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Assimilation to the Unmarked

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assimilation of the latter to the former rather than vice-versa. I propose to circumvent the majority rule effect by invoking the local conjunction of co-relevant markedness and faithfulness constraints. A local conjunction of this type is asymmetrically violated by a mapping from an unmarked feature value to a marked one, and is universally ranked above its conjuncts — its faithfulness conjunct in particular — thereby heading off the apparent problem induced by the symmetry of faithfulness. This solution yields the successful description of an attested pattern, assimilation to the unmarked, which is furthermore claimed to correspond to the pattern of dominant-recessive vowel harmony.

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marked *in combination* with particular values of other features. For instance, non-high [+ATR] and non-low [–ATR] vowels tend to be marked by virtue of the combination of articulatorily antagonistic feature values. As Hall & Hall (1980:207) note: "as the tongue root is moved forward [i.e., in the implementation of [+ATR] — EB], the tongue body is compressed and therefore raised. Conversely, as the tongue root is retracted [i.e., in the implementation of [–ATR] — EB], the tongue body is pulled down and therefore lowered."[14]

The constraint responsible for the dominance of [+ATR] vowels thus may not be *[–A] $\&_l$ IDENT[A], with a markedness conjunct violated by all [–ATR] vowels, but rather something more like *[–L,–A] $\&_l$ IDENT[A], with a multiple-feature markedness conjunct violated only by antagonistically-specified [–LO, –ATR] vowels. The empirical impact of this choice is subtle but significant: *[–L,–A] is not violated by a [+LO, –ATR] vowel, meaning that the local conjunction *[–L,–A] $\&_l$ IDENT[A] is not violated by a change from a [+LO, +ATR] vowel [ɐ] to a [+LO, –ATR] vowel [ɑ]. The result is that a [+LO, +ATR] vowel is predicted never to be dominant, as shown in (19).

(19) Input: √[–ATR] • [+LO, +ATR]

Candidates		AGR[A]	*[–L,–A] $\&_l$ ID[A]	ID[A]
a.	√[–A] • [+L,+A]	* !		
b. ☞	√[–A] • [+L,–A]			*
c.	√[+A] • [+L,+A]			*

As it happens, many if not most of the languages with dominant-recessive harmony have no [+LO, +ATR] vowel in their inventory, making this distinction irrelevant in those cases. Kalenjin *does* have [+LO, +ATR] vowels, but only as a result of assimilation to a [+ATR] (dominant) vowel; in other words, it is a fact of Kalenjin that there are no dominant low vowels. I take this fact to be significantly non-accidental and therefore propose that the relevant local conjunction is indeed *[–L,–A] $\&_l$ IDENT[A].

5 Summary

In this paper I explain how an apparent problem arises when one considers input forms with uneven ratios of the values of an assimilatory feature. If the usual positional considerations of assimilation are irrelevant, then an effect dubbed 'majority rule' emerges. Majority rule is a pathological consequence of the vertical symmetry of input-output faithfulness whereby an arbitrarily better-represented feature value overrules the other value, resulting in

[14] This passage is also cited by Archangeli & Pulleyblank (1994:175).

I claim that the dominant-recessive harmony pattern of Kalenjin is a consequence of the low rank of the constraint usually responsible for root/stem control. The pertinent agreement constraint, AGREE[A], together with an appropriate local conjunction of markedness and faithfulness, conspire to always prefer the candidate with assimilation to the unmarked when assimilation is necessary (that is, when the vowels of a word underlyingly disagree in terms of [ATR]; otherwise, faithfulness to both values of [ATR] prevails.)

For this to work for Kalenjin and for the many other languages where [+ATR] is the 'dominant' harmonic feature value,[13] the 'recessive' harmonic feature value [–ATR] must be the marked one, yielding *[–A] $\&_l$ IDENT[A] as the appropriate local conjunction. Given a choice between assimilation to [+ATR] and assimilation to [–ATR], the local conjunction prefers the former.

This is shown by the tableau in (18) for a simple bimorphemic case with a [–ATR] recessive root and a [+ATR] dominant suffix. The faithful realization of this input, shown in (18a), is summarily disposed of by undominated AGREE[A]. The candidate in (18b), with assimilation to the marked [–ATR] value of the stem, is ruled out by the local conjunction, *[–A] $\&_l$ IDENT[A]. This leaves the candidate in (18c), with assimilation to the unmarked, as the winner — despite its lack of control.

