Majority Rule in Harmonic Serialism

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This paper argues that output constraints defined in terms of precedence relations make pathological predictions, focusing on Majority Rule agreement as a case study. Precedence relations refer to the relative order of segments, defining *subsequences* without any notion of distance or contiguity (Heinz, 2007, 2010; Rogers et al., 2010). For example, the string [eʃʃ] contains 2 subsequences e. . . ʃ, but only one contiguous *substring* eʃ. We show that Harmonic Serialism produces Majority Rule agreement only with output constraints defined in terms of precedence relations, e.g., *{s. . . ʃ, ʃ. . . s}, and hypothesize that such constraints are not available to Con. We further show that this leads to undergeneration, and propose adopting *directional* evaluation (Eisner, 2000) to model iterative harmony in Harmonic Serialism.

Majority Rule (MR) is a pathological agreement pattern predicted in parallel Optimality Theory (OT) (Prince & Smolensky, 1993/2004), where assimilation is controlled by the largest class in the input (Lombardi, 1999; Baković, 2000). For example, if an input contains more /ʃ/ than /s/, all sibilants in the output surface as [ʃ]; this is illustrated in Tableau (1). Candidates (1c) and (1d) satisfy the output constraints Corr(sib), which requires sibilants to correspond, and CC-Ident(ant), which requires correspondents to agree in anteriority. The loci of violation of CC-Ident(ant) are indicated with λ (McCarthy, 2003). Ident(ant) prefers (1c) over (1d) because fewer segments are targeted for harmony.

(1)

/ʃ. . . ʃ. . . ʃ. . . s. . . s/	Corr(sib)	CC-Ident(ant)	Ident(ant)
a. ʃ. . . ʃ. . . ʃ. . . s. . . s	W 10		L
b. $ʃ_i$ . . . $ʃ_i$ . . . $ʃ_i$ . . . s_i . . . s_i (λ λ λ / λ λ λ)		W 6	L
→ c. $ʃ_i$ . . . $ʃ_i$ . . . $ʃ_i$ . . . ($ʃ_i$) . . . ($ʃ_i$)			2
d. (s_i) . . . (s_i) . . . (s_i) . . . s_i . . . s_i			W 3

In OT, MR arises from differences in the number of times candidates violate a given faithfulness constraint. This is also predicted with locally defined agreement constraints. These differences do not arise in Harmonic Serialism (HS) (Prince & Smolensky, 1993/2004; McCarthy, 2000), because Gen is limited to producing candidates that differ from the input via the application of at most one unfaithful operation. Candidates therefore can only violate a given faithfulness constraint at most once. HS should therefore not produce MR, but we show that output constraints defined in terms of precedence relations motivate it.

Tableau (2) below gives the first step of the HS derivation mapping /ʃ. . . ʃ. . . ʃ. . . s. . . s/ onto [ʃ. . . ʃ. . . ʃ. . . ʃ̲. . . ʃ̲]. Because Gen can only make single changes, no candidate fully satisfies the output constraints, and candidates whose sibilants correspond violate CC-Ident(ant) to various degrees. The faithful candidate (2b) and the candidate where an /ʃ/ is targeted (2d) incur more violations of CC-Ident(ant) than the candidate where an /s/ is targeted (2c), which is chosen as optimal. In the next step of the derivation, the remaining /s/ palatalizes, satisfying CC-Ident(ant). In general, at each step of the derivation, targeting a member of the smallest class always incurs the fewest violations of CC-Ident, removing more loci of violation than are added. Over the course of a derivation, minority classes gradually assimilate to the largest class until total harmony is achieved.

This reveals that MR is a pathology that holds both in OT and HS. In HS, MR is associated with Con, specifically, it obtains from evaluating CC-Ident as assigning violations to every pair of disagreeing correspondents, which is standardly held (Walker, 2000; Rose &

(2)

Step 1: /ʃ. . . ʃ. . . ʃ. . . s. . . s/	Corr(sib)	CC-Ident(ant)	Ident(ant)
a. ʃ. . . ʃ. . . ʃ. . . s. . . s	W 10		L
b. ʃ$_i$ . . . ʃ$_i$ . . . ʃ$_i$ . . . s$_i$ . . . s$_i$ (λ λ λ / λ λ λ)		W 6	L
→ c. ʃ$_i$ . . . ʃ$_i$ . . . ʃ$_i$ . . . (ʃ$_i$) . . . s$_i$ (λ λ λ λ)		4	1
d. ʃ$_i$ . . . ʃ$_i$ . . . (s$_i$) . . . s$_i$ . . . s$_i$ (λ λ λ / λ λ λ)		W 6	1

Walker, 2004; Hansson, 2010; Bennett, 2015). This approach, which Hansson (2007) terms *global* evaluation, is equivalent to defining an agreement constraint over disagreeing sibilant subsequences: *{s. . . ʃ, ʃ. . . s}. Rejecting global evaluation removes MR from HS. This is desirable computationally, as phonological transformations are regular (Johnson, 1972; Kaplan & Kay, 1994), and MR exceeds that expressivity (Riggle, 2004; Heinz & Lai, 2013).

However, the alternative to global evaluation, *local* evaluation of CC-Ident (Hansson, 2007, 2014; Walker, 2015), undergenerates in HS. Under local evaluation, only *chain-adjacent* pairs of correspondents are potential loci of violation. For example, in the string [sasaʃaʃ], only the medial [s-ʃ] pair violates CC-Ident(ant). This is equivalent to projecting a tier and requiring that tier-adjacent segments agree (Heinz et al., 2011; McMullin & Hansson, 2015; McMullin, 2016). The difficulty for HS is that iterative harmony does not obtain with locally defined agreement constraints (Pater et al., 2007). Harmonizing in either direction, i.e. [saʃ̲aʃaʃ] ∼ [sasas̲aʃ], does not improve on CC-Ident and needlessly violates faithfulness.

To overcome this, we propose adopting *directional* evaluation of CC-Ident (Eisner, 2000). Directional evaluation distinguishes between loci by their relative position within a candidate, and was introduced to avoid the Midpoint Pathology associated with Alignment constraints (Eisner, 1997, 2000), also defined over subsequences (McCarthy, 2003; Hyde, 2012, 2016). For example, a string [ʃ. . . ʃ. . . ʃ. . . s. . . s] contains 5 sibilants and 4 potential loci of violation - one for each chain-adjacent pair of sibilants. Evaluating right-to-left, loci are more marked the closer to the right edge of the candidate they occur. This is illustrated in Tableau (3) by splitting CC-Ident(ant) into 4 constraints in a strict dominance relation. Iterative harmony is possible, as each step pushes the locus of violation further leftwards.

(3)

Step 1: /ʃ. . . ʃ. . . ʃ. . . s. . . s/ (λ_1 λ_2 λ_3 λ_4)	Corr(sib)	CC-Ident(ant) λ_4	λ_3	λ_2	λ_1	Ident(ant)
a. ʃ. . . ʃ. . . ʃ. . . s. . . s	W 10			L		L
b. ʃ$_i$ . . . ʃ$_i$ . . . ʃ$_i$ . . . s$_i$ . . . s$_i$ (λ)			W 1	L		L
c. ʃ$_i$ . . . ʃ$_i$ . . . ʃ$_i$ . . . (ʃ$_i$) . . . s$_i$ (λ)		W 1		L		1
→ d. ʃ$_i$ . . . ʃ$_i$ . . . (s$_i$) . . . s$_i$ . . . s$_i$ (λ)				1		1