Weak Edges and Final Geminates in Swiss German

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1. Introduction

A fundamental property of geminate consonants, geminates for short, is that they contribute to syllable weight in a similar manner than does vowel length. This property is expressed directly in a theory that treats geminates as consonants associated with an underlying mora (Prince 1980, McCarthy & Prince 1986, Hayes 1989). This paper defends the view that underlying moraicity is in fact the only distinguishing characteristic of geminates. This analysis has repercussions for the status of 'extrametricality' and the representation of appendices. The core of the proposal is a constraint, a rough approximation of which is given in (1).

(1) WEAKEDGE (informal)

The right edge of a prosodic constituent should be weak

In particular it will be shown that this constraint accounts for the preference of certain elements in edge position. For example non-moraic consonants are preferred to moraic ones. A constraint conflict arises when other constraints require moraic consonants to be in peripheral position. Such a situation arises in Glarnertüütsch (henceforth GT), a Swiss German dialect spoken in the Canton of Glarus, which has word final geminates. These are illustrated in (2)[1].

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[1] A note on the transcription of vowels. I will be using ä, ö, Ü and ü for the umlauted counterparts of a, o, U and u respectively. Orthographic ö, Ü and ü stand for the front round vowels ø, Y and y, while ä is the low front vowel æ.

(2)	**xäpp**	'Casper (name)'
	bett	'bed'
	rokk	'dress'
	ʃIff	'ship'
	ross	'horse'
	bUʃʃ	'bush'
	taxx	'roof'
	tUppf	'spot'
	xatts	'cat'
	mUttʃ	'type of bread'
	lamm	'lamb'
	haŋŋ	'slope'
	ball	'ball'

These geminates interact with a vowel lengthening process in a way which, at first sight, seems problematic for the moraic theory of geminates, but in fact can be shown to be a strong argument for the moraic conception of geminates, once we adopt an analysis in the framework of Optimality Theory (Prince & Smolensky 93).

2. GT Monosyllabic Noun Lengthening

Vowel length alternations are found in GT in certain monosyllabic nouns, which have a long vowel in the singular, but a short vowel in the plural and the diminutive (Streiff 1915). Examples of this process are given in (3)[2]. A similar example which shows the short vowel only in the diminutive is given in (4).

	singular	plural	diminutive	gloss
(3)	raad	redər	redlI	'wheel'
	graab	grebər	greblI	'grave'
	wIIs		wIslI	'meadow'
	haas	hasə	häslI	'rabbit'
	jUUd	jUdə		'Jew'
(4)	ʃlaag	ʃleeg	ʃleglI	'hit/blow' ('stroke')

This alternation can best be interpreted as a case of lenghtening, with the proposed underlying forms for the items in (3 & 4) as shown in (5).

(5)	/rad/	/wIs/	/jUd/
	/grab/	/has/	/ʃlag/

The conditions under which lengthening occurs are all and only those cases where the forms are monosyllabic. Whenever they become polysyllabic through affixation they preserve the short vowel. The crucial case here that shows this is *ʃleeg* 'blows', since it is exactly in this case, where the plural form is not marked with a suffix leaving it monosyllabic, that a plural form shows a long vowel. Whenever the stem receives a suffix, making it polysyllabic, such as in *redər* 'wheels', the stem vowel is short. The restriction of lengthening to monosyllabic words seems to indicate that such items are 'too short' and the lengthening can be interpreted as the enforcement of a minimal length requirement on GT words. The items that undergo lengthening are all of the type C_0VC. Assuming the last consonant is extrametrical, they consist of a single light, i.e., monomoraic, syllable, and can therefore not constitute a foot without augmentation. This length

[2] The change in vowel quality in these examples is due to a morphologically governed, and slightly idiosyncratic umlaut process. Umlaut has no effect on the vowel length, and can therefore be disregarded with respect to the problems discussed here.

requirement is therefore an instance of the minimal prosodic word in the sense of McCarthy and Prince (1986), which requires that a prosodic word be a bimoraic foot.

That this is indeed the correct analysis is supported by a number of facts. First there are no surface forms that are monosyllabic with a short vowel and a simple, i.e., non geminate, final consonant. In other words there are no forms such as those shown in (6), which contrast minimally with those in (3 & 4) above.

(6) * rad * grab * jUd * ʃlag

Further there are examples with long vowels that do not alternate, shown in (7). These examples make it clear that an explanation of the length alternation as a shortening process is not possible.

(7)	**singular**	**plural**	**diminutive**	**gloss**
	raat	räät	räätlI	'councilman'
	taag	tääg	täägII	'day'
	huus	hüüsər	hüüsII	'house'

Finally, the account proposed above relies crucially on the notion of final consonant extrametricality, and the fact that the examples under consideration all had only a single coda consonant. It is therefore expected that nouns with final consonant clusters should not undergo lengthening, and indeed they do not. For example:

(8)	**singular**	**diminutive**	**gloss**
	xraft	xreftlI	'strength'
	gUmp	gÜmplI	'jump'
	xrants	xräntslI	'wreath'

As these examples show, nouns with a short vowel followed by a consonant cluster keep the short vowel in their monosyllabic singular forms as well as in the polysyllabic diminutive. In this respect words with final geminates pattern with consonant clusters.