(18) Input: √[–ATR] • [+ATR]

Candidates		AGR[A]	*[–A] $\&_l$ ID[A]	ID[A]
a.	√[–A] • [+A]	* !		
b.	√[–A] • [–A]		* !	*
c. ☞	√[+A] • [+A]			*

This ranking thus properly defines a dominant-recessive harmony system like Kalenjin, in which all vowels in a word assimilate to any vowel of the word that bears the dominant — understood here as unmarked — value of the harmonic feature. It is important to note in this context that I am not necessarily making a claim about the markedness of the values of the feature [ATR] in isolation. As is well known and understood (see in particular Archangeli & Pulleyblank 1994:172*ff*), the values of [ATR] are typically marked or un-

[13] I thank the respondents to an electronic query I posted on the Optimal List and the LINGUIST List (Summary: Issue 9.776.1) — Roderic Casali in particular — for their help in cataloging a representative set of examples of dominant-recessive harmony systems. The typological fact that these all seem to involve [ATR] rather than other vowel features is to my knowledge not explained, nor explainable, by any theory of assimilation. I will not make any vain attempts to make sense of this fact here; this is of course not to say that it is not worthy of attention.

positional constraint is low-enough ranked, it is almost as good as rendering it irrelevant. I claim that what is known as *dominant-recessive* vowel harmony is an instance of precisely this result.[11]

Root- or stem-controlled vowel harmony systems are by far the better-known examples of vowel harmony. In such systems, the harmonic feature value of a word is systematically determined by a vowel in the stem of affixation. In the less well-known examples of dominant-recessive vowel harmony systems, the harmonic feature value of a word seems to be determined not by a particular morpheme or class of morphemes but rather by the underlying presence in any morpheme of a vowel with a particular value of the harmonic feature. Thus, in a dominant-recessive vowel harmony system, vowels in the root/stem may in some cases change to agree with an affix vowel.

For instance, in Kalenjin (Hall et al. 1974, Halle & Vergnaud 1981, Ringen 1988), words generally consist exclusively of [+ATR] vowels or of [–ATR] vowels. The presence of a [+ATR] vowel anywhere in the word requires all other vowels in the word to be [+ATR]; otherwise, all vowels surface with their underlying value of [–ATR]. The example in (17a) is a word with all [–ATR] vowels underlyingly, and it surfaces as such. The example in (17b) replaces the [–ATR] root /kɛr/ 'shut' with the [+ATR] root /keːr/ 'see', causing all the other vowels in the word to shift to [+ATR]. The same is shown in (17c); here, it is the [+ATR] noncompletive suffix /e/ that causes the shift of all vowels to [+ATR], including the root vowel.[12] Note the fact that as many [–ATR] vowels as necessary are changed to agree with a single [+ATR] vowel (17b,c), despite the fact that [–ATR] is otherwise contrastive (17a); that is, there is no clearly no majority rule.

(17) Kalenjin [ATR] harmony (adapted from Hall et al. 1974:247)

a.	/ kɪ̠ • ɑ̠ • √kɛ̠r /	→	kɪ̠ɑ̠gɛ̠r
	DIST. PAST • 1SG • shut		'I shut it'
b.	/ kɪ̠ • ɑ̠ • √ke̟ːr • ɪ̠n /	→	ki̟ɐ̟ge̟ːri̟n
	DIST. PAST • 1SG • see • 2SG		'I saw you (sg.)'
c.	/ kɪ̠ • ɑ̠ • √kɛ̠r • e̟ /	→	ki̟ɐ̟ge̟re̟
	DIST. PAST • 1SG • shut • NONCOMPL.		'I was shutting it'

[11] Lombardi (1996) analyzes 'bidirectional devoicing' in Swedish (Hellberg 1974) in just this manner. Coda obstruents do not necessarily agree with following onset obstruents in Swedish; if either the coda or the onset is voiceless underlyingly, an obstruent cluster surfaces voiceless. Thus, *hö[g]* 'high' but *hö[kt]id* 'festival', with assimilation to the onset in voicelessness, and *[d]ag* 'day' but *ti[st]ag* 'Tuesday', with assimilation to the coda in voicelessness.

[12] A bullet '•' denotes a morpheme boundary and the radical symbol '√' denotes that the following morpheme is the root. The diacritics under the vowel symbols indicate their respective [ATR] values for ease of reference.

(§3.2). Violation of the faithfulness conjunct — in this case, IDENT[V] — does not aid and abet in the violation of the markedness conjunct NOCODA. In other words, simply removing the relevant IDENT[V] violation from a candidate that violates NOCODA $\&_l$ IDENT[V] does not thereby result in the satisfaction of NOCODA; a coda remains, whether it's voiced or voiceless.

