Sonority-Driven Reduction
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0. Combinations of Sonority and Stress

In their analysis of Imdlawn Tashlhiyt Berber syllabification, Prince and Smolensky (1993) postulate that different types of prominence, such as sonority and syllabicity, should align—a phenomenon they term *prominence alignment*. This concept is implemented by Prince and Smolensky using families of inherently-ranked constraints that are derived from combining phonetic prominence scales. The types of constraints they use are illustrated in (1), along with the prominence scales used to derive them:

(1) Prominence Constraints (Prince and Smolensky 1993, chapter 8)

*M/a >> *M/i >> … >> *M/t (*M/λ = λ must not be parsed as a margin.)
*P/t >> … >> *P/i >> *P/a (*P/λ = λ must not be parsed as a peak.)

<u>Syllable Position Prominence:</u> P > M (peaks are more prominent than margins)
<u>Segment Sonority Prominence</u>: a > i > … > t

Kenstowicz (1994) has demonstrated that the prominence alignment phenomenon is not unique to syllabification phenomena. Specifically, Kenstowicz shows that prominence alignment can affect stress placement. He examines a number of languages in which stress placement is affected by the relative sonority of the vowels in a given word. For example, in Kobon (cf. (2a)), stress is attracted by high sonority vowel: stress generally falls on the most sonorous non-affixal vowel in the word. Similarly, in Northwest Mari stress is repelled by low sonority vowels: stress generally falls on the penult, but will move leftward to avoid falling on certain low-sonority vowels such as [ɪ] (cf. (2b)).

(2) Sonority-Driven Stress (Kenstowicz 1994)

a. Kobon (stress attracted by high sonority)

stressed [a]:	kɨdolmáŋ	*'arrow type'*	ki.á	*'tree sp.'*
stressed [o]	mó.u	*'thus'*	si.óg	*'bird sp.'*
stressed [i,u]	wí.ör	*'mango tree'*	mú.ɨs	*'fungus sp.'*

b. Nothwest Mari (stress repelled by low sonority)

penult stress:	[jalúnto]	*'heel'*	[roséta]	*'sprouts'*
non-penult stress	[tɪgénɪkɪ]	*'such a'*	[kídɪʃtɪzɪ]	*'in his hand'*

Kenstowicz terms this type of stress system "sonority-driven stress", and analyzes it using the same prominence alignment mechanism developed by Prince and Smolensky (1993). The constraints used by Kenstowicz are illustrated in (3):

(3) Constraints on Stress/Sonority Combinations (Kenstowicz 1994)

- *Targeting Low-Sonority:* Non-sonorous vowels should not be in stressed position:
  *Stressed/ə >> *Stressed/i,u >> *Stressed/e,o >> *Stressed/a
- *Targeting High Sonority:* Sonorous vowels should not be in unstressed positions.
  *Unstressed/a >> *Unstressed/e,o >> *Unstressed/i,u >> *Unstressed/ə

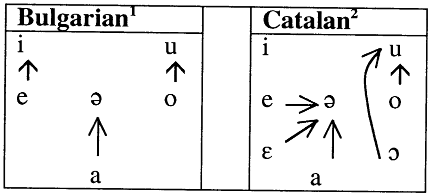
In this paper, I argue that exactly the same constraint families used by Kenstowicz to predict stress placement in sonority-driven stress systems can also motivate vowel quality alternations. In particular, the *Unstressed/X constraint family will be shown to motivate a particular type of vowel reduction, termed here "sonority-driven reduction". This finding is interesting because it provides attestation for the fourth and final member of the predicted typology of the possible ways in which sonority and stress can combine under the prominence alignment hypothesis.

1. Types of Vowel Reduction

Vowel reduction is a common phonological phenomenon in which (some) vowels undergo qualitative neutralizations in unstressed position. In sonority-driven reduction, it is precisely the high-sonority vowels that undergo reduction in unstressed position. In order to further clarify the exact nature and analysis of sonority-driven reduction, it may be helpful to compare and contrast it with a different sort of vowel reduction phenomenon. In previous work on vowel reduction, I have demonstrated that there are at least two classes of this phenomenon: sonority-driven reduction and perception-based (contrast-enhancing) reduction (Crosswhite 1999). Although both types of phenomena cause vowel neutralizations in unstressed syllables, they differ along a number of parameters, all of which relate to the fact that sonority-driven reduction is motivated by an inherently ranked set of prominence constraints. For example, whereas sonority-driven reduction targets vowels by sonority class, perception based reduction can target (presumably) any natural class of vowels. Furthermore, whereas sonority-driven reduction always uses sonority-decreasing neutralizations, perception-based reduction is not subject to this limitation.

