Harmony is myopic.

Reply to Walker (2010), *Nonmyopic harmony and the nature of derivations*

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## 1 Introduction

Wilson (2004, 2006) claims that harmony is *myopic* — in unbounded spreading processes, the viability of local spreading does not depend on the viability of complete harmony. Walker (2010), however, claims that Central Veneto metaphony represents *non-myopic* harmony: height harmony affects an unstressed penult only if the stressed antepenult is a suitable target for spreading.

On the basis of Central Veneto, Walker (2010) argues in favor of parallel evaluation in Optimality Theory (OT) (Prince and Smolensky, 1993/2004), and against versions of OT with serial evaluation. The argument against serial evaluation relies on a single locality constraint that is insensitive to the quality of skipped vowels. In this paper, I show that using quality-sensitive locality permits an analysis of Central Veneto in Harmonic Serialism (HS) (McCarthy, 2000, 2007), which has a number of typological advantages over parallel OT with respect to harmony processes (McCarthy, to appear).

To maintain comparability, I adopt the representational and theoretical assumptions in Walker's analysis of Central Veneto, but with a slight modification to the constraints governing locality, which I justify on independent grounds (see Section 5 for a brief discussion of the consequences of some of the inherited assumptions). In this squib, I demonstrate that

under this modified analysis, Central Veneto no longer poses difficulties for serial evaluation.

## 2 Central Veneto and Nonmyopia

In Central Veneto, mid vowels [e,o] in stressed syllables raise to high [i,u] when followed by a high vowel. When low and [-ATR] vowels [a,ɛ,ɔ] appear in stressed position, they do not raise (Walker, 2005, 2010).

In words with antepenultimate stress, the stressed vowel targeted by raising is separated from the high trigger by an intervening unstressed penult. When the intervening penult contains a mid vowel, the stressed vowel raises, and the intervening vowel is affected as well (1a). When the intervening penult contains a low vowel, raising of the stressed vowel is blocked (1b). When the stressed vowel is low or [−ATR], the intervening vowel is also unaffected (1c-d).

(1) Antepenultimate stress[1]

| | | | |
|---|---|---|---|
| a. | órden-o | úrdin-i | ‘order (1sg/2sg)’ |
| b. | lavór-a-v-a | lavór-a-v-i | ‘work (1sg/2sg impf. ind.)’ |
| c. | pɛ́rseg-o | pɛ́rseg-i | ‘peach (m sg/pl)’ |
| d. | ángol-o | ángol-i | ‘angle (m sg/pl)’ |

Walker (2005) proposes that height harmony in Central Veneto is motivated by a licensing constraint — the feature [HIGH] must be licensed by association with a vowel in a stressed syllable. The pattern in (1) represents an apparent case of nonmyopia: spread-

ing [HIGH] to the unstressed penult depends on the possibility of spreading further to the stressed vowel. This presents a problem for serial versions of OT like Harmonic Serialism, which lack derivational look-ahead — in an iterative theory of spreading, only one vowel can harmonize at a time, so dependencies like the one in Central Veneto are predicted to be impossible.

In Harmonic Serialism, GEN is restricted to producing candidates that differ from the input by at most a single change. This limited candidate set is evaluated by EVAL, and the optimum becomes the input to the next step in the derivation. The GEN→EVAL loop continues until the faithful candidate at a given step is chosen as the optimum, at which point the derivation converges.[2]

There are two possible paths leading from /órden-i/ to [úrdin-i] in which only one vowel is changed at a time. In (2a), [HIGH] first spreads to the unstressed penult, and subsequently spreads to the stressed vowel. In (2b), [HIGH] first spreads to the stressed vowel, and then subsequently spreads to the unstressed penult.