(9)	**singular**	**diminutive**	**gloss**
	brätt	brättlI	'board'
	ʃlUkk	ʃlÜkklI	'gulp, swallow'

The generalization which emerges is that lengthening of the vowel in a monosyllabic word in GT occurs when a short vowel is followed by a simple consonant. When the vowel is followed by more than one consonant, such as the cluster /ft/ in *xraft* 'strength' or the geminate /tt/ in *brätt* 'board', lengthening does not occur. This is exactly what the analysis predicts, since in case the word has a long vowel, or a short vowel followed by a consonant cluster, making the final consonant extrametrical will leave the remaining syllable heavy, i.e., at least a CVV or a CVC syllable. But in case the word has a short vowel followed only by a simple consonant, making the last C extrametrical will result in a light, i.e., monomoraic, syllable. The examples relevant to this account are summarized here in (10).

(10) ra<d> raa<t> brät<t> xraf<t>

Critical to this analysis is that the final segment in *brätt*, a geminate, is treated effectively as two segments. Therefore if the final consonant is made extrametrical the syllable will still have a coda consonant making it a heavy syllable. If the final /t/ is extrametrical in a form like *raat* the result still has a long vowel and the syllable is bimoraic, while in the form *xraft* the result is a heavy CVC syllable. Only in *rad* is the resulting syllable monomoraic.

The situation in GT is essentially the same as in Ponapean (Levin 1989, McCarthy 1984). In Ponapean there is an alternation in the length of the vowels of certain 'short' nouns.

Some nouns which have a short vowel in suffixed forms, show a long vowel in the corresponding free form. This can be seen in the examples in (11) taken from Levin (1989).

(11) **Ponapean**

	base	free form	gloss
a.	sali-	saal	'rope'
	sap^{w}ɛ-	saap^{w}	'land'
	p^{w}oŋe-	p^{w}ooŋ	'night'
b.	(i)nsar-	(i)nsar	'snare'
	aramas-	aramas	'person'
c.	ɛmpi-	ɛmp	'coconut crab'
	mall-	mall	'grassy area'

The standard analysis of these cases relies on a general process of final vowel deletion which is operative in Ponapean. If the remaining stem after truncation is of type CVC, the result undergoes lengthening, as can be seen in (11a). Vowels in longer words do not lengthen, as shown in (11b). Note that the /n/ in *nsar* 'snare' is moraic, making the word bimoraic, and arguably even disyllabic, since there is optional epenthesis word initially as well in such cases. Words with final clusters, including geminates, pattern with the latter, as can be seen in (11c). Again this can be analyzed as lengthening of monomoraic nouns after final consonant extrametricality.

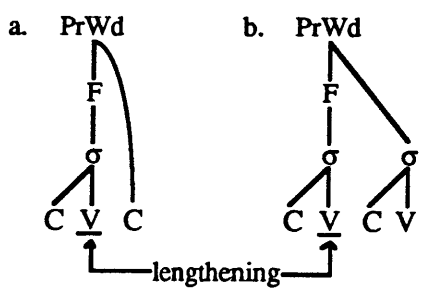
3. An Optimality Analysis

The immediate question that arises when trying to capture the content of the above analysis in Optimality Theory is that of how to express extrametricality. The intuition behind extrametricality is that material at the edge, typically the right edge, should be exempt from assigned structure, in other words that the right edge should be structurally weak. A constraint which relates to this issue and that has been discussed in the OT literature is that of NONFINALITY from P&S, given in (12).

(12) NONFINALITY (Prince & Smolensky 1993, p.52)
No head of PrWd is final in PrWd

P&S use NONFINALITY to account for the recurring pattern of penultimate stress, a pattern that is standardly analyzed as involving 'final syllable extrametricality.' That NONFINALITY can be used to account for final consonant extrametricality as well can be seen in the diagram in (13a) (Itô, Mester, McCarthy classnotes). Assigning prosodic structure to a word of the shape CVC in the most straightforward manner would lead to a violation of NONFINALITY, since the only foot of the word will be in final position. One way to avoid this is by excluding the final C from the foot thereby making the head foot non-final in the prosodic word. But then the remaining material, the CV, will need to augment, e.g. by lengthening, in order to comply with the requirement of foot binarity. A similar idea has been proposed by Hung (1993) to account for the lengthening of the first syllable in CVCV words in certain languages (13b).