Two examples of sonority-driven reduction are illustrated in (4) below. Note that in both cases, the high sonority mid and low vowels are subject to reduction in unstressed position. Furthermore, note that these vowels are eliminated using neutralizations that decrease sonority. (Note: although [ə] is often described as a mid vowel, it is in fact very low in sonority—for example, it uses a very close jaw position similar to that seen with [i,u] (Petterson and Wood 1987b).)

(4) Sonority-Driven Reduction



Note that the neutralizations used in these two example cases are different (Bulgarian /e/ > [i] while Catalan /e/ > [ə], for example), although the resulting vowel sub-inventories are identical ([i,u,ə]). This results from the fact that the same vowel reduction constraints motivate the process in both languages—these constraints are illustrated in (5) below. However, the different neutralization patterns result from different rankings of vowel faithfulness constraints with respect to the members of the *Unstressed/X family. For example, in Bulgarian it is imperative to preserve underlying palatality and rounding, while in Catalan underlying palatality can be lost under reduction.

To see how this analysis works, let us consider the case of Bulgarian vowel reduction. The pertinent features of Bulgarian vowel reduction are: unstressed vowels that are high in sonority are eliminated, and the neutralizations used to eliminate them do respect underlying vowel palatality and rounding, but do not respect underlying height. This system can easily be modeled by ranking vowel faithfulness constraints for [front] and [round] very high, while ranking vowel faithfulness for [high] and [low] very low. This is illustrated in (5) below:

(5) Constraint Ranking for Bulgarian

*Unstressed/a		*Unstressed/i,u,ə
*Unstressed/e,o	>>	Ident[high]
Ident[front]		Ident[low]
Ident[round]		

As demonstrated in the following tableaux (6) for reduction of underlying unstressed /e/ and /o/, this ranking derives the correct neutralization patterns. (Note that only one of the lowest-ranked constraints Ident[high] and Ident[low] are shown per tableau, due to space limitations.)

[1] Lehiste & Popov 1970, Scatton 1984, Groen 1987, Petterson & Wood 1987a,b
[2] Recasens 1991, Mascaró 1978

(6) Tableaux for Bulgarian Unstressed /o/ and /a/:

(cf. [róguf] 'of horn')

/rogát/ 'horned'	Ident [round]	*Unstr.- a	*Unstr.- e,o	*Unstr.- i,u,ə	Ident [high]
☞ [rugát]				*	*
[rogát]			*!		
[rəgát]	*!				
[rigát]	*!			*	*

(cf. [grát] 'city')

/gradéts/ 'town'	Ident [round]	*Unstr.- a	*Unstr.- e,o	*Unstr.- i,u,ə	Ident [low]
☞ [grədéts]				*	*
[gradéts]		*!			
[grudéts]	*!			*	*

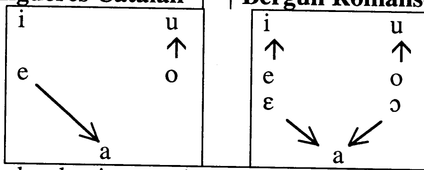
In the first tableau, underlying unstressed /o/ must reduce to [u], since reduction to any other low-sonority vowel (i.e., [ə] or [i]) involves violation of Ident[round]. Furthermore, non-reduction of unstressed /o/ is not an option, since this violates the highly-ranked constraint *Unstressed/e,o. Similarly, the second tableau shows that reduction of unstressed underlying /a/ to [u] is not an option because this also violates the Ident[round] constraint, and non-reduction of /a/ violates *Unstressed/a. Although both winning candidates violate a height-based faithfulness constraint (either Ident[low] or Ident[high]), these constraints are ranked so low that they cannot affect the choice of the optimal output form.

