Alignment Continued:
Distance-Sensitivity, Order-Sensitivity, and the Midpoint Pathology[*]

Brett Hyde
Washington University
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1 Introduction

An interesting consequence of the traditional alignment formulation (McCarthy and Prince 1993), first identified by Eisner (1997), is that alignment constraints can draw a stress, tone, or other object towards the center of form. Consider, for example, the same-edge alignment constraints MIDPOINTLEFT and MIDPOINTRIGHT, which align a particular syllable edge with the same edge of a primary stress.

(1) a. MIDPOINTLEFT: The left edge of every syllable is aligned with the left edge of some primary stress. A violation is assessed for each syllable that intervenes between misaligned edges.

b. MIDPOINTRIGHT: The right edge of every syllable is aligned with the right edge of some primary stress. A violation is assessed for each syllable that intervenes between misaligned edges.

Despite their opposite directional specifications, MIDPOINTLEFT and MIDPOINTRIGHT both have the effect of drawing primary stress to the center of a string of syllables.

(2)

	MIDPOINTLEFT	MIDPOINTRIGHT
a. σ́σσσσσσ	* ** *** **** ***** ******	* ** *** **** ***** ******
b. σσ́σσσσσ	* * ** *** **** *****	* * ** *** **** *****
c. σσσ́σσσσ	** * * ** *** ****	** * * ** *** ****
d. σσσσ́σσσ	☞ *** ** * * ** ***	☞ *** ** * * ** ***
e. σσσσσ́σσ	**** *** ** * * **	**** *** ** * * **
f. σσσσσσ́σ	***** **** *** ** * *	***** **** *** ** * *
g. σσσσσσσ́	****** ***** **** *** ** *	****** ***** **** *** ** *

In the seven-syllable string in (2), both constraints prefer that the primary stress occur on the fourth.

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A similar effect arises with opposite-edge alignment constraints. Consider OffsetLeft and OffsetRight, which align a particular syllable edge with the opposite edge of a primary stress.

(3) a. OffsetLeft: The left edge of every syllable is aligned with the right edge of some primary stress. A violation is assessed for each syllable that intervenes between misaligned edges.

b. OffsetRight: The right edge of every syllable is aligned with the left edge of some primary stress. A violation is assessed for each syllable that intervenes between misaligned edges.

Both constraints draw the primary stress towards the center of a string of syllables, but not to the exact center. The slight difference in position reflects their different directional specifications.

(4)

	OffsetLeft	OffsetRight
a. σ́σσσσσσ	* * ** *** **** *****	* ** *** **** ***** ****** *******
b. σσ́σσσσσ	** * * ** *** ****	* ** *** **** ***** ******
c. σσσ́σσσσ	☜ *** ** * * ** ***	* * ** *** **** *****
d. σσσσ́σσσ	**** *** ** * * **	** * * ** *** ****
e. σσσσσ́σσ	***** **** *** ** * *	☜ *** ** * * ** ***
f. σσσσσσ́σ	****** ***** **** *** ** *	**** *** ** * * **
g. σσσσσσσ́	******* ****** ***** **** *** ** *	***** **** *** ** * *

In the seven-syllable form in (4), OffsetLeft prefers that the primary stress occur just to the left of the fourth syllable, over the third. OffsetRight prefers that the stress occur just to the right of the fourth syllable, over the fifth.

One reason that effects like those illustrated in (2, 4) have not received wider attention in the literature may be that they have the feel of toy examples. Constraints that align syllable edges with stress edges have seen little, if any, significant use. Similar problems arise, however, with constraints that actually do play an important role in current theories. Consider the familiar AllFeetL and AllFeetR constraints.

(5) a. AllFeetL: The left edge of every foot is aligned with the left edge of some prosodic word. A violation is assessed for each syllable that intervenes between misaligned edges.

b. AllFeetR: The right edge of every foot is aligned with the right edge of some prosodic word. A violation is assessed for each syllable that intervenes between misaligned edges.

In practice, ALLFEETL and ALLFEETR are most often used to evaluate forms that contain a single prosodic word. ALLFEETL draws every foot within the prosodic word towards the left edge, and ALLFEETR draws every foot within the prosodic word towards the right edge. The problem arises when the constraints evaluate forms that contain multiple prosodic words.

(6)

		ALLFEETL
a.	[(σσ)(σσ)(σσ) σ] [(σσ)(σσ)(σσ) σ]	** **** ** ****
b.	[(σσ)(σσ) σ (σσ)] [(σσ)(σσ)(σσ) σ]	☞ ** ** ** ****
c.	[σ (σσ)(σσ)(σσ)] [(σσ) σ (σσ)(σσ)]	* *** ** *** *****
d.	[σ (σσ)(σσ)(σσ)] [σ (σσ)(σσ)(σσ)]	* *** ** * *** *****

The candidates in (6), for example, contain two seven-syllable prosodic words with three feet in each. Under evaluation by ALLFEETL, the left edge of the second prosodic word forms a sort of midpoint that can attract feet from either direction. Rather than drawing the first three feet towards the left edge of the first prosodic word and the second three feet towards the left edge of the second, as might be expected, ALLFEETL actually draws the final foot of the first prosodic word towards the left edge of the second, as in (6b), because it incurs fewer violations when evaluated with respect to the second left edge.