(13)



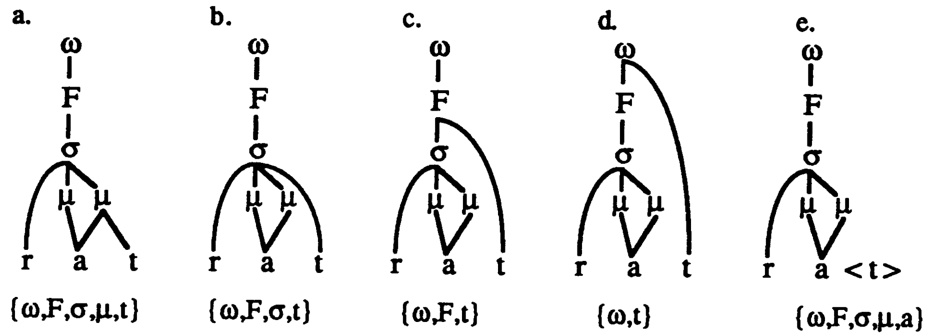
A nice aspect of this analysis is the fact that no new constraints need to be introduced, since it relies on a constraint, NONFINALITY, which is independantly necessary and motivated. It should however be noted that NONFINALITY is essentially the statement of an observation. I will therefore propose a different constraint of more general scope than NONFINALITY, which I will call WEAKEDGE. I will than show how NONFINALITY can be seen to be a special case of WEAKEDGE. In addition I will discuss how WEAKEDGE might ultimately be reduced to other principles and therefore not constitute a separate constraint of its own. In order to be in a position to formulate WEAKEDGE the following definition is necessary:

(14) Def: <u>the Right Periphery of node *n*</u> is the set of all nodes *m* such that *n* dominates *m*, and there is no node *m'* such that *n* dominates *m'*, and *m* precedes *m'*.

The intuitive force of this definition is that it will yield for any given tree structure the set of nodes that constitute the right edge of the structure. With this notion WEAKEDGE can now simply be stated as in (15).

(15) WEAKEDGE (P-CAT)
The right periphery of P-Cat should be empty

The effects of WEAKEDGE are best illustrated by looking at an example. In (16) are a few of the possible candidate structures for *raat* 'councilman'. Indicated immediately below each structure in set braces is the right periphery for that structure.

(16)


Although (a) and (b) include the segment /t/ in prosodic structure in a way consistent with the Strict Layer Hypothesis (Selkirk 1984), (c) and (d) will clearly also be among the candidate set produced by GEN. If we compare the four candidates with respect to their right periphery as defined earlier, we note that the right periphery of (d) contains the least amount of structure, and is therefore the most harmonic with respect to WEAKEDGE.

A crucial point is also that WEAKEDGE refers to the *prosodic* structure. Consider for example the candidate (e), where the final /t/ is not parsed. Since the segment /t/ is not included in the prosodic structure, it is irrelevant in the determination of the right periphery of candidate (e). In fact, candidate (e) has the right periphery given above, and is therefore considerably less harmonic than candidate (d) with respect to WEAKEDGE. From this it should be clear that WEAKEDGE does not in and of itself lead to a preference for underparsing.

A further point that becomes clear from this discussion is that since every candidate has a right periphery, every candidate will also incur some violation of WEAKEDGE. WEAKEDGE can therefore not constistute a constraint that simply judges success or failure, but instead must be seen as a case of Minimal Violation such as EDGEMOST (Prince & Smolensky 1993) for infixation in Tagalog etc., or Alignment (McCarthy & Prince 1993b) for directionality of footing, syllabification, etc. The main difference to the latter cases, which involve minimal violation of alignment constraints and are horizontal in nature, is that WEAKEDGE is an instance of minimal violation that focuses on the vertical minimization of hierarchical structure. It therefore constitutes a case of *Hierarchical Minimal Violation.*

There are other constraints that interact with WEAKEDGE in order to account for the complete pattern of GT Noun Lengthening. For ease of presentation they can be divided into three groups: the first group consists of those constraints that limit the basic types of permissible structure, the second group enforces the 'minimal word effect' and the third group includes the constraints termed 'faithfulness constraints' by P&S i.e., those that demand that the output deviate as little from the input as possible.

Turning then to the first group, the constraints that limit the permissible prosodic structures, it was seen that WEAKEDGE by itself will generally prefer as little structure as possible. If zero structure is not the the default situation, then clearly some other constraints must be enforcing some minimal requirements on prosodic structure. These requirements have summarily been called the Prosodic Hierarchy (Selkirk 1978, Nespor & Vogel 1982, McCarthy & Prince 1986, Zec 1988, Inkelas 1991), the standard conception of which is given in (17).

(17)

$$\begin{array}{c} \omega \\ | \\ F \\ | \\ \sigma \\ | \\ \mu \\ | \\ \text{Seg} \end{array}$$

As it is stated in (17), the Prosodic Hierarchy represents an entire collection of statements, such as the types of nodes that are necessary for a licit prosodic structure, as well as how they are layered. It is unlikely that all of these statements comprise a single constraint, say PROSHIER, to be ordered among the other constraints. Instead (17) should probably be the result of a number of different constraints ordered more or less individually. A possible way of conceptualizing this is by breaking (17) up into a number of local hierarchies, i.e. ω domintes F, F dominates σ, and so on. In the form of a constraint schema this can be formalized as in (18).