The conjuncts of *[+V] $\&_l$ IDENT[V], on the other hand, *are* co-relevant. Removing the relevant IDENT[V] violation from a candidate that violates *[+V] $\&_l$ IDENT[V], for example, guarantees the satisfaction of *[+V] since the result is a [–voice] obstruent. The faithfulness violation is in a sense *responsible* for the markedness violation in the case of *[+V] $\&_l$ IDENT[V], but not in the case of local conjunctions like NOCODA $\&_l$ IDENT[V].[10] The local conjunction relation must thus be defined such that a local conjunction of markedness and faithfulness is necessarily co-relevant.

4 Dominance

As has been noted throughout this paper, assimilation to the unmarked in the case of voicing assimilation results when onset-specific faithfulness is irrelevant. One might ask whether this is a fact about voicing assimilation alone; I suspect that it is not, and that there is assimilation to the unmarked whenever positional considerations of particular assimilation processes are rendered irrelevant due to one reason or another. Unfortunately, this is not easy to test, as may have been noted in the case of voicing assimilation itself: in order to garner any evidence from actual alternations, a language must at least have obstruent-final stems, suffixes consisting of nothing other than an obstruent (or obstruents), and the ability to tolerate the resulting tautosyllabic obstruent cluster — each a taller order than the last. Indeed, even when such a language is in evidence, as in the case of Yiddish, there are insufficient data to truly see the full range of possibilities. I have no doubt that Lombardi is right in her suspicion that no language could have the equivalent of 'majority rule,' but it would seem that this is not really possible to know for sure.

Other assimilation processes do not seem to offer any solace. In the case of vowel harmony, for instance, positional considerations could never be rendered irrelevant. There is always a root, and root-specific faithfulness (or whatever is responsible for root/stem control; see Baković, forthcoming) will always be there to select the position-controlled candidate. Or will it? This is OT, after all, and constraints are ranked and violable. If the relevant

[10] The conjuncts of the local conjunctions invoked by Lubowicz (1998) to account for phonologically-derived environment effects are unproblematically co-relevant, but those of the ones invoked to account for *morphologically*-derived environment effects are not. This discrepancy is not addressed here; see Burzio 1998 for an alternative approach to both types of derived environment effects.

candidate in (15a) is, as usual, ruled out by its fatal violation of AGREE[V]. The majority rule, assimilation-to-the-marked candidate in (15b) correctly loses to the desired assimiliation-to-the-unmarked candidate in (15c), because the former fatally violates the universally higher-ranked local conjunction *[+V] $\&_l$ IDENT[V] while the latter only violates the (in this case irrelevantly) lower-ranked symmetrical faithfulness conjunct IDENT[V].

(15) Input: [+voice] [+voice] [–voice]

Candidates		AGR[V]	*[+V] $\&_l$ ID[V]	ID[V]	*[+V]
a.	[+V] [+V] [–V]	* !			* *
b.	[+V] [+V] [+V]		* !	*	* * *
c. ☞	[–V] [–V] [–V]			* *	

This local conjunction solution to the majority rule problem supports and reflects Lombardi's insight that markedness wins the day when onset-specific faithfulness is not at stake; i.e., that there is assimilation to the unmarked, regardless of the relative percentages of marked and unmarked values of [voice] in the input. Still, there is a residual issue left to be addressed.

Itô & Mester (1998:§2.2) argue against the local conjunction of markedness and faithfulness constraints. As these authors show, there are some undesirable consequences that result when certain markedness and faithfulness constraints are locally conjoined with each other. For instance, the local conjunction of the markedness constraint NOCODA (violated by closed syllables) and the faithfulness constraint IDENT[V], ranked with respect to other constraints as in (16), can generate a language in which obstruents may be voiced *only in the coda of a syllable*, the reverse of what is typically found.

(16) Syllable-initial devoicing? (Itô & Mester 1998:14-15)
NOCODA $\&_l$ IDENT[V] » *[+V] » IDENT[V]

The argument proceeds as follows. Voiced obstruents are in general devoiced due to the ranking of *[+V] over IDENT[V] — except in codas, because codas violate NOCODA and therefore devoicing (more generally, any change in voicing) in the coda violates the top-ranked local conjunction NOCODA $\&_l$ IDENT[V]. The result is a voicing contrast only in the coda or, more or less equivalently, voicing neutralization only in the onset.[9]

As Alan Prince and Ania Lubowicz (p.c.) have pointed out to me, the problem with local conjunctions like Itô & Mester's NOCODA $\&_l$ IDENT[V] is that its conjuncts are not co-relevant, in the specific sense defined earlier

[9] This argument presupposes that codas aren't otherwise dealt with in the language by, e.g., deletion or epenthesis; see Itô & Mester 1998 for these details.

conjunction of a constraint with itself ('local self-conjunction'; see Smolensky 1995, Alderete 1997, Itô & Mester 1996, 1998, Spaelti 1997), because the effect of A $\&_l$ A would be the same as the effect of A alone.

Various types of constraints may be locally conjoined. For instance, Kirchner (1996) argues that the proper analysis of synchronic chain shifts involves the local conjunction of faithfulness constraints, Itô & Mester (1998) show how positional markedness effects can be analyzed with the local conjunction of markedness constraints, and Lubowicz (1998) proposes to account for derived environment effects with the local conjunction of markedness and faithfulness. I specifically adopt Lubowicz's proposal here, and assume local conjunctions of the form in (14).

(14) *[+V] $\&_l$ IDENT[V] — An output segment must not be specified as [+V] if its input correspondent is not also specified as [+V].

Note that the conjuncts of the local conjunction in (14) are *relevant* to each other in the sense that each conjunct mentions a particular feature also mentioned by the other conjunct. I refer to such local conjunctions as *co-relevant*.[8] The net effect of a co-relevant local conjunction of markedness and faithfulness is to specifically prohibit the unfaithful introduction of a marked segment. *[+V] $\&_l$ IDENT[V] is not violated by just any [+voice] obstruent in the output; it is violated only if such an output obstruent is in correspondence with a [–voice] obstruent in the input — in other words, only if the output vowel is *unfaithfully* [+voice]; only if it is [+voice] *by virtue of its unfaithfulness* to the input value of [voice]. (I return to the importance of the concept of co-relevance futher below.)

*[+V] $\&_l$ IDENT[V] is almost exactly the same as the feature value faithfulness constraint IDENT[–V]: both are violated by a voiced obstruent in the output that is in correspondence with a voiceless obstruent in the input. The important difference between them is that *[+V] $\&_l$ IDENT[V] is universally higher-ranked than each of its conjuncts *[+V] and IDENT[V], according to the universal ranking element (13c) of the theory of local conjunction. Therefore, the asymmetrical local conjunction *[+V] $\&_l$ IDENT[V] will always get evaluative priority over its symmetrical faithfulness conjunct IDENT[V], eliminating the majority rule problem.

This is shown in (15), where the input is the same as the one considered in (9) and (12), with two voiced obstruents and a voiceless one. The faithful

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Fukazawa 1997, Itô & Mester 1998, and Lubowicz 1998). The concensus seems to be that *not* any two constraints should be conjoinable, and there are thus various proposals for properly restricting the somewhat broad definition in (13a).

[8] I thank Ed Keer, Ania Lubowicz, and Alan Prince for discussion, both direct and indirect, of the significance of the concept of co-relevance defined here.

the choice between the two possible candidates that survive AGREE[V] never actually falls to the problematically symmetrical IDENT[V]. Like the forced tie approach (§2.1), the local conjunction solution correctly predicts assimilation to the unmarked in the absence of onset-specific faithfulness considerations. The proposed solution thus incorporates all of the benefits and none of the drawbacks of the other two solutions.

Smolensky (1993, 1995, 1997) proposes that besides the constraint domination relation '»', there exists another relation that may hold between the constraints of Universal Grammar: the local conjunction relation '$\&_l$'. Two constraints A and B may be locally conjoined, creating a third constraint A $\&_l$ B that is violated whenever both A and B are simultaneously violated in some local domain *l*. Local conjunctions are in general motivated by situations in which it appears that A and B are individually violable in order to satisfy some conflicting constraint C, but when satisfaction of *both* A and B within some local domain is at stake, C is forced to be violated instead. Such an interaction of constraints is simply not possible under strict domination; if C dominates A and B, then either A or B or both are violated as many times as necessary to satisfy C. In order for the coincidental violation of both A and B to 'gang up' on C, a local conjunction A $\&_l$ B that in turn outranks C is necessary.

The elements of the theory of local conjunction that I assume are as follows (adapted from Itô & Mester 1998:11). Note in particular the universal ranking that is assumed to hold between local conjunctions and their conjuncts, stated in (13c), to the effect that it is universally worse to violate a local conjunction than it is to violate either of its conjuncts. This component of the theory plays a crucial part in my proposal, as I make clear below.

(13) Local conjunction
   a. Definition: Let A and B be members of the constraint set *Con*. Then their local conjunction A $\&_l$ B is also a member of *Con*.
   b. Interpretation: The local conjunction A $\&_l$ B is violated if and only if both its conjuncts A and B are violated in the smallest domain evaluable by A and B.
   c. Ranking (universal): A $\&_l$ B » { A, B }

I follow Lubowicz (1998) in assuming that the local domain *l* of a local conjunction is always the smallest domain evaluable by its conjuncts, as noted in (13b). This restriction prevents some of the potential proliferation of local conjunctions, because two local conjunctions cannot differ solely by their domain of application.[7] It also appears to render ineffectual the local

[7] A considerable amount of attention is paid in the literature on local conjunction to the question whether any two constraints are conjoinable (see e.g. Miglio &

The majority rule problem is avoided under this proposal by taking the symmetry out of featural faithfulness. When onset-specific faithfulness is not at stake, the 'trigger' of assimilation is determined by the relative ranking of IDENT[+V] and IDENT[–V]. If IDENT[+V] dominates IDENT[–V], then it is preferable to maintain any underlying [+voice] specifications on the surface, regardless of how many [–voice] specifications need to be changed in order to ensure agreement. If IDENT[–V] dominates IDENT[+V], on the other hand, it is preferable to maintain any [–voice] specifications and any number of [+voice] specifications may be sacrificed in order to achieve assimilation.

This is shown in (12). The input considered here is the same as the one considered in (9), with two voiced obstruents and a voiceless one. The faithful candidate in (12a) violates undominated AGREE[V] and is thus ruled out. This leaves the usual two assimilated candidates, (12b) and (12c), the former being the majority rule, assimilation-to-the-marked candidate and the latter being the desired assimiliation-to-the-unmarked candidate. The former correctly loses to the latter, due to the former's single but fatal violation of higher-ranked IDENT[–V] compared to the latter's double but irrelevant violation of lower-ranked IDENT[+V].

(12) Input: [+voice] [+voice] [–voice]

Candidates		AGR[V]	ID[–V]	ID[+V]	*[+V]
a.	[+V] [+V] [–V]	* !			**
b.	[+V] [+V] [+V]		* !		***
c. ☞	[–V] [–V] [–V]			**	

This is the correct result, but it is bought at a serious price. As mentioned earlier, the fundamental insight behind Lombardi's analysis is that when onset-specific faithfulness is not at stake, there is predicted to be assimilation to the unmarked. This prediction can at best only be stipulated assuming feature value faithfulness. For instance, in this particular case it must be stipulated that IDENT[–V] universally dominates IDENT[+V] in order to avoid generating an unattested language in which there is assimilation to the marked [+voice] when onset-specific faithfulness is irrelevant. Such a universal ranking statement would in effect duplicate the independently necessary role of markedness, with significant explanatory loss.

3 Local conjunction

My own proposed solution to the apparent problem of 'majority rule' is to recognize the *local conjunction* (Smolensky 1993, 1995, 1997) of markedness and faithfulness constraints (Lubowicz 1998). Like the feature value faithfulness approach (§2.2), the result of this solution to the problem is that

2.2 Feature value faithfulness

In the context of the proposal just reviewed, Lombardi (1996) alludes to so-called MAX[*f*] constraints, on which see Lombardi 1995, 1998, Causley 1997, and Walker 1997, among others.[5] In the Correspondence theory of faithfulness, MAX is a constraint that requires input elements to have output correspondents; MAX[V] would thus be a constraint that requires an underlying instance of [voice] to be preserved in the output. Various refinements of this basic idea have been proposed in the literature, and each of them is partly designed to get around the fact that an underlying instance of [α*f*] can technically be in correspondence with an output instance of [–α*f*], because imperfect correspondence is still correspondence.[6]

It seems then that MAX[*f*] constraints must somehow require *feature value identity*, not just featural preservation. One way to achieve this is to assume that (some) features are privative, such that binary distinctions like "voiced" vs. "voiceless" are captured by the presence vs. absence, respectively, of some monovalent feature [voice] (see Lombardi 1991, 1995 and references therein on the privativity of [voice]). Thus, MAX[V] would require preservation of voicing, while the counterpart constraint DEP[V] would require preservation of voicelessness by penalizing output instances of [voice] with no underlying correspondents.

This is the second candidate for the redefinition of featural faithfulness constraints to consider: one which distinguishes between, e.g., voiced-to-voiceless and voiceless-to-voiced input-output mappings. To avoid various technical problems with the specifics of the MAX[*f*]/DEP[*f*] approach (for instance, the fact that additional constraints are needed to prevent features from freely floating around, on which see Itô, Mester, & Padgett 1995, Myers 1997, among others), I consider instead the proposal found in Pater 1995, McCarthy & Prince 1995, 1997, and Butska 1998, among others — equivalent in presently relevant respects to the MAX[*f*]/DEP[*f*] approach — in which the featural faithfulness constraints that have so far become familar here are redefined as follows (cf. (2a)).

(11) Feature value faithfulness
- a. IDENT[+V] — If an output obstruent is [+voice], then its input correspondent in the output is also [+voice].
- b. IDENT[–V] — If an output obstruent is [–voice], then its input correspondent in the output is also [–voice].

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[5] See also Kirchner 1993, Myers 1994, Itô, Mester, & Padgett 1995, and many others on the analogous PARSE[*f*] constraints of pre-Correspondence OT.
[6] See Baković 1999 and references therein on imperfect correspondence.

The intended result in this particular case is clear, but the details of the proposal are left largely unaddressed by Lombardi, and there is at least one unintended consequence that must be addressed. If it really is the case that IDENT[V] is violated exactly once by any number of changes in voicing, then a bizarre situation is predicted. Recall that in Yiddish, there is voicing assimilation in clusters but a voicing contrast otherwise. The basic contrast is due to the ranking of IDENT[V] over *[+V], which allows both voiced and voiceless obstruents to surface faithfully, and the assimilation in clusters is due to the ranking of AGREE[V] over IDENT[V] (putting aside the onset/coda asymmetry). This much has already been established. Now consider a form with *both* a cluster and a single obstruent. The outcome should be assimilation in the cluster and an independent contrast in the single obstruent. But this is not necessarily the result under Lombardi's proposal when taken at face value. Since any number of changes in voicing receive only one violation of IDENT[V], what is predicted is assimilation in the cluster and neutralization to voicelessness in the single obstruent, as shown in (10).[4]

(10) Input: [+voice]⁀[–voice], [+voice]

Candidates		AGREE[V]	IDENT[V]	*[+V]
a.	[+V]⁀[–V], [+V]	* !		* *
b. ☠	[–V]⁀[–V], [+V]		*	* !
c. ☞	[–V]⁀[–V], [–V]		*	

A faithful rendition of the cluster fatally violates AGREE[V], as shown by the candidate in (10a); one member of the cluster must assimilate to the other. Given this, there are two relevant candidates left to consider: what should be the actual Yiddish output in (10b), in which the single obstruent remains voiced, and the output in (10c), in which the single obstruent is devoiced. Both of these latter two candidates involve a change in voicing; the first involves one change (assimilation), the second involves two (assimilation and devoicing). Taking Lombardi's proposal literally, this integral distinction is as irrelevant in this case as it needs to be in (9); therefore, (10c) is expected to win, contrary to fact. What's really going wrong here is that the voicing contrast of the single obstruent should not depend at all on whether there is a cluster elsewhere in the form, but it does. Unless Lombardi's proposal can somehow be purged of this unintended consequence while retaining the desired result in (9), it must be rejected for this reason.

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[4] The input considered in this tableau represents a form with a voiced-voiceless cluster (linked by a tie bar) and a single voiced obstruent (separated by a comma). To put aside the onset/coda asymmetry, only candidates that satisfy ONS-IDENT[V] are considered; this means that the single obstruent must be word-final.

final obstruents, as in (8), two of which are voiced (the first two here, but this detail is technically irrelevant). A faithful rendition of this input fatally violates AGREE[V], as shown by (8a); the two remaining candidates are left to be compared by IDENT[V], which prefers one change from [–voice] [+voice] (8b) rather than two changes from [+voice] to [–voice] (8c).

(8) Input: [+voice] [+voice] [–voice]

Candidates		AGR[V]	ID[V]	ONS-ID[V]	*[+V]
a.	[+V] [+V] [–V]	* !			**
b. ☞	[+V] [+V] [+V]		*		***
c. ☠	[–V] [–V] [–V]		** !		

As Lombardi (1996) notes, no phonological process is known to work in this way, caring one way or the other about the relative percentages of feature values in the input — a pathological situation I refer to as 'majority rule.' Lombardi proposes to avoid the erroneous majority rule prediction by redefining featural faithfulness constraints. Any such redefinition has consequences beyond the case at hand, of course, and in §2 immediately below I review two potential candidates for the redefinition of featural faithfulness constraints and reject them based on their respective adverse consequences. In §3 after that, I offer my own proposal, the local conjunction (Smolensky 1993, 1995, 1997) of markedness and faithfulness (Lubowicz 1998).

2 Two Faithfulness Makeovers

2.1 Forcing the tie

The logic of Lombardi's own proposal runs as follows: it is the lack of a tie on IDENT[V] that yields the wrong result in (8); therefore, this constraint — or, more generally, all featural faithfulness constraints — must be redefined such that there *is* a tie in this case. Lombardi proposes that IDENT[V] should be redefined in such a way that any number of changes in voicing receive a grand total of exactly one violation of IDENT[V]. The result, as desired, is for the candidate comparison in (8) to be corrected as shown in (9).

(9) Input: [+voice] [+voice] [–voice]

Candidates		AGR[V]	IO-ID[V]	ONS-ID[V]	*[+V]
a.	[+V] [+V] [–V]	* !			**
b.	[+V] [+V] [+V]		*		* ! **
c. ☞	[–V] [–V] [–V]		*		

(5) Input: [+voice] [–voice]

Candidates		AGR[V]	ID[V]	ONS-ID[V]	*[+V]
a.	[–V] [+V]	* !			*
b.	[+V] [+V]		*		* ! *
c. ☞	[–V] [–V]		*		

*[+V] cannot be ranked just anywhere; it must be crucially ranked with respect to both of the faithfulness constraints. For example, ONS-IDENT[V] must dominate *[+V] to account for assimilation of a voiceless coda to a voiced onset, as shown in (6) (cf. (3)).

(6) Input: [–voice]$_{\text{Coda}}$ [+voice]$_{\text{Onset}}$

Candidates		AGR[V]	ID[V]	ONS-ID[V]	*[+V]
a.	[–V]$_{\text{Coda}}$ [+V]$_{\text{Onset}}$	* !			*
b. ☞	[+V]$_{\text{Coda}}$ [+V]$_{\text{Onset}}$		*		* *
c.	[–V]$_{\text{Coda}}$ [–V]$_{\text{Onset}}$		*	* !	

IO-IDENT[V] must also dominate *[+V] in order to account for the fact that single voiced obstruents (i.e., not in clusters) are generally contrastive, as shown in (7). (The fact that ONS-IDENT[V] dominates *[+V] is not sufficient to account for this fact, since the voicing contrast obtains in word-final codas as well as in onsets. The potentially extraneous violation of ONS-IDENT[V] is therefore indicated in the tableau by a parenthesized asterisk.)

(7) Input: [+voice]

Candidates		AGR[V]	ID[V]	ONS-ID[V]	*[+V]
a. ☞	[+V]				*
b.	[–V]		* !	(*)	

The significant insight behind this proposal is that it is *markedness* that decides between two AGREE[V]-satisfying candidates when onset-specific faithfulness is not at stake. This makes the interesting prediction that all else being equal, there will be *assimilation to the unmarked*; to wit, in the case of Yiddish, assimilation to voicelessness. This seems to be the correct result in general: there are apparently no languages in which there is assimilation to the marked value [+V] when onset-specific faithfulness is irrelevant.

Nevertheless, the ranking in (7) predicts that in a string of three or more obstruents in final position (that is, when ONS-IDENT[V] is irrelevant) what will emerge will not depend on markedness, but rather on the *relative percentages* of [+voice] and [–voice] in the input. Take an input with three

(2) Constraints

a. IDENT[V] — An output obstruent and its input correspondent must have the same value of the feature [voice].

b. ONS-IDENT[V] — An output onset obstruent and its input correspondent must have the same value of the feature [voice].

c. AGREE[V] — Adjacent output obstruents must have the same value of the feature [voice].

AGREE[V] enforces voicing assimilation in obstruent clusters due to its rank above IDENT[V]; no matter where the onset-specific ONS-IDENT[V] is ranked with respect to these, it decides in favor of assimilation to the onset.