(7)

		ALLFEETR
a.	[(σσ)(σσ)(σσ) σ] [(σσ)(σσ)(σσ) σ]	***** *** * ** *** *
b.	[(σσ)(σσ) σ (σσ)] [(σσ)(σσ)(σσ) σ]	***** *** ** *** *
c.	[σ (σσ)(σσ)(σσ)] [(σσ) σ (σσ)(σσ)]	☞ **** ** ** **
d.	[σ (σσ)(σσ)(σσ)] [σ (σσ)(σσ)(σσ)]	**** ** **** **

Similarly, in (7), under evaluation by ALLFEETR, the right edge of the first prosodic word forms a sort of midpoint that attracts feet from both directions. ALLFEETR draws the initial foot of the second prosodic word towards the right edge of the first, as in (7c), because it incurs fewer violations when evaluated with respect to the first right edge.

The purpose of this paper is to identify the properties of the traditional alignment formulation that are responsible for producing results like those illustrated in (2, 4, 6, 7) and to identify the modifications that can be made to avoid these results while maintaining alignment's ability to perform its traditional functions. We will find that the necessary modifications are easily achieved under an extended version of the approach proposed by McCarthy (2003).

1.1 The Necessary Conditions

I will refer to the collection of situations where an object is drawn towards a medial position in a form as the *Midpoint Pathology*. Midpoint Pathology effects arise somewhat unexpectedly under traditional alignment since its directional specifications are explicitly edge-oriented.

(8) Align (*Cat1*, *Edge1*, *Cat2*, *Edge2*, *Cat3*)

The *Edge1* of every *Cat1* coincides with the *Edge2* of every *Cat2*. A violation is assessed for each *Cat3* that intervenes between misaligned edges.

Under the traditional formulation, *Cat1* and *Cat2* specify the categories whose edges are being aligned, and *Edge1* and *Edge2* specify the relevant edges. The *Edge1* of every *Cat1* is required to coincide with the *Edge2* of some *Cat2*. When the coincidence requirement is not met, a violation is assessed for each instance of *Cat3* that separates each pair of misaligned edges.

Since alignment is clearly a relationship between category peripheries, it is a somewhat surprising that it can draw instances of one of the aligned categories towards the center of a form. Two conditions are necessary to produce this result, however. First, alignment must be sensitive to the distance between misaligned edges. MIDPOINTLEFT and MIDPOINTRIGHT, for example, can draw stress to the center syllable because it is the syllable with the shortest total distance between itself and every other syllable. Because the two constraints essentially seek the shortest total distance between the syllable with primary stress and every other syllable, they draw the primary stress to the middle syllable, where the total distance is minimized.

If the constraints were sensitive to simple misalignment, rather than to the distance between misaligned edges, they would be unable to produce this result. Consider the distance-insensitive versions given in (9).

(9)

a. DI-MIDPOINTLEFT: The left edge of every syllable is aligned with the left edge of some primary stress. A violation is assessed for each pair of misaligned edges.

b. DI-MIDPOINTRIGHT: The right edge of every syllable is aligned with the right edge of some primary stress. A violation is assessed for each pair of misaligned edges.

Rather than having the ability to draw stress to the center of the form, the distance insensitive versions are unable to influence the stress's position at all.

(10)

	DI-MidpointLeft	DI-MidpointRight
a. σ́σσσσσσ	* * * * * *	* * * * * *
b. σσ́σσσσσ	* * * * * *	* * * * * *
c. σσσ́σσσσ	* * * * * *	* * * * * *
d. σσσσ́σσσ	* * * * * *	* * * * * *
e. σσσσσ́σσ	* * * * * *	* * * * * *
f. σσσσσσ́σ	* * * * * *	* * * * * *
g. σσσσσσσ́	* * * * * *	* * * * * *

As (10) illustrates, the number of misaligned edges is the same regardless the stress's position. Since the number of misaligned edges is the same, and the constraints are sensitive only to simple misalignment, the overall number of violations incurred by each candidate is also the same.

The second condition is that violation assessment must not be sensitive to the order of misaligned edges. For MidpointLeft and MidpointRight to draw primary stress to the center of the form, they must assess violations for misaligned edges whether the relevant stress edge precedes or follows the relevant syllable edge. If violations were only assessed when the stress and syllable edges occurred in a particular order, then the stress would be drawn to an edge of the form rather than the center.