2. The Necessity of Promenince Constraint Families

In the previous section, we saw that prominence constraints can be used to account for sonority-driven reduction. Is there any evidence that it is the necessary approach? In order to answer this question, it may be useful to consider a different type of vowel reduction—one that is not based on sonority. The vowels targeted for perception-based reduction constitute some perceptually-challenging natural class of vowels, such as the mid vowels or nonperipheral vowels. Furthermore, these vowels can be eliminated in a number of different ways, including lowering, raising, tensing, or centralization. Two examples of perception-based reduction are provided in (7):

(7) Perception-Based Reduction

Algueres Catalan[3] | **Bergün Romansch**[4]



This type of vowel reduction can be analyzed using a single position-specific constraint—either a positional markedness constraint (Steriade 1994a,b, Zoll 1998) or a positional faithfulness constraint (Beckman 1998). As pointed out by Beckman (1998), either type is sufficient for vowel reduction. For concreteness, I will adopt a positional markedness approach to perception-based reduction. Therefore, the two examples of perception-based reduction illustrated in (7) above can both be derived using the constraint shown in (8). The different neutralization patterns result from different rankings for vowel faithfulness constraints:

(8) *License[Mid]/stress*: Mid vowels are licensed only under stress.

Is there any basis for using different formal mechanisms to account for these two types of reduction? Put another way—is there any evidence that sonority-driven reduction requires a family of inherently-ranked constraints, rather than a single, unitary vowel reduction constraint targeting non-high vowels?

The utility of the prominence alignment approach is that it allows us to use a finer-grained approach to vowel desirability. Under the unitary-constraint approach (cf. (8)), a given unstressed vowel is either good or bad: the distinction is binary. Under the prominence alignment approach, unstressed high vowels and [ə] are pretty good, unstressed mid vowels are worse, and unstressed low vowels are terrible. What we need is evidence that sonority-based reduction systems consider unstressed low vowels to be *worse* than unstressed mid vowels.

In fact, there are two types of evidence that suggest that this is precisely the case: the existence of sonority-driven reduction targeting only low vowels, and the occurrence of partial blockage of sonority-driven reduction in which unstressed mid (but now low) vowels surface without reduction.

The first such case is Sri Lankan Portuguese Creole (Smith 1978), in which the three underlying low vowels /æ,a,ɒ/ cannot occur in unstressed position, and instead alternate with the corresponding mid vowel or [ə]:

[3] Recasens 1991

[4] Lutta 1923, Kamprath 1991

(9) Sri Lankan Portuguese Creole (Smith 1978)

	Stressed Low Vowels		**Same Vowels Unstressed**	
unstressed ɒ > o	ɒ́:brə nɒ́:mi	'profession' 'name'	obré:ru nominá:	'manual worker' 'nominate'
unstressed æ > e	pǽ:dərə fæ̃:ru	'stone' 'iron'	pedriyá:du feré:ru	'ornamented w/stones' 'blacksmith'
unstressed a > ə	bá:jlu bá:rvə	'dance' 'beard'	bəjldó:r bərvé:ru	'dancer' 'barber'

Intuitively, this phenomenon is very similar to the sonority-driven reduction case seen in Bulgarian: unstressed high sonority vowels are eliminated in such a way as to preserve underlying palatality and rounding. The only difference is that Sri Lankan Portuguese Creole does tolerate unstressed mid vowels, whereas Bulgarian does not. This type of system can easily be modeled using the Bulgarian constraint ranking as a starting point—the constraint Ident[high] simply needs to be ranked slightly higher, as illustrated in (10). In effect, this makes the presence of an unstressed mid vowel slightly less important since the constraint *Unstressed/e,o is now dominated by the conflicting constraint Ident[high].

(10) Tableaux for Sri Lankan Unstressed /æ/ and /a/:

(cf. [fæ̃:ru] 'iron')

/ fæ réru / 'blacksmith'	Ident [front]	*Unstr.- a	Ident [high]	*Unstr.- e,o	*Unstr.- i,u,ə	Ident [low]
☞ [feré:ru]				*		*
[firé:ru]			*!		*	*
[færé:ru]		*!				
[fəré:ru]	*!				*	*

(cf. [bá:jlu] 'dance')

/ bajldór / 'dancer'	Ident [front]	*Unstr.- a	Ident [high]	*Unstr.- e,o	*Unstr.- i,u,ə	Ident [low]
☞ [bəjldó:r]					*	*
[bajldó:r]		*!				
[bejldó:r]	*!			*		*
[bijldó:r]	*!		*		*	*

Note that the ranking between the constraints *Unstressed/a and Ident[high] could be reversed, hence the dotted line separating these two tableau columns. What is imperative is that *both* Ident[high] and *Unstressed/a outrank *Unstressed/e,o—a ranking that can only be set in place if *Unstressed/a and *Unstressed/e,o are in fact separate entities in the grammar. In the Bulgarian grammar, the lower ranking of Ident[high] prevented it from affecting the outcome. With a higher rank for Ident[high], reduction via raising is ruled out, highlighting the different effects of *Unstressed/a and *Unstressed/e,o.

