

(a) [σ́σ → [[`σ.σ_ σ ´σ] cf. (10)

- stress preservation takes place in all other cases. (ALIGN (PRWD, L, FT, L) is satisfied, WSP, ALL-FT-L and PARSEσ may be violated)

(b) [´σ → [[`σ ....] σ ´σ] cf. (12)

(c) [`σσ ... ´σ → [[`σσ ... `σ ....] σ ´σ]

e.g. [`σσ ´σ → [[`σσ `σ] σ ´σ] cf. (13)
[`σσ σ ´σ →[[`σσ σ `σ] σ ´σ] cf. (6)

As a final note I want to give an outlook on the possibilities that an analysis based on violable constraints offers for crosslinguistic comparison. It is striking that while English, just as German, seems to have a constraint requiring initial syllables to bear secondary stress, it does preserve stem stress at the cost of violating this constraint. Compare the two examples given at the beginning of this paper. Stress falls on the initial syllable of the underived

(53) Tà.ta.ma.góu.chi

but, because of stress preservation, on the second syllable of *originality*:

(54) o.**rí**.gi.nal → o.**rì**.gi.ná.li.ty

The reason for this differing behavior resides in the fact that the constraint ALIGN (PRWD, L, FT, L), differently from German, is bottom-ranked in English. In fact, as Pater (1995) shows, it is dominated by a number of constraints as, e.g., the WSP:

(55) WSP >> ALIGN (PRWD, L, FT, L)
(cf. Pater 1995)

Thus, while ALIGN (PRWD, L, FT, L) can show its force in words with a pretonic string of light syllables, as in *Tatamagouchi*, it will be violated when the second syllable is heavy:

(56) Mo.nòn.ga.hé.la

One of the constraints dominating ALIGN (PRWD, L, FT, L) is the faithfulness constraint requiring identity between morphologically related forms (STRESSIDENT, in Pater's terminology):

(57) STRESSIDENT >> ALIGN (PRWD, L, FT, L)
(Pater 1995)

Hence the requirement of initial secondary stress is given up in *o.rì.gi.ná.li.ty* in order to preserve stem stress. This does not mean, however, that stress is preserved across the board in English. Just as in German, the stem's main stress is preserved only as a secondary stress, [34] showing that the requirements of main stress assignment are more important than perfect preservation of stem stress. In Pater's work ALIGN (PRWD, R, HEAD(PRWD), R) is the constraint responsible for main stress assignment:

(58) ALIGN (PRWD, R, HEAD(PRWD), R) >> STRESSIDENT
(Pater 1995)

Summarizing, stress preservation is nonuniform, both in German and in English. The differences between the two languages can be explained by the differing overall stress pattern: in German the requirement of initial stress is high-ranked and dominates faithfulness to the stem stress, in English the same requirement is low ranked and dominated by faithfulness.

4. Conclusions

The case of stress preservation in German loan words suffixed by *-ität* makes clear some of the advantages of treating preservation of stem stress as the result of a violable faithfulness constraint and thus gives support to recent analyses of the phenomenon in these terms. Stress preservation in this subpart of the lexicon is context-specific: it occurs only where high ranked stress pattern constraints are observed, but not where they would be violated. A comparison of the predictions made by this model with respect to the predictions of a rule-based analysis makes clear that the former approach is more restrictive in that the interactions between the faithfulness constraint and the stress pattern constraints can be only of a certain type: stress preservation is predicted to respect the hierarchy established for underived words. Moreover, once we have placed the faithfulness constraint PK-MAX (B/O) in some intermediate position of the constraint hierarchy (below ALIGN (PRWD, L, FT, L), but above the WSP), we can show that it interacts in the predicted way with other stress pattern constraints such as ALL-FT-L,

[34] This is true for level I suffixes like *-ity*.

RIGHTMOST and TROCH. Stress preservation thus is closely linked to the principles that determine stress assignment, a result that cannot be easily obtained in a system based on the application of rules.

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