Consider the order-sensitive versions of MidpointLeft and MidpointRight in (11).

(11) a. OS-MidpointLeft: The left edge of every syllable is aligned with the left edge of some primary stress. A violation is assessed for every syllable intervening between a left syllable edge and a following left stress edge.

b. OS-MidpointRight: The right edge of every syllable is aligned with the right edge of some primary stress. A violation is assessed for every syllable intervening between a right syllable edge and a preceding right stress edge.

As (12) illustrates, OS-MidpointLeft draws the primary stress to left edge of the prosodic word because violations can be prevented simply by avoiding configurations where the left stress edge follows a left syllable edge. Although there are many misaligned left syllable edges in the preferred candidate (12a), they fail to produce violations, because they are not followed by the left stress edge.

(12)		OS-MidpointLeft	OS-MidpointRight
	a. σ́σσσσσσ	☞	* ** *** **** ***** ******
	b. σσ́σσσσσ	*	* ** *** **** *****
	c. σσσ́σσσσ	** *	* ** *** ****
	d. σσσσ́σσσ	*** ** *	* ** ***
	e. σσσσσ́σσ	**** *** ** *	* **
	f. σσσσσσ́σ	***** **** *** ** *	*
	g. σσσσσσσ́	****** ***** **** *** ** *	☞

OS-MidpointRight draws the primary stress to the right edge in a similar fashion. Although there are many misaligned right syllable edges in the preferred candidate (12g), they fail to incur violations, because they are not preceded by the right stress edge.

Although they also fail to draw primary stress towards the center syllable, a different effect is obtained with order-sensitive versions of the opposite-edge OffsetLeft and OffsetRight.

(13) a. OS-OffsetLeft: The left edge of every syllable is aligned with the right edge of some primary stress. A violation is assessed for every syllable intervening between a left syllable edge and a preceding right stress edge.

b. OS-OffsetRight: The right edge of every syllable is aligned with the left edge of some primary stress. A violation is assessed for every syllable intervening between a right syllable edge and a following left stress edge.

OS-OffsetLeft, as (14) illustrates, draws primary stress into a two-syllable window at the right edge of the form. The constraint is satisfied whether the stress occurs over the penult or ultima, since, in either location, the right stress edge does not precede a misaligned left syllable edge.

(14)		OS-OffsetLeft	OS-OffsetRight
	a. σ́σσσσσσ	* ** *** **** *****	☞
	b. σσ́σσσσσ	* ** *** ****	☞
	c. σσσ́σσσσ	* ** ***	*
	d. σσσσ́σσσ	* **	** *
	e. σσσσσ́σσ	*	*** ** *
	f. σσσσσσ́σ	☞	**** *** ** *
	g. σσσσσσσ́	☞	***** **** *** ** *

In a similar fashion, OS-OFFSETRIGHT draws primary stress into a two-syllable window at the left edge of the form. The constraint is satisfied whether the stress occurs over the initial syllable or the peninitial, since the left stress edge in either position does not follow a misaligned right syllable edge.

The two conditions, then, that are necessary for alignment constraints to create Midpoint Pathology effects are sensitivity to the distance between misaligned edges and insensitivity to the order in which the misaligned edges occur. While the blame for the Midpoint Pathology is usually laid at the feet of distance-sensitivity alone, both conditions are necessary, and the pathology disappears if either is not met.

As stated above, the purpose of this paper is to find the best way to modify alignment constraints so that they no longer produce Midpoint Pathology effects. I argue that the best approach is to make alignment sensitive to the order of misaligned edges. Two lines of evidence support this solution. The first is that distance-sensitivity is necessary to produce a number of attested stress patterns, so the possibility of distance-sensitive alignment must be maintained. The second is that order-sensitive constraints very naturally provide for a general account of trisyllabic stress windows.

1.2 Outline

The paper proceeds as follows. Section 2 outlines McCarthy's (2003) approach to same-edge, distance-insensitive alignment constraints. In Section 3, I extend the approach to allow for distance-sensitive alignment, demonstrate that the resulting formulations avoid the Midpoint Pathology, and present evidence supporting their inclusion in the grammar. In Section 4, I extend the approach to allow for opposite-edge alignment constraints, demonstrate that they avoid the Midpoint Pathology, and indicate how they account for trisyllabic stress windows. Section 5 contains a summary and concluding remarks and suggests some general conditions on alignment constraints.

2 The Basic Schemas

In modifying alignment to avoid the Midpoint Pathology, I take the approach of McCarthy (2003) as the starting point. McCarthy's approach is an appropriate place to begin because it exhibits neither of the characteristics necessary to produce the Midpoint Pathology.

McCarthy takes a very different approach to alignment than that found in the traditional formulation. Rather than defining a desired relationship and then providing a way to assess violations when the relationship does not obtain, McCarthy's approach defines a prohibited relationship and then assesses violations when the relationship does obtain. For McCarthy, the relevant relationship is based on precedence and containment: one category is prohibited from preceding another category within the domain of a third category.