(18) PARSE-(P-CAT$_1$)-IN-(P-CAT$_2$) (cf. Itô & Mester 1992, also Selkirk 1993)
all instances of a prosodic category (P-CAT$_1$) must be dominated by instances of prosodic category (P-CAT$_2$)

Specifically (18) is instantiated as the family of constraints given below. Interestingly this approach, together with the notion of constraint violability, also addresses the question whether the Prosodic Hierarchy requires absolute inclusion of each layer within the next higher one, so called strict layering, or not. Under this view strict layering is the result of fulfilling all the constraints in (19) maximally. It is an ideal rather than an absolute target. In other words, strict layering is a violable constraint.

(19) PARSE-F-IN-ω
all F must be dominated by ω
PARSE-σ-IN-F
all σ must be dominated by F
PARSE-μ-IN-σ
all μ must be dominated by σ
PARSE-C-IN-σ
all C must be dominated by σ

PARSE-V-IN-σ
all V must be dominated by σ

Not all the constraints in (19) are obeyed equally. For example PARSE-σ-IN-F is quite commonely violated, while others are observed more strictly. This analysis assumes that, in particular, PARSE-μ-IN-σ is ranked fairly high, while PARSE-C-IN-σ is ranked lower.

Turning next to the 'minimal word effect' that is the requirement that a lexical item be minimally bimoraic. P&S (see ch.4, cf. also Mester to appear, etc.) show that this can be interpreted as the result of a series of constraints acting together. The constraints included in this group are Foot Binarity (FTBIN) and the requirement that a lexical word must also be a prosodic word (LX $\approx$ PR) among others. The formulations here are taken from P&S.

(20) **LX $\approx$ PR** (*MCat*), (Prince & Smolensky 1993, p.43)
A member of the morphological category *MCat* corresponds to a PrWd.

(21) **Foot Binarity** (FTBIN), (Prince & Smolensky 1993, p.47)
Feet are binary at some level of analysis (μ, σ).

These constraints are argued to be at the top of the constraint hierarchy undominated (P&S ch 4). Note that these two conditions, together with the hierarchy in (17), have the effect of requiring that a word be minimally bimoraic.

The final group of constraints necessary for the analysis are the faithfulness constraints (P&S), which generally require that the output be maximally similar to the input. These constraints come in two types: PARSE and FILL (see P&S for discussion). Since the phenomena discussed here are length alternations, the relevant PARSE constraint is PARSE-μ given here in (22). For the FILL constraint I will adopt the formulation from McCarthy (1993b) given in (23).

(22) **PARSE μ**
All underlying moras must be parsed.

(23) **M-MORA** (McCarthy 1993b) corresponds to FILL of Prince & Smolensky 1993
Every mora belongs to a morpheme

A point that needs some clarification is what is meant by 'belongs to a morpheme'. For the purposes here I will assume this to mean: licensed by underlying material. This can be understood as dividing into two cases: the first is that of a mora which is underlyingly specified. For example a long vowel licenses two moras rather than the usual one, and similarly a geminate consonant licenses a mora as well. The second case is licensing by position. This occurs when a segment is included in a syllable following a nucleus (so called 'Weight by Position', Hayes 1989). The complete ranking of the constraints discussed so far is given in (24). Explications of the particular rankings will be given in conjunction with the relevant tableaux.

(24)
$$\left.\begin{array}{c}\text{FTBIN}\\ \text{PARSE-}\mu\\ \text{PARSE-}\mu\text{-IN-}\sigma\end{array}\right\} \gg \text{WEAKEDGE} \gg \left\{\begin{array}{c}\text{M-MORA}\\ \text{PARSE-C-IN-}\sigma\end{array}\right.$$

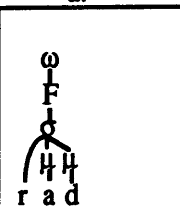
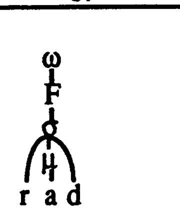
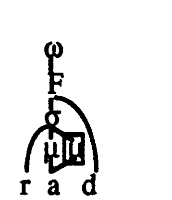
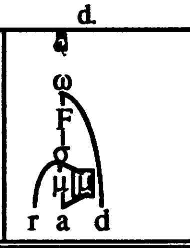
Turning to the analysis of the GT data, we note that the moraic conception of geminates does provide distinct underlying representations for all the crucially distinct forms. Adopting the moraic analysis proposed in Hayes (1989), the underlying forms for the monosyllabic nouns given in (10) are as seen here in (25).

(25)

Following Hayes all vowels are marked underlyingly with a mora. Long vowels, as in the second example *raat* 'council', are assigned two moras, while geminates, as in the third example *brätt* 'board', are also assigned a mora. This enables all the necessary distinctions to be made.