A similar phenomenon occurs in standard Catalan. Standard Catalan has a 7-vowel inventory under stress: /i,u,e,o,ɛ,ɔ,a/. In unstressed positions, this is reduced to the 3-vowel sub-inventory [i,u,ə]. This is illustrated in (11):

(11) Standard Catalan Vowel Reduction

	V UNDER STRESS		SAME V UNSTRESSED	
/a,e,ɛ/ > [ə]	sák	'sack'	səkɛ́t	'small sack'
	pɛ́l	'hair'	pəlút	'hairy'
	sérp	'snake'	sərpɔ́tə	'big snake'
/o,ɔ/ > [u]	pɔ́rt	'harbor'	purtuári	'of a harbor'
	gós	'dog'	gusás	'big dog'
/i,u/ remain unreduced	prím	'thin'	əprimá	'to make thin'
	ʎúm	'light'	ʎuminós	'light' (adj.)

Again, this reduction phenomenon is similar in many respects to the Bulgarian vowel reduction process: low and mid vowels are eliminated, leaving only vowels that are low in sonority in unstressed position ([i,u,ə]). The difference between Catalan and Bulgarian is that the front mid vowels /e,ɛ/ reduce via centralization to [ə] in Catalan, whereas in Bulgarian /e/ reduces via raising to [i]. This indicates that preservation of underlying palatality is not as imperative in Catalan as it is in Bulgarian. Instead, Catalan vowel reduction always preserves rounding (/o,ɔ/ > [u]), and also preserves vowel height in cases where this does not require losing rounding /e,ɛ/ > [ə]). This system can be generated by demoting the Ident[front] constraint to the bottom of the constraint hierarchy, while ranking Ident[high] to an intermediate position in the hierarchy. This is illustrated in (12):

(12) Constraint Ranking for Catalan

*Unstressed/a *Unstressed/e,o Ident[round]	>>	Ident[high]	>>	*Unstressed/i,u,ə Ident[low] Ident[front]

(13) Sample Tableaux for Catalan /o/

/gosás/	Ident [round]	*Unstr.- a	*Unstr.- e,o	Ident [high]	*Unstr.- i,u,ə
☞ [gusás]				*	*
[gosás]			*!		
[gəsás]	*!				

In tableau (13), the high rank of Ident[round] prevents centralization of underlying /o/ to [ə]. Furthermore, the constraint *Unstressed/e,o rules out non-reduction of unstressed /o/. Therefore, the successful candidate is the one in which unstressed /o/ raises to [u]: this candidate avoids a high-sonority vowel in unstressed position, and it does so in a way that preserves underlying rounding. If, however, the unstressed vowel had not been underlyingly round, we would predict a different outcome, as illustrated in the following tableau:

(14) Sample Tableaux for Catalan /e/

/serpɔ́ta/	Ident [round]	*Unstr.- a	*Unstr.- e,o	Ident [high]	*Unstr.- i,u,ə
☞ [sərpɔ́ta]					*
[sirpɔ́ta]				*!	
[serpɔ́ta]			*!		

In tableau (14), we see that the constraint Ident[round] has no effect—the unstressed vowel is not underlyingly round. Instead, the faithfulness constraint Ident[high] decides the day. Reduction via centralization to [ə] is the optimal candidate: it avoids an unstressed vowel that is high in sonority, and it preserves both rounding (vacuously) and vowel height. Note, however, that in both of the tableaux presented for Catalan vowel reduction, there is no reason to maintain *Unstressed/a and *Unstressed/e,o as separate constraints: they could have been combined into a single constraint, or their rankings could have been reversed—neither modification would have affected the outcome in these tableaux. However, when we examine additional data on Catalan vowel reduction, it becomes clear that we must have separate constraints against unstressed low vowels and mid vowels. The pertinent data involve hiatus environments: if application of vowel reduction would result in vowel hiatus between [a] and [ə] (or two schwas), vowel reduction is *blocked.* I will refer to this phenomenon as hiatus blocking. Data illustrating hiatus blocking are provided in (15):

(15) Catalan Hiatus Blocking (Mascaró 1978):

[teátrə]	*[təátrə]	'theatre'
[reəlitát]	*[rəəlitát]	'reality'
[meándrə]	*[məándrə]	'meander'
[əsteárik]	*[əstəárik]	'stearic'
[useənɔ́grəf]	*[usəənɔ́grəf]	'oceanographic'
[pəruneál]	*[pərunəál]	'tibular' (< peruné + al)
[lineál]	*[linəál]	'linear' (< line + al)

As illustrated above, unstressed /e/ is allowed to surface unreduced if reduction would otherwise produce an illicit form of vowel hiatus. However, hiatus blocking *does not affect unstressed /a/*: unstressed /a/ always undergoes reduction, even when it creates an illicit hiatus: cf. [səárik] 'Saharan'. (*[saárə]). To account for Catalan hiatus blocking, I propose the following constraint:

(16) ***Hiatus ([a],[ə])**: A vowel hiatus must contain at least one vowel that is specified for *vowel color* (vowel color = at least one of {+front, +round}).

By ranking the hiatus constraint between *Unstressed/a and *Unstressed/e,o, the correct results will be derived:

(17) Analyzing Catalan Hiatus Blocking

/saárik/	*Unstr.- a	*Hiatus ([a], [ə])	*Unstr.- e,o	*Unstr.- i,u,ə
☞ səárik		*		
saárik	*!		*	

/teátr/	*Unstr.- a	*Hiatus ([a], [ə])	*Unstr.- e,o	*Unstr.- i,u,ə
☞ teátr			*	
təátr		*!		

What we see in these two tableaux is that unstressed low vowels are worse than unstressed mid vowels in Catalan: not even the desire to avoid an infelicitous hiatus will induce the language to tolerate an unstressed low vowel, whereas unstressed mid vowels are acceptable under these circumstances. This is encoded grammatically by saying that the constraint *Unstressed/a is more important (higher ranked) than is the hiatus constraint. The multiple-constraint approach to sonority-driven reduction is further supported by the fact that Catalan unstressed /ɛ/ is also subject to hiatus blocking. In hiatus conditions, unstressed /ɛ/ undergoes partial reduction, surfacing as [e][5]: e.g. /kunr̄ɛá/ > [kunr̄eá] (cf. *[kunr̄əá]). This indicates that the hiatus constraint must in fact be ranked below *Unstressed/ɛ,ɔ, as illustrated in tableau (18):

(18) The ranking of *Hiatus([a],[ ]) and *Unstressed/ɛ, ɔ

/kunr̄ɛá/	*Unstr.- a	*Unstr.- ɛ,ɔ	*Hiatus ([a], [ə])	*Unstr.- e,o	*Unstr.- i,u,ə
☞ kunr̄eá				*	
kunr̄əá			*!		
kunr̄ɛá		*!			

In conclusion, we have seen that the prominence alignment approach is sufficient to account for simple cases of sonority-driven reduction such as that seen in Bulgarian. Furthermore, we saw that the multiple-constraint element of prominence alignment is in fact necessary to account for more complex examples of sonority-driven reduction. The members of the *Unstressed/X family must be inherently ranked such that *Unstressed/a outranks *Unstressed/e,o (cf. Sri Lankan Portuguese Creole), and constraints must be able to intervene between the members of the *Unstressed/X constraint family (cf. Catalan hiatus blocking).

3. An Alternative Analysis

Anderson (1996) has proposed an alternate analysis for Bulgarian vowel reduction, relying on particle-based vowel representations. In particle-based representations, vowels consist of three basic particles or elements: <I,U,A>.

[5] The fact that partial reduction is only an option for /ɛ/, and not for /a/ (*[seárik]), indicates that a Max/Dep approach to vowel faithfulness is required: Catalan vowel reduction allows violation of Max[+front] (/e,ɛ/>[ə]), but does not allow violation of Dep[+front] (/a/ cannot surface as [e]).

Different vowel qualities result from different combinations of these particles: [e] is a combination of <A> and <I>, for example. In most particle-based theories, these particles can be combined in various degrees: the combination of <A> plus <I> might have <A> as the dominant quality, or <I> as the dominant quality. The dominant quality is referred to as the "head" element. Anderson (1996) presents the following particle-based representation of the Bulgarian vowel system. In this system, the "head" element in a combination is listed first.