In McCarthy's alignment schemas, provided in (15), the category to the left of the focus bar is prohibited from occurring in the configuration to the right of the focus bar. In the configuration to the right, the association lines indicate that *Cat1* contains *Cat2* and *Cat3* and that there is no other *Cat1* that contains *Cat2* or *Cat3* but not both. Although the order specified for *Cat2* and *Cat3* is crucial, they need not be adjacent.

(15) Alignment Schemas (McCarthy 2003)

a. **Cat2* / *Cat1*
   Cat3 *Cat2*

b. **Cat2* / *Cat1*
   Cat2 *Cat3*

To provide some reference points to the traditional formulation, we can still think of *Cat1* and *Cat2* as the categories whose edges are being aligned, and we can think of *Cat3* as the 'separator' category, the category whose intervention between the relevant edges signals misalignment. By prohibiting *Cat2* from following *Cat3* within *Cat1*, (15a) requires that there be no *Cat3* intervening between the left edge of *Cat2* and the left edge of *Cat1*. In effect, then, (15a), requires that the left edge of *Cat2* align with the left edge of *Cat1*. Similarly, by prohibiting *Cat2* from preceding *Cat3* within *Cat1*, (15b) requires that there be no *Cat3* intervening between the right edge of *Cat2* and the right edge of *Cat1*. In effect, (15b) requires that the right edge of *Cat2* align with the right edge of *Cat1*.

Constraints formulated under the schemas in (15) have neither of the characteristics necessary for the Midpoint Pathology to emerge. They are not sensitive to the distance between misaligned edges because they do not assess violations in a way that takes into account individual instances of the separator category, *Cat3*. They are not insensitive to the order of misaligned edges because a crucial order is always specified in the prohibited configuration. To violate a constraint based on the schema in (15a), the left edge of *Cat1* must precede the left edge of *Cat2*. To violate a constraint based on the schema in (15b), the right edge of *Cat1* must follow the right edge of *Cat2*.

The basic schemas proposed here differ in one detail from McCarthy's: the locus of violation is defined as a pair consisting of the aligned categories, *Cat1* and *Cat2*, rather than an individual aligned category.

(16) Same-Edge, Distance-Insensitive Alignment

a. *⟨*Cat1*, *Cat2*⟩ / *Cat1*

Cat3 *Cat2*

b. *⟨*Cat1*, *Cat2*⟩ / *Cat1*

Cat2 *Cat3*

I discuss the reasons for this slight departure further below.

To provide a clearer picture of how violations are assessed under the proposed schemas, consider two constraints, FOOTL and FOOTR.

(17) a. FOOTL: *⟨ω, F⟩ / ω

σ F

b. FOOTR: *⟨ω, F⟩ / ω

F σ

To evaluate any given candidate, FOOTL detects pairs of prosodic words and feet where the foot follows a syllable within the prosodic word. These pairs are the loci of violation, and a violation is assessed for each pair. In the example in (18), the second and third feet follow syllables within the single prosodic word. The loci of violation are ⟨ω_1, F_2⟩ and ⟨ω_1, F_3⟩, and a violation is assessed for each, resulting in two violations overall.

(18)

	FOOTL	FOOTR
(σσ)(σσ)(σσ)σ	* *	* * *

Similarly, FOOTR detects pairs of prosodic words and feet where the foot precedes a syllable within the prosodic word and assesses a violation for each pair. In the example in (18), each foot precedes a syllable within the single prosodic word. The loci of violation are ⟨ω_1, F_1⟩, ⟨ω_1, F_2⟩, and ⟨ω_1, F_3⟩. A violation is assessed for each, and the result is three violations overall.

Since constraints based on the schemas in (16) are distance-insensitive, they cannot be used to influence the position of every instance of a particular category. They are quite useful, however, in cases where it is desirable to influence a single instance. Although FOOTL and FOOTR require all feet in a prosodic word to align with the relevant edge, they can only actually influence the position of the nearest foot. Consider, for example, how FOOTL evaluates the candidates in (19).

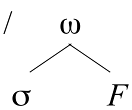
(19)		FOOTL	FOOTR
	a. (σσ)(σσ)(σσ)σ	☜ * *	* * *
	b. (σσ)(σσ)σ(σσ)	☜ * *	☜ * *
	c. (σσ)σ(σσ)(σσ)	☜ * *	☜ * *
	d. σ(σσ)(σσ)(σσ)	* * *	☜ * *

In (19), each candidate has three feet, but only the leftmost has the potential to occur at the left edge, avoid being preceded by a syllable, and reduce the overall number of violations. Because the remaining feet must all be preceded by a syllable, they are always misaligned, but they contribute the same number of violations to the overall total regardless of their degree of misalignment. FOOTL prefers (19a-c), then, where the leftmost foot occurs at the left edge, to (19d), where it does not.