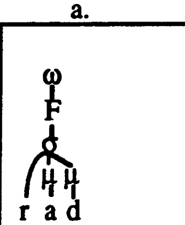
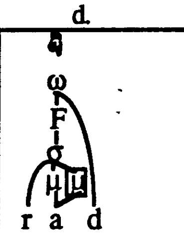
Considering the first case, that of the C^0VC words which undergo lengthening, (26) shows how the relevant candidates for the word *rad* 'wheel' are evaluated by the constraint WEAKEDGE. As was seen earlier, the most harmonic candidate with respect to WEAKEDGE will be the one that links the final /d/ directly to the prosodic word. This is exactly the desired situation since (26d) is in fact the output.

(26)[3]

	a.	b.	c.	d.
				
WEAKEDGE	ω,F!,σ,μ,d	ω,F!,σ,d	ω,F!,d	ω,d

The fact that (d) is the winning candidate immediately tells us something about the necessary constraint rankings. Note that (d) contains a mora without morphemic affiliation (boxed in the above representation), thereby violating M-MORA. Also the fact that the final /d/ is directly dominated by the prosodic word, bypassing intermediary constituents leads to a violation of the 'prosodic hierarchy constraints', in particular PARSE-C-IN-σ. At the same time the candidate (a) does not violate either of these constraints. This entire situation can be summarized in a tableau, given here as (27).

(27)

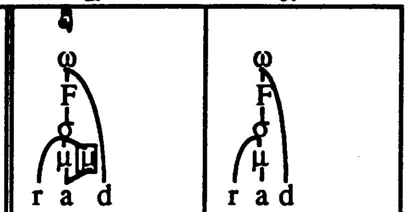
	a.	d.
		
WEAKEDGE	ω,F!,σ,μ,d	ω,d
M-MORA		*
PARSE-C-IN-σ		*

[3] Cautionary note: the following tableaux have the candidates along the horizontal axis and the constraints arranged vertically in contrast to the standard of Prince &Smolensky 1993.

The fact that (d) violates both M-MORA and PARSE-C-IN-σ, while still winning out over candidate (a) tells us that both of these constraints must be ranked below WEAKEDGE.

There are of course further candidates which need to be considered as well. Tableau (28) compares (d) with a candidate (e), identical in all respects except that the vowel is not lengthened. Such a candidate will of course have a foot consisting of a light syllable and therefore violate Foot Binarity. From this it can be determined that Foot Binarity must dominate M-MORA at least.

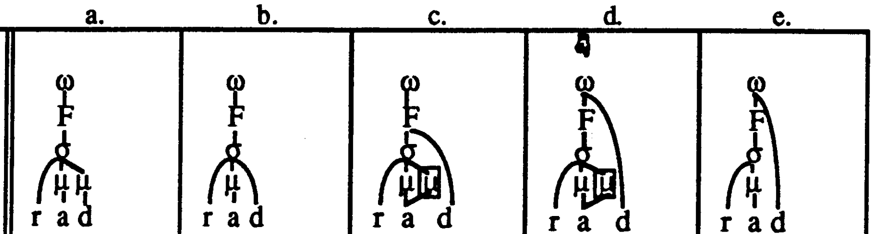
(28)



	d. ☞	e.
FTBIN		*!
WEAKEDGE	ω,d	ω,d
M-MORA	*	

A summary of all the candidates discussed so far, and their evaluation on all the relevant constraints, is given in the tableau in (29).

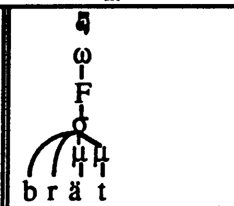
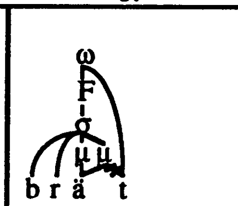
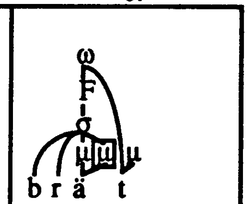
(29)



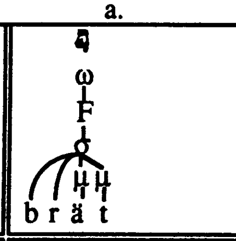
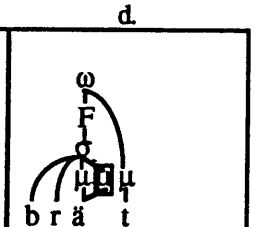
UR: μ r a d	a.	b.	c.	d. ☞	e.
FTBIN		*!			*!
PARSE-μ					
PARSE-μ-IN-σ					
WEAKEDGE	ω,F!,σ,μ,d	ω,F,σ,d	ω,F!,d	ω,d	ω,d
M-MORA			*	*	
PARSE-C-IN-σ			*	*	*

Moving on to the form *brätt* 'board', which has a word-final geminate, we can immediately apply the rankings that have been determined so far. In addition some further constraint rankings can be determined.