(2) a. órden-i → órdin-i → úrdin-i

b. órden-i → úrden-i → úrdin-i

If (2a) was an optimal first step, then */pɛ́rseg-i/→[pɛ́rsig-i] would also be predicted — Walker (2010) rightly rules out this derivational path. The problem attributed to (2b), which involves non-local harmony (transparency), is that not all unstressed penults behave as transparent in Central Veneto — [a] is opaque, and does not permit spreading to proceed across it. Walker proposes that the non-locality in the first step of (2b) violates a

constraint prohibiting non-adjacent spreading, LOCALITY. The ranking of this constraint that motivates the initial step /órden-i/→[úrden-i] will also prefer */lavór-a-v-i/→[/lavúr-a-v-i/]. Given this constraint set, there is no ranking that will produce both transparent [e] and opaque [a] — LICENSE-[HIGH] and LOCALITY are paradoxically ranked.

Because LOCALITY treats [e] and [a] identically, the only grounds on which their ability to be skipped can be distinguished requires derivational look-ahead: [e] can be skipped at the initial step because it is subsequently raised, while [a] cannot be skipped because it is ineligible for raising. Based on this failure of the myopic analysis, Walker (2010) argues in favor of a parallel OT analysis.

In parallel OT, nonmyopia is readily accounted for; because all operations are performed and evaluated simultaneously, it's possible to compare a candidate with raising of both the penult and antepenult to a candidate with no harmony at all. However, the ability of parallel OT to produce languages with nonmyopic harmony has pathological typological effects — see Wilson (2004, 2006); McCarthy (to appear) for a discussion of these pathologies, and the role that the lack of derivational look-ahead in theories like HS plays in resolving many of them.

## 3 A Successful Myopic Analysis

In the analysis above, nonmyopia is a result of the inability to distinguish between skipping [e] and skipping [a] in the initial step of the derivation. This results from the fact that locality is governed by a single, omnibus constraint — LOCALITY is blind to the quality

of intervening segments, and its ranking determines transparency and opacity across the board for all non-participants.

At the initial step in the derivation, Central Veneto represents a harmony system where some segments are transparent, while others are opaque. While this is predicted to be impossible with a single LOCALITY constraint, it is possible if locality is instead governed by a family of quality-sensitive constraints, as in (3).

(3) *SKIP(X): Assign one violation for every segment of type X that intervenes between two segments that are linked to the same instance of a feature F.

Because locality constraints are quality sensitive, the constraint violated by skipping [a] and the constraint violated by skipping [e] may be ranked separately with respect to the constraint motivating spreading. This predicts that harmony systems with both transparent and opaque segments should be possible (see Kaun 1995 for a similar proposal).

With /órden-i/, skipping [e] is temporarily tolerated in order to license height. On the first step in the derivation in (4), LIC-[HIGH] prefers spreading height to the stressed syllable. This comes at the expense of violating *SKIP(MID) and IDENT. At the second step, *SKIP(MID) compels a violation of IDENT(HIGH) to resolve the gapped configuration. On the third step, no further spreading is motivated, and the derivation converges.

(4) **Step 1:**

| órden-i | *SKIP(LOW) | LIC-[HIGH] | *SKIP(MID) | ID(HIGH) |
|---|---|---|---|---|
| a. órden-i | | W1 | L | L |
| b. órdin-i | | W1 | L | 1 |
| c. ☞ úrden-i | | | 1 | 1 |

**Step 2:**

| úrden-i | *SKIP(LOW) | LIC-[HIGH] | *SKIP(MID) | ID(HIGH) |
|---|---|---|---|---|
| a. úrden-i | | | W1 | L |
| b. ☞ úrdin-i | | | | 1 |

**Step 3:** *Convergence*

With /lavór-a-v-i/, however, the need to license height is unable to compel skipping of [a]. On the first step of the derivation in (5), LIC-[HIGH] again prefers spreading to the stressed vowel to license height. However, this comes at the expense of violating *SKIP(LOW), which outranks LIC-[HIGH], and no spreading occurs. Because the input

is selected as the optimum, the derivation converges.

(5) **Step 1:** *Convergence*

| lavór-a-v-i | *SKIP(LOW) | LIC-[HIGH] | *SKIP(MID) | ID(HIGH) |
|---|---|---|---|---|
| a. ☞ lavór-a-v-i | | 1 | | |
| b. lavór-e-v-i | | 1 | | W1 |
| c. lavúr-a-v-i | W1 | L | | W1 |

With a single LOCALITY constraint, a nonmyopic analysis of Central Veneto was necessary because the only way to distinguish the acceptability of skipping [e] and skipping [a] relied on derivational look-ahead. With a family of quality-sensitive locality constraints, however, a myopic analysis is possible — because skipping [e] and skipping [a] violate different, separately rankable constraints, they can be distinguished without reference to the outcome of subsequent derivational steps.

## 4 Transparency and Blocking

The difference between (Walker, 2010)'s analysis and the present proposal is the quality-sensitive nature of locality. Cross-linguistic evidence for this kind of quality sensitivity can be found in languages whose surface patterns include both transparent and opaque

segments; such languages are easily accounted for under the current approach, but predicted to be impossible with a single omnibus locality constraint.

In Menominee, for example, low vowels do not participate in height harmony. However, low front vowels are transparent, while low back vowels are opaque (Bloomfield, 1962). [3]

The mid vowels [e:] and [o:] raise to [i:] and [u:] before a high vowel.[4] The low back vowel [a:] does not undergo raising, but acts as transparent (6ab); the initial [e:] in [ce:pa:hkow] becomes [i:] in [neci:pa:hkim], despite the intervening [a:]. The low front vowel [æ,æ:] also does not undergo raising, but acts as opaque (6cd); the initial [o:] in [so:wa:næhki:qsew] is mid, despite a subsequent [i:], because [æ] intervenes.

(6) Transparency and opacity in Menominee

a. c**e:**pa:hkow ‘he cooks’ // nec**i:**pa:hk**i**m ‘cook-NOM’

b. s**o:**poma:hkow “he makes sugar’ // nes**u:**poma:hk**i**m ‘sugar-maker’

c. s**o:**wa:næhk**i:**qsew ‘he has his hair blown back by the wind’

d. p**e:**htæhk**i:**ʔtaw ‘he sticks his head in’

Abstracting away from the constraint motivating spreading, it becomes clear that a single constraint governing locality will not account for a language like Menominee. As with Central Veneto above, there is no ranking that will produce both the transparency of [a:] and the opacity of [æ,æ:].

Using a family of quality-sensitive locality constraints, however, there is a consistent

ranking that will produce Menominee. *SKIP(FRONT) outranks the constraint motivating spreading, and blocks harmony when [æ,æ] intervenes; *SKIP(BACK) is dominated by the spreading constraint, and [a:] is skipped.

Other languages whose surface harmony patterns have been described as having both transparency and opacity include Finnish (Ringen and Heinämäki, 1999), Hungarian (Hayes and Londe, 2006), Lokaa (Akinlabi, 2009), Eastern Cheremis (Sebeok and Ingemann, 1961; Odden, 1991), Wolof (Archangeli and Pulleyblank, 1994), Berber (Hansson, 2010), and Shuluun Höh and Khalkha Mongolian (Kaun, 1995).

What formal or functional factors play a role in determining which segments are transparent and which are opaque remains an open question — though see Kaun (1995); Nevins (2004); Benus (2005) for further discussion. For example, Kaun proposes a single fixed hierarchy of quality-sensitive locality constraints, but Benus suggests an explanation that depends critically on the particular properties of the harmonizing feature, in which case relativized hierarchies for different types of harmony may be merited. Furthermore, the role of similarity/identity in blocking (as in Khalkha, where high round vowels block rounding harmony) merits further exploration.

Languages in which transparent and opaque segments co-occur pose a very real problem for a theory of transparency and opacity in harmony that relies on a single locality constraint, but are given a straightforward analysis in a theory with multiple, quality-sensitive locality constraints, suggesting that this departure from Walker (2010)'s assumptions is justified.