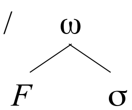
In a similar fashion, FOOTR only distinguishes candidates where the rightmost foot is final from those where it is not, preferring (19b-d) to (19a).

At first glance, it may seem unnecessary to require that both aligned categories be included in the locus of violation. FOOTL, for example, could be formulated under McCarthy's original schemas by including just the foot category in the locus of violation, as in (20a), and produce exactly the same result.

(20) a. FOOTL′: **F* /



b. FOOTL″: *ω /



The formulation in (20b) would be also possible, however, and it does not produce the same result. Because it includes only the prosodic word category in the locus of violation, FOOTL″ assesses a single violation if any foot within a prosodic word is misaligned.

(21)		FOOTL	FOOTL′	FOOTL″
	a. (σσ)(σσ)(σσ)σ	☜ * *	☜ * *	*
	b. (σσ)(σσ)σ(σσ)	☜ * *	☜ * *	*
	c. (σσ)σ(σσ)(σσ)	☜ * *	☜ * *	*
	d. σ(σσ)(σσ)(σσ)	* * *	* * *	*

In general, the types of phenomena that are typically analyzed using alignment constraints require finer distinctions than those made by a constraint like FOOTL″. Since I am not aware of any cases where the very broad type of evaluation associated with constraints like FootL″ would actually be necessary, the proposed schemas include both aligned categories in the locus of violation in order to exclude them.[1]

In this section, I have presented a set of schemas for same-edge, distance-insensitive alignment constraints. The schemas are similar to those proposed by McCarthy (2003), the one slight difference being that they include both aligned categories in the locus of violation. In the next section, I extend these basic schemas to allow for distance-sensitivity.

3 Distance-Sensitive Alignment

Under the traditional definition, alignment constraints do more than make the broad distinction between edges that coincide and edges that fail to coincide. They actually make much finer distinctions based on the degree of misalignment, giving them the ability to influence the position of categories even in cases where the coincidence requirement cannot be met. Though it has been criticized as making alignment constraints too powerful (Eisner 1997, McCarthy 2003), this ability is actually quite necessary. Distance-sensitivity is often required to correctly position primary stress, and it is often required to produce binary stress patterns that exhibit conflicting directionality.

To provide for distance-sensitive alignment under the proposed approach, violation assessment must take into account the individual instances of the separator category, *Cat3*, that either precede or follow, depending on the directional orientation, each instance of the aligned category, *Cat2*. This is accomplished simply by including *Cat3* in the locus of violation, making it an ordered triplet. A violation is assessed for each triplet where *Cat2* and *Cat3* occur in the prohibited order within *Cat1*.

(22) Same-Edge, Distance-Sensitive Alignment

a. *⟨*Cat1*, *Cat2, Cat3*⟩ / [*Cat1* [*Cat3*] [*Cat2*]]

b. *⟨*Cat1*, *Cat2, Cat3*⟩ / [*Cat1* [*Cat2*] [*Cat3*]]

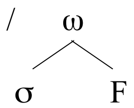
In the way that it defines prohibited configurations, the distance-sensitive schemas in (22) are identical to the distance-insensitive schemas in (16). In (22a), *Cat2* is prohibited from

[1] FootL″ still assesses violations in a distance-insensitive fashion, but it assesses them, in effect, only for the foot furthest from the left edge. If the constraint were distance-sensitive, like the same-edge constraints to be introduced in Section 3, it would assess violations in a distance-sensitive fashion, but only, in effect, for the foot furthest from the left edge. This effect is also one that does not appear to be particularly helpful, and it is excluded by requiring that the locus of violation include both aligned categories.

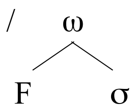
following *Cat3* within *Cat1*. In (22b), *Cat2* is prohibited from preceding *Cat3* within *Cat1*. The method for assessing violations is also the same. A single violation is assessed for each locus. The difference is in how the locus is defined.

By defining the locus as a triplet consisting of the aligned categories, *Cat1* and *Cat2*, and the separator category, *Cat3*, the schemas in (22) ensure that the overall number of violations assessed is equal to the number of instances of *Cat3* that intervene between each *Cat2* and the relevant edge of *Cat1*. To illustrate, we can formulate ALLFEETL and ALLFEETR under the new schemas, as in (23).