Tableau (30) shows some of the relevant candidates. Here the winning candidate is (a) which includes the final /t/ in the syllable, as opposed to (b) and (c) where the /t/ is directly dominated by the prosodic word. As a result (b) and (c) are both more harmonic with respect to WEAKEDGE. The crucial difference in this case, as opposed to that of *rad*, is that here the /t/ is underlyingly moraic. The structures in (b) and (c) are therefore only possible if this underlying association is disrespected, that is they constitute violations of the constraint PARSE-μ. This case then constitutes a ranking argument that PARSE-μ dominates WEAKEDGE. It is interesting to compare (30a/c) with the minimally different pair (27a/d). The underlying mora in (30) makes all the difference

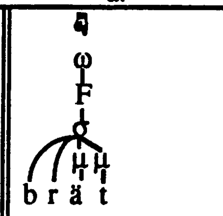
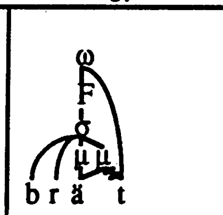
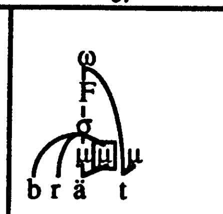
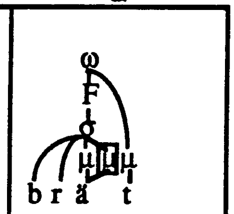
(30)	a.	b.	c.
			
PARSE-μ		*!	*!
WEAKEDGE	ω,F,σ,μ,t	ω,t	ω,t
PARSE-C-IN-σ		*	*

A further important candidate pair to consider is that given in (31). Candidate (d) rather than violating the underlying moraicity of the /t/ simply attaches the moraic /t/ directly to the prosodic word. The problem with this, however, is that it violates the prosodic hierarchy, albeit a different aspect than that discussed earlier. Here the violation is that of not including a mora properly within a syllable. In other words (d) violates PARSE-μ-IN-σ, and this situation provides an argument for ranking PARSE-μ-IN-σ above WEAKEDGE.

(31)	a.	d.
		
PARSE-μ-IN-σ		*!
WEAKEDGE	ω,F,σ,μ,t	ω,μ,t
M-MORA		*

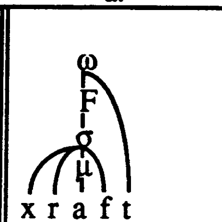
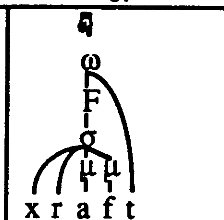
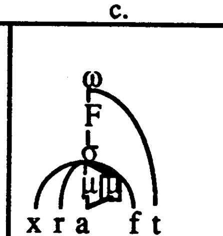
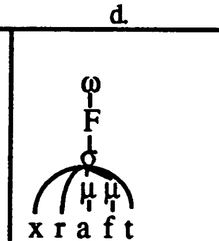
Again the candidates discussed are all summarized in the tableau in (32).

(32)

	a.	b.	c.	d.
UR: μ μ b r ä t				
FTBIN				
PARSE-μ		*!	*!	
PARSE-μ-IN-σ				*!
WEAKEDGE	ω,F,σ,μ,t	ω,t	ω,t	ω,μ,t
M-MORA			*	*
PARSE-C-IN-σ		*	*	*

Finally in (33) is the set of the relevant candidates of the example *xraft* 'strength', which has a final consonant cluster. Here the ranking of the constraints that was determined to account for the two previous cases, is completely sufficient and correctly predicts (b) the winning candidate.

(33)

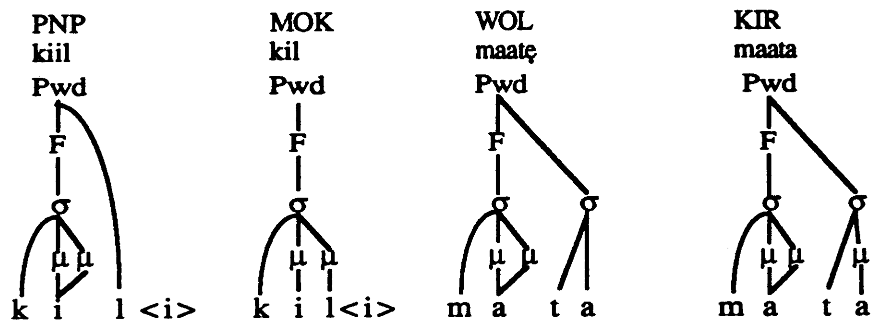
	a.	b.	c.	d.
UR: μ x r a f t				
FTBIN	*!			
PARSE-μ				
PARSE-μ-IN-σ				
WEAKEDGE	ω,t	ω,t	ω,t	ω,F!,σ,t
M-MORA			*!	
PARSE-C-IN-σ	*	*	*	

This case brings out another interesting aspect of Optimality Theory, the fact that what counts as optimal is decided relative to a set of candidates of the same form. This is demonstrated by the fact that, in contrast to this set, in the case of *rad*, the candidate that underwent vowel lenghtening was the optimal one.

4. Further cases: the Micronesian languages

Having considered the GT case in detail it is interesting to take another look at Ponapean and some closely related Micronesian languages. As was noted earlier Ponapean exhibits the same type of lengthening pattern as does GT, modulo the further complication of final vowel deletion. In fact other closely related Micronesian languages display similar patterns. Notably Woleaian and Kiribati also show lengthening, while Mokilese exhibits final vowel deletion. An excellent discussion of the variation across the languages is found in Rehg (1984). The interesting case for comparison between the four languages is the different realization of underlying CVCV words. In Ponapean (PNP) the first vowel is lengthened, while the final vowel is deleted. In Mokilese (MOK) there is final vowel deletion without the lengthening. Both Woleaian (WOL) and Kiribati (KIR) have lengthening without deletion, but in Woleaian the final vowel is voiceless. The analysis that derives these forms from underlying CVCV items mirrors to a certain extent the historical development. For each of the four languages this has however been argued independantly to constitute the synchronic analysis as well (see Rehg 1981 for PNP, Harrison 1976 for MOK, Sohn 1975 for WOL). The combined pattern of lengthening and deletion in PNP leads one at first to assume that this is a case of compensatory lengthening. But as Rehg (1984) points out the lack of deletion in WOL and KIR calls into question the idea that the lengthening is in any way compensatory. (34) illustrates the different structures for CVCV words in the four languages.

(34) URs: /kili/ 'skin, bark' /mata/ 'eye'



Although (34) represents crosslinguistic variation, the free generability of output candidates for a given input in OT will mean that (34) also constitutes part of the candidate set for a CVCV word in any one of the four languages. In other words, each of the four languages will include among its set of potential output candidates for an underlying CVCV form, all four of the above structures, after substituting the appropriate segmental material. Which one is chosen among the four will be the result of the language particular constraint ranking.

A further point that follows directly from the architecture of OT is that, since the constraints that make up the rankings are universal, the constraints that account for the success of a particular candidate in one language, must also be the constraints responsible for the outcome in the other languages, but in a permuted order.

This is also demonstrably the case in the Micronesian family. The constraints that account for the situation are WEAKEDGE, M-MORA, and PARSE-SEG. The first two are already familiar from the discussion of GT. PARSE-SEG is a constraint that penalizes loss of segmental material. The relevant ordering of these constraints for the four languages is given in (35).

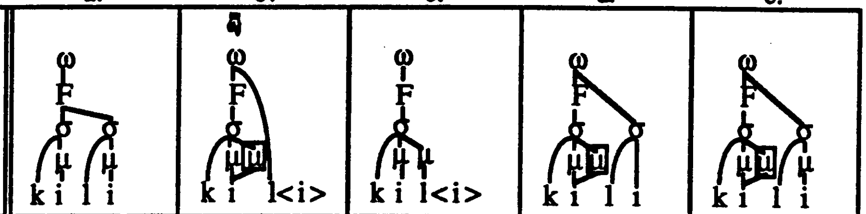
(35) PNP: WEAKEDGE >> M-MORA , PARSE-SEG

MOK: M-MORA >> WEAKEDGE >> PARSE-SEG

WOL and KIR: PARSE-SEG >> WEAKEDGE >> M-MORA

How these constraint rankings account for the language variation can be shown with the help of the following tableaux. The first case to consider is that of Ponapean. In Ponapean WEAKEDGE is ranked highest. The other two constraints do not interact with each other and are therefore not crucially ranked.

(36) PNP

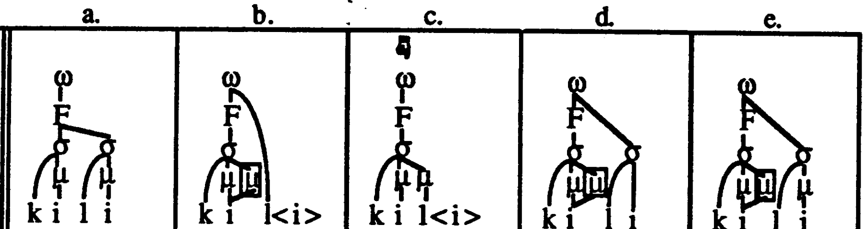


	a.	b. ☞	c.	d.	e.
WEAKEDGE	ω,F!,σ,μ,i	ω,l	ω,F!,σ,μ,l	ω,σ!,i	ω,σ!,μ,i
M-MORA		*		*	*
PARSE-SEG		*	*		

Since WEAKEDGE is the highest ranked of the relevant constraints the optimal candidate will be the one that is most harmonic with respect to it. This means that the candidate with the least structure in its right periphery will be chosen, even if this requires underparsing of segmental material or lengthening of a vowel. In fact the winning candidate (b) requires both. Competing candidates (d) and (e) which parse the final vowel are less harmonic with respect to WEAKEDGE, since a final vowel will necessarily form a syllable nucleus, thereby leading to more structure in the periphery.