## 5 Further Consequences

Both the account presented here and the LOCALITY-based analysis presented in Walker (2010) assume a theory of GEN in which candidates with non-local harmony can be produced. This is by no means an innocent assumption — see Archangeli and Pulleyblank (1994); Gafos (1999); Ni Chiosain and Padgett (2001); Walker (1998) and others. There is no general consensus on the viability of non-local harmony, and it is possible that the present assumptions will prove to be untenable. However, if non-adjacent autosegmental links are instead excluded from GEN, it would still be possible to adopt the present proposal using segmental correspondence relations and a quality-sensitive version of Rose and Walker (2004)'s PROXIMITY constraint.

An anonymous reviewer points out that there may be other sources of blocking beyond a locality constraint; if these could explain other examples of quality-sensitive locality, but not Central Veneto, the argument for introducing quality-sensitivity into the locality constraint would be undermined. For example, Walker (2009) presents an Agreement by Correspondence (ABC) analysis of Menominee, in which harmony is blocked by an intervening segment that is too similar to the trigger. Such an approach encounters difficulty, however, with languages like Finnish and Hungarian, where blocking is quality-sensitive but not similarity-sensitive — insofar as ABC can be adapted to handle these cases (see e.g. Rhodes 2010), it can also be adapted to handle Central Veneto.

Another anonymous reviewer notes that the *SKIP(X) family over-generates the predicted typology of harmony processes — under the right ranking conditions, a skipped

segment could be induced to change its quality to violate a lower-ranked *SKIP(X) constraint. This is a real problem, but it is not limited to *SKIP(X) and Harmonic Serialism. Under Walker (2010)'s analysis, certain rankings would induce segmental deletion in order to avoid violations of LOCALITY. This is true of any analysis that includes a constraint against locality, and is a subset of the Too Many Solutions Problem (Steriade, 2001; Blumenfeld, 2006, and others). A complete account of transparency must of course address this issue, but it is beyond the scope of this squib.

The overall argument here, however, does not depend on the specific viability of the *SKIP(X) proposal. Any well-formedness constraint which distinguished a transparent [a] from a transparent [e] would permit a successful HS analysis of the Central Veneto data.

## 6 Conclusion

Walker (2010) argues that metaphony in Central Veneto represents a type of nonmyopic harmony, and claims that Harmonic Serialism, which lacks derivational look-ahead, is unable to account for Central Veneto harmony. In this paper, I have shown that a modest revision to the constraints governing transparency and blocking permits an analysis where derivational look-ahead is not required. Furthermore, I have shown that this modification is independently justified, because it provides an account of languages whose surface harmony patterns include both transparent and opaque segments. The analysis presented here removes a thus far unique exception to the claim that harmony is myopic.

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Notes

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[1]The examples in (1a-b) are the only data of their kind presented in Walker (2005, 2010). Walker also cites Grado as an example of the pattern shown in Central Veneto, but Mascaró (2009) presents conflicting data. Following Walker, I will proceed under the assumption that the Central Veneto examples are representative of a general pattern.

[2]Walker (2010) focuses on a particular instantiation of HS, Optimality Theory with Candidate Chains (OT-CC) (McCarthy, 2007). For expositional ease, I abstract away from the specific technical details of OT-CC, which are not relevant to the present discussion.

[3]Bloomfield (1962) and others (Cole and Trigo, 1987, 1988; Cole, 1987; Steriade, 1987) analyze the harmonizing feature in Menominee as height, but Archangeli and Pulleyblank (1994); Milligan (2000) and others interpret it as [+ATR]. Their proposed reanalysis is based on analytical rather than empirical grounds; the phonetic descriptions provided by Bloomfield and transcriptions and sound files in a prepared dictionary (The Menominee

Indian Tribe of Wisconsin, 2005) are both unequivocal in implicating height.

[4]Because short vowels in Menominee are so short and weak, the role of [e] and [o] is unclear; Bloomfield (1962) transcribes them as transparent, but it is also possible that they are participants.