(23) a. ALLFEETL: $*\langle \omega, F, \sigma \rangle$ /



b. ALLFEETR: $*\langle \omega, F, \sigma \rangle$ /



To assess violations for a given candidate, ALLFEETL detects triplets consisting of individual prosodic words, feet, and syllables, where the foot follows the syllable within the prosodic word. These triplets are the loci of violation, and a violation mark is assessed for each triplet. In (24), for example, the second and third feet both follow multiple syllables in the single prosodic word. Combining each misaligned foot with each syllable it follows, and with the prosodic word in which both occur, results in the following loci of violation: $\langle \omega_1, F_2, \sigma_1 \rangle$, $\langle \omega_1, F_2, \sigma_2 \rangle$, $\langle \omega_1, F_3, \sigma_1 \rangle$, $\langle \omega_1, F_3, \sigma_2 \rangle$, $\langle \omega_1, F_3, \sigma_3 \rangle$, and $\langle \omega_1, F_3, \sigma_4 \rangle$. A violation is assessed for each locus, resulting in six overall, two due to triplets involving the second foot and the syllables it follows and four due to triplets involving the third foot and the syllables it follows. This is the same number of violations as those that would be assessed under the original ALLFEETL.

(24)

	ALLFEETL	ALLFEETR
(σσ)(σσ)(σσ)σ	** ****	***** *** *

ALLFEETR detects triplets consisting of individual prosodic words, feet, and syllables, where the foot precedes the syllable in the prosodic word. In (24), each of the three feet precedes one or more syllables within the prosodic word. Combining each misaligned foot with each syllable that it precedes, and the prosodic word in which both occur, yields the following loci of violation: $\langle \omega_1, F_1, \sigma_3 \rangle$, $\langle \omega_1, F_1, \sigma_4 \rangle$, $\langle \omega_1, F_1, \sigma_5 \rangle$, $\langle \omega_1, F_1, \sigma_6 \rangle$, $\langle \omega_1, F_1, \sigma_7 \rangle$, $\langle \omega_1, F_2, \sigma_5 \rangle$, $\langle \omega_1, F_2, \sigma_6 \rangle$, $\langle \omega_1, F_2, \sigma_7 \rangle$, and $\langle \omega_1, F_3, \sigma_7 \rangle$. Of the nine violations assessed, the same number that would be assessed under the original ALLFEETR, five are due to triplets involving the first foot and the syllables it precedes, three are due to triplets involving the second foot and the syllables it precedes, and one is due to the triplet involving the third foot and the syllable it precedes.

Given the identical results in overall violation assessment, it should be clear that the new ALLFEETL and ALLFEETR are sensitive to distance in the same manner as the originals, giving them the ability to influence the position of every foot in a form.

(25)

	ALLFEETL	ALLFEETR
a. (σσ)(σσ)(σσ)σ	☞ ** ****	***** *** *
b. (σσ)(σσ)σ(σσ)	** *****	***** ***
c. (σσ)σ(σσ)(σσ)	*** *****	***** **
d. σ(σσ)(σσ)(σσ)	* *** *****	☞ **** **

As (25) illustrates, ALLFEETL not only influences the position of the leftmost foot but it influences the position of every other foot as well, drawing each foot as near as possible to the left edge of the prosodic word. Similarly, ALLFEETR influences the position not only of the rightmost foot but of every foot. It prefers the candidate where each foot is drawn as near possible to the right edge.

At this point, it is worth noting that the schemas in (22) achieve distance-sensitivity while maintaining the categorical evaluation argued for by McCarthy (2003). According to McCarthy, categorical evaluation assesses only one violation for each locus, but gradient evaluation can assess multiple violations per locus. In extending McCarthy's formulation to allow for distance-sensitive constraints, the proposed schemas do not assess multiple violations per locus, as in the traditional alignment formulation. Instead, they modify the locus's definition. Where the locus of violation for distance-insensitive constraints is a pair consisting of the aligned categories, *Cat1* and *Cat2*, the locus for distance-sensitive constraints is a triplet consisting of the aligned categories, *Cat1* and *Cat2*, and the separator category, *Cat3*. The inclusion of the separator category in the locus is the critical factor in producing distance-sensitive alignment.

Although they are often connected in the literature, then, it turns out that gradient evaluation is not really necessary to achieve distance-sensitivity. This will likely be of little comfort to the proponents of the Categoricality Hypothesis, however, as the perceived pitfalls of distance-sensitivity are some of the main motivations for advancing the Hypothesis in the first place. Next, we see how the proposed schemas avoid the Midpoint Pathology – one of the perceived pitfalls of distance-sensitivity – and why distance-sensitivity is actually quite necessary.[2]

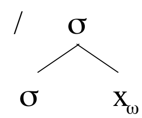
[2] Another problem that is often mistakenly attributed to distance-sensitivity is alignment's ability to produced unwanted deletions. Although many consider alignment constraints to be distinct from markedness constraints, they do have the effect of making certain configurations marked. As long as the marked configurations can be eliminated through deletion, deletion will be a possible result. It is important to keep in mind that this is true of markedness constraints generally, however, and that it has nothing to do with distance-sensitivity or gradient evaluation.