(19) A Particle-Based Analysis of Bulgarian (Anderson 1996)

Qualities		
i		u
e		o
	ə	
	a	

Representations		
<I>		<U>
<A,I>		<A,U>
	< >	
	<A>	

(w/ slight typographic modifications)

Using this system of representations, it is quite simple to model Bulgarian sonority-driven reduction as the elimination of the <A> particle from unstressed syllables. For example, eliminating the <A> particle from <A,I> converts underlying /e/ into surface [i], and so forth. The benefit of this approach is that the process used to eliminate the undesirable vowels is uniform: only particle-deletion is required. However, despite the superficial similarities between vowel reduction in Bulgarian and Sri Lankan Portuguese Creole, the analysis sketched above cannot be straightforwardly extended. Assuming that the low vowels /æ/ and /ɒ/ differ from the mid vowels in terms of headedness, we would have the following particle-based representation of the Sri Lankan vowel system:

(20) Extending the Particle-Based Analysis to Sri Lankan

Qualities		
i		u
e	ə	o
æ	a	ɒ

Representations		
<I>		<U>
<I,A>	< >	<U,A>
<A,I>	<A>	<A,U>

To derive the Sri Lankan vowel reduction phenomenon, we must prohibit the particle <A> from occurring in *head* position of an unstressed syllable. Although reduction of /a/ to [ə] would still be modeled as deletion of an <A>-particle, reduction of unstressed /æ/ to [e] is not a case of particle deletion, but a case of headedness reversal. Therefore, two different, ranked processes are needed.

(21) Condition: <A> cannot be the head element in an unstressed vowel
<A,*x*> → <*x*,A> (headedness reversal)
<A> → <∅> (<A>-deletion)

Similarly, the particle-based approach has difficulty representing the partial reduction of unstressed /ɛ/ to [e] in Catalan hiatus environments, since particle-based theories usually represent the tense~lax distinction by giving something *extra* to the tense qualities (i.e., tense vowels might be headed, while lax vowels are headless; tense vowels might have an additional <I> particle that lax vowels lack). This being the case, the /ɛ/ to [e] reduction would have to be formally modeled as an augmentation rather than a reduction. In summary then, although the particle-based approach offers a more elegant, unitary-process analysis of simple cases of sonority-driven reduction, examinations of more complex cases require a heterogeneous class of processes to be admitted. Although these processes are formally dissimilar (i.e., ranging from deletion, to reversal, to augmentation), they are functionally similar: they all decrease sonority. In fact, this approach can almost be considered a notational variant of the Optimality-Theoretic analysis provided above. The main difference is that under the particle-based approach, vowel sonority is encoded in vowel representations. In the Optimality-Theoretic approach, vowel sonority is encoded in phonetically-based prominence constraints.

4. Conclusion: Maximizing Sonority-Stress Combinations

The fact that prominence alignment is the motivation behind sonority-driven reduction is an interesting finding since it fills in the final slot in the typology of possible interactions between stress and sonority, as predicted by the prominence alignment hypothesis. That is, if a language maximizes prominence by aligning stress and sonority, there are two parameters that can be varied, each of which has two values. The first parameter is the type of element to be targeted for special attention: high prominence elements or low prominence elements. The second parameter is the phonological entity that can be modified: stress or vowel quality (sonority). Taking Kenstowicz' (1994) examples of sonority-driven stress as a starting point, we can see that all sonority-driven stress systems keep vowel quality (sonority) static, but they do modify stress placement. However, with respect to the position that is singled out for special attention, two different categories of sonority-driven stress are observed: those that concentrate on high prominence elements (requiring high-sonority vowels be stressed, cf. Kobon) and those that concentrate on low-prominence elements (requiring that low-sonority vowels be unstressed, cf. Northwest Mari). This is illustrated in the first row of the following table (22):

(22) Maximizing Stress/Sonority Combinations: A Brief Typology

	Focus on High Prominence	**Focus on Low Prominence**
Modify Stress	High sonority vowels attract stress placement (Kobon)	Low sonority vowels repel stress placement. (NW Mari)
Modify Sonority	Stressed low sonority vowels undergo sonority increases (Chamorro, Crosswhite 1998)	**sonority-driven reduction:** unstressed high-sonority vowels undergo sonority reduction

As shown in the second row, it is also possible to maximize stress-sonority combinations by keeping stress placement static and modifying vowel quality (sonority). Again, there are two different categories of this phenomenon: those that focus on high prominence elements (i.e., stressed positions) and those that focus on low prominence elements (i.e., unstressed positions). As shown, three of the categories predicted by this typology are already attested. The attestation of sonority-driven reduction completes this typology.

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