(3) Input: $[–\text{voice}]_{\text{Coda}}$ $[+\text{voice}]_{\text{Onset}}$

Candidates		AGR[V]	ID[V]	ONS-ID[V]
a.	$[–\text{V}]_{\text{Coda}}$ $[+\text{V}]_{\text{Onset}}$	* !		
b. ☞	$[+\text{V}]_{\text{Coda}}$ $[+\text{V}]_{\text{Onset}}$		*	
c.	$[–\text{V}]_{\text{Coda}}$ $[–\text{V}]_{\text{Onset}}$		*	* !

There are obstruent clusters, however, in which neither obstruent is an onset and thus to which ONS-IDENT[V] is technically inapplicable. Take, for instance, final clusters created by affixation of a suffix consisting of a single obstruent to an obstruent-final root. If either of the obstruents is underlyingly voiceless, the cluster surfaces as voiceless.[2]

(4) Final obstruent clusters in Yiddish (Katz 1987:127-131)

[+voice] [–voice] → [–voice] [–voice]

[zɔ*g*] 'say! (familiar)' [zɔ*kt*] 'say! (formal)'

Since ONS-IDENT[V] is irrelevant in final clusters, it cannot be the constraint that breaks the tie between the two potential AGREE[V]-satisfying candidates. Lombardi attributes assimilation to voicelessness to a markedness constraint against voiced obstruents, *[+V].[3] This is depicted in (5).

[2] There are no examples in Yiddish of a voiced obstruent suffix. Lombardi (1996:28) claims that this gap is "more or less expected" because "such suffixes would always devoice" — but this is clearly not the case. Such a suffix is expected to devoice only when attached to a root with a final voiceless obstruent, but since word-final voicing is otherwise contrastive in Yiddish (see (1)), it is otherwise expected to faithfully surface voiced. (There also seem to be no examples of final voiced clusters, polymorphemic or otherwise, but Lombardi provides one from Serbo-Croatian, which is parallel to Yiddish: [gro*zd*] 'bunch of grapes'.)

[3] Lombardi's constraint is called '*Lar', amounting to the same thing here.

Assimilation to the Unmarked[*]

Eric Baković

1 Control and its Loss

Assimilation is often *controlled* by a segment in a particular position. For instance, vowel harmony is often *root*- or *stem-controlled*, meaning that the value of the harmonic feature in the root morpheme (more accurately, the stem of affixation) remains constant while the value of the feature in affixes alternates to agree with the root. Similarly, in voicing assimilation, the value of [voice] often remains constant in an onset while a coda alternates to agree with the onset; voicing assimilation is thus often *onset-controlled*.[1] An example of onset-controlled voicing assimilation comes from Yiddish (Katz 1987, Lombardi 1996). Final obstruents contrast in voicing, but adopt a following initial obstruent's value of the feature in compounds.

(1) Obstruent clusters in Yiddish (Katz 1987:29-30)

a. $[+\text{voice}]_{\text{Coda}}\ [-\text{voice}]_{\text{Onset}} \rightarrow [-\text{voice}]_{\text{Coda}}\ [-\text{voice}]_{\text{Onset}}$

[vɔ*g*]	'weight'	[vɔ*kʃ*ɔl]	'scale'
[bri*v*]	'letter'	[bri*ft*rɛgər]	'mailman'
[aj*z*]	'ice'	[aj*sk*astn]	'icebox'
[ʃanta*ʒ*]	'blackmail'	[ʃanta*ʃʃ*tik]	'blackmailing tactics'

b. $[-\text{voice}]_{\text{Coda}}\ [+\text{voice}]_{\text{Onset}} \rightarrow [+\text{voice}]_{\text{Coda}}\ [+\text{voice}]_{\text{Onset}}$

[ba*k*]	'cheek'	[ba*gb*ejn]	'cheekbone'
[bu*x*]	'book'	[bu*ɣg*əʃɛft]	'bookstore'
[zi*s*]	'sweet'	[zi*zv*arg]	'candy products'
[kɔ*p*]	'head'	[kɔ*bv*ejtik]	'headache'
[vaj*t*]	'far'	[vaj*dz*ɛəvdik]	'farsighted'

Lombardi (1996) proposes to account for onset-controlled voicing assimilation through the interaction among three types of constraints: faithfulness (McCarthy & Prince 1995, 1997), *onset-specific* faithfulness (Beckman 1998), and agreement (Lombardi's own proposal in these works; see also Butska 1998). Tokens of these constraint types that are relevant to obstruent voicing are defined in (2) below.

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[1] The term 'onset' is used here as a shorthand for a consonant tautosyllabically released into a sonorant (see Lombardi 1991; cf. Steriade 1997).