3.1 Avoiding the Midpoint Pathology: The Containment Requirement

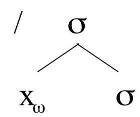
Despite their distance-sensitivity, same-edge alignment constraints formulated under the schemas in (22) fail to produce the Midpoint Pathology. They avoid the Midpoint Pathology because the prohibited configuration is one where one of the aligned categories contains the other, making alignment sensitive to the order of misaligned edges. If *Cat1* contains *Cat2*, a misaligned right edge of *Cat2* must precede the right edge of *Cat1*. Similarly, if *Cat1* contains *Cat2*, a misaligned left edge of *Cat2* must follow the left edge of *Cat1*.

Although it makes alignment sensitive to the order in which misaligned edges occur, containment is actually a stronger requirement that places additional restrictions on alignment's influence. To illustrate, the closest approximations of MIDPOINTLEFT and MIDPOINTRIGHT possible under the proposed schemas are SYLLABLE-STRESS-LEFT and SYLLABLE-STRESS-RIGHT, given in (26).

(26) a. SYLLABLE-STRESS-LEFT:[3] $*\langle\sigma, x_\omega, \sigma\rangle$ /



b. SYLLABLE-STRESS-RIGHT: $*\langle\sigma, x_\omega, \sigma\rangle$ /



Under the proposed same-edge schemas, one of the aligned categories in the prohibited configuration must include the other aligned category. To require same-edge alignment between syllables and stress, the prohibited configuration must be one where the syllable includes the stress. This is not the case under the traditional alignment approach.

Using MIDPOINTLEFT and SYLLABLE-STRESS-LEFT as the examples in (27), we can see the difference in violation assessment between the two formulations.

(27)

		MIDPOINTLEFT	SYLLABLE-STRESS-LEFT
a. σ́σσσσσσ		* ** *** **** ***** ******	
b. σσ́σσσσσ		* * ** *** **** *****	
c. σσσ́σσσσ		** * * ** *** ****	
d. σσσσ́σσσ	☞	*** ** * * ** ***	
e. σσσσσ́σσ		**** *** ** * * **	
f. σσσσσσ́σ		***** **** *** ** * *	
g. σσσσσσσ́		****** ***** **** *** ** *	

[3] "x_ω" refers to a prosodic word-level entry on the metrical grid. Entries on this level indicate the presence of a primary stress.

Since the demands of MIDPOINTLEFT are not restricted to the domain of individual syllables, it must assess violations for those syllables that do not contain the primary stress, and it does so whether the syllable precedes or follows the stress. The result is that MIDPOINTLEFT draws stress to the middle syllable, and the Midpoint Pathology emerges. In contrast, since the requirements of SYLL-STRESS-LEFT are restricted to the domain of the syllable, it cannot assess violations for syllables that do not contain the stress. Since syllables that do contain the stress are appropriately aligned, it fails to assess violations in these cases as well. The result is that SYLL-STRESS-LEFT is satisfied regardless of which syllable contains the stress, and we cannot discern any directional effects at all.

To see directional effects from constraints formulated under the schemas in (22), it is necessary to consider cases where misalignment can occur within the domain of one of the aligned categories. In comparing the original and proposed formulations of ALLFEETL, for example, we can see the effect of sensitivity to the order of misaligned edges.

(28)

	ALLFEETL (original)
a. [(σσ)(σσ)(σσ) σ] [(σσ)(σσ)(σσ) σ]	** **** ** ****
b. [(σσ)(σσ) σ (σσ)] [(σσ)(σσ)(σσ) σ]	☞ ** ** ** ****

The coincidence requirement of the original ALLFEETL applies outside of the domains of individual prosodic words, and it applies to all foot and prosodic word edges regardless of the order in which they occur. As a result, it prefers a candidate that bunches feet from both directions at the boundary between the two prosodic words, as in (28b), producing a Midpoint Pathology effect.

(29)

	ALLFEETL (proposed)
a. [(σσ)(σσ)(σσ) σ] [(σσ)(σσ)(σσ) σ]	☞ ** **** ** ****
b. [(σσ)(σσ) σ (σσ)] [(σσ)(σσ)(σσ) σ]	** ***** ** ****

In contrast, the proposed ALLFEETL only applies within the domains of individual prosodic words, ensuring that violations are assessed only when a misaligned left foot edge follows a left prosodic word edge. The result is that feet in the first prosodic word are pulled towards the left edge of the first prosodic word and feet in the second prosodic word are pulled towards the left edge of the second, as in (29a). No Midpoint Pathology effect emerges.

Despite their distance-sensitivity, then, the containment requirement creates a sensitivity to the order of misaligned edges that allows the same-edge schemas in (22) to avoid the Midpoint Pathology. This is an important result, since there is considerable evidence that distance-sensitive alignment is actually quite necessary.