The case of Mokilese is illustrated with tableau (37). The important difference to Ponapean is that M-MORA, the constraint against unlicensed morae, is ranked highest. This means that increasing the harmony of the periphery will only be possible as long as it doesn't require lengthening of an underlying short vowel. This eliminates candidates (b), (d) and (e).

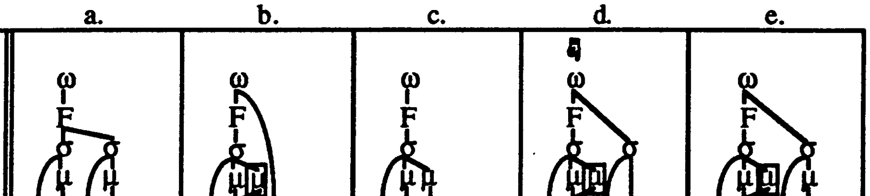
(37) MOK



	a.	b.	c. ☞	d.	e.
M-MORA		*!		*!	*!
WEAKEDGE	ω,F,σ,μ,i!	ω,l	ω,F,σ,μ,l	ω,σ,i	ω,σ,μ,i
PARSE-SEG		*	*		

Among the candidates that do not violate M-MORA, the one that is most harmonic with respect to WEAKEDGE will be the optimal candidate. This makes (c) which has a final consonant the preferred candidate over (a) which has a final vowel. The reason for preferring final consonants over final vowels is that a vowel is a syllable head in contrast to a coda consonant. If the notion 'head of' is a structural one than the final vowel, the syllable head, will contribute more structure to the periphery of the prosodic word than a coda consonant.

Finally the tableau in (38) shows the situation for Woleaian. In this case the constraint PARSE-SEG is ranked above WEAKEDGE. This means that underparsing in order to improve the harmony of the right periphery is not an option. The winning candidate will therefore be chosen among the candidates that preserve the underlying final vowel, that is, candidates (a), (d), and (e). Among these the winner is determined by the next ranking constraint, in this case WEAKEDGE. The optimal form is therefore either (d) or (e) depending on whether (d) is a legitimate structure in the language. In Woleaian such structures are acceptable making (d) the winning candidate.



(38) WOL	a.	b.	c.	d.	e.
	m a t a	m a t<a>	m a t<a>	m a t a	m a t a
PARSE-SEG		*!	*!		
WEAKEDGE	ω,F!,σ,μ,a	ω,t	ω,F,σ,μ,t	ω,σ,a	ω,σ,μ!,a
M-MORA		*		*	*

The tableau for Kiribati would be essentially identical to that of Woleaian. The different choice of winning candidate is simply a matter of (d) being disallowed as a structure in Kiribati. This would be achieved by having an additional constraint, militating against non-moraic vowels, ranked above WEAKEDGE.

These three languages illustrate three of the four possible constraint rankings. The fourth is one where WEAKEDGE is ranked lowest. This leads to what might be called the default case, namely the one where the candidate most faithful to the underlying form is the winner (candidate (a) in all of the tableaux above).

5. Conclusion

Summarizing the discussion, it was shown that in the case of GT the universal constraint WEAKEDGE accounts for the 'extrametrical' behavior of final consonants. The language particular constraint ranking, given the violable nature of constraints in OT, explains the fact that this behavior is found only in non-moraic consonants, but never in moraic ones.

Ordering WEAKEDGE differently relative to other constraints leads to diverse effects. A glimpse of the extent of possible variation is illustrated by the languages of the Micronesian family. For instance, Woleaian shows a 'Nonfinality effect', lengthening a vowel in order to avoid a word final head foot. This Nonfinality effect turns out to be a special case of WEAKEDGE. The reasoning is as follows: assuming that 'head' is a structural notion, a head will always have more structure than a non-head. This in turn means that since candidates with less structure in their right periphery are more harmonic with respect to WEAKEDGE, WEAKEDGE will militate against heads in peripheral position. This, however, is exactly the formulation of NON-FINALITY in Prince & Smolensky (1993) given as (12) above (cf. also Itô & Mester 1992).

The same type of reasoning can be applied to the case of vowels versus consonants. Vowels are syllable nuclei and therefore syllable heads. As a result, consonants are the preferred peripheral elements. Constraints to this effect that have been proposed are FINAL-C (McCarthy 1993a, McCarthy & Prince 1993a) and FREE-V (Prince & Smolensky 1993). Mokilese is a language that has such a condition, and deletes final vowels.

The analysis of Ponapean is interesting in that it relates both the vowel deletion and the Nonfinality effect to the same cause without making the lengthening 'compensatory'. This is as should be, since the Woleaian and Mokilese data show that the two processes are in principle independant.

Extending WEAKEDGE to the segemental domain, and assuming voice to be privative, segments containing [voi] are dispreferred, as opposed to segments without such a specification. This gives an account of final devoicing. A question for further research is whether the broad range of effects covered by WEAKEDGE might make it preferable to view it as a family of constraints rather than a single entity.

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