3.2 The Evidence Supporting Distance-Sensitivity

The primary evidence supporting distance-sensitive alignment comes from situations where the grammar must directly affect the position of a nonperipheral category with respect to the edge of some larger domain. The clearest examples can be found in bidirectional stress patterns and in cases of nonperipheral primary stress. The former are discussed in Section 3.2.1 and the latter in Section 3.2.2.

3.2.1 Bidirectionality

In producing the directional parsing effects of individual stress patterns, it is necessary to determine the position of each foot in a form relative to the edge of the prosodic word. As demonstrated by the Rhythmic Licensing approach of Kager (2001, 2005), it is often possible to achieve the desired result without manipulating feet directly. Prohibiting lapse, for example, or requiring it in certain positions, indirectly affects the positions of feet.

(30) Lapse Avoided

a. Trochaic System	b. Iambic System
σ(σ́σ)(σ́σ)(σ́σ)	(σσ́)(σσ́)(σσ́)σ

As (30) illustrates, requiring that lapse be avoided pushes trochaic feet towards the right edge in odd-parity forms and iambic feet towards the left.

(31) Peripheral Lapse Required

a. Final Lapse	b. Initial Lapse
(σ́σ)(σ́σ)(σ́σ)σ	σ(σσ́)(σσ́)(σσ́)

As (31) illustrates, requiring a lapse to occur at the right edge pushes trochaic feet to the left, and requiring one at the left edge pushes iambic feet to the right.

Under certain circumstances, it is even possible to indirectly produce a bidirectional parsing pattern where a single foot is anchored at one edge of the prosodic word and all others are oriented towards the opposite edge. As (32) illustrates, when an internal lapse is required to occur next to the primary stress, the nonhead feet in a form are pushed towards the left edge when the head foot occurs at the right, and they are pushed towards the right edge when the head foot occurs at the left.

(32) Internal Lapse Adjacent to Primary Stress

a. Head Foot Rightmost	b. Head Foot Leftmost
(σ̀σ)(σ̀σ)σ(σ́σ)	(σ́σ)σ(σ̀σ)(σ̀σ)

Piro (Matteson 1965), Polish (Rubach and Booij 1985), and Garawa (Furby 1974) are all examples of trochaic bidirectional systems that might be produced in this fashion.

The success of such an approach ultimately rests, of course, on the assumption that there are no languages with an internal lapse between secondary stresses, since it is impossible to use an edge or primary stress to locate lapse in such cases. While the proponents of Rhythmic Licensing and other lapse-based approaches have insisted that such languages are unattested, their position is undermined by the sheer number of counterexamples that have to be explained away in order to maintain it. An initial dactyl pattern with lapse between secondary stresses has been identified, for example, in languages such as Brazilian Portuguese (Abaurre, et al 2008), Indonesian (Cohn 1989), Norwegian (Lorentz 1996), and Spanish (Harris 1983). In fact, languages with initial dactyl patterns of this type outnumber those with all other bidirectional patterns combined, and it is becoming increasingly difficult to accept the idea that every one of these examples has been poorly described, mischaracterized, or has arisen as the result of a morphological conspiracy.

Consider the case of Spanish. According to Harris (1983), there are two possible stress patterns: a unidirectional "rhetorical" pattern where secondary stresses occur on alternate syllables preceding the primary stress, and a bidirectional "colloquial" pattern that results in initial dactyls in odd-parity forms. The latter is exemplified by the forms in (33).

(33) Initial Dactyls in Spanish

a. gèneratívo
b. bùrocratìzación
c. nàturalísta
d. nàturalìzación
e. ràcionalísta
f. ràcionalìzación
g. gràmaticàlidád

Harris discusses two circumstances that prevent us from attributing the initial dactyl pattern to a morphological conspiracy. First, it emerges in words that have no relevant internal structure, such as the toponyms *Tègucigálpa* and *Tròmpipendécuaro*. Second, it emerges regardless of whether stress assignment is cyclic or noncyclic.

There is clear evidence that stress assignment is cyclic for words formed with certain suffixes, such as the adverb-forming suffix *–mente*. When these suffixes are added to a word, the base's stress pattern or, in some situations, its stress-dependent alternations are preserved. There is also clear evidence, however, that stress assignment is noncyclic for words formed with most other suffixes. The stem's stress pattern and stress-dependent alternations are not preserved, and the overall stress pattern depends only on the position of the primary stress and the number of syllables in the word. The initial dactyl pattern routinely emerges under noncyclic stress assignment.

Given the inability of indirect approaches such as Rhythmic Licensing to produce bidirectional patterns like that found in Brazilian Portuguese, Indonesian, Norwegian, and Spanish, the grammar must be able to influence the position of each foot in a prosodic word directly. Distance-sensitive alignment gives it this ability.

The analysis of bidirectional patterns outlined below is very similar to the traditional alignment analysis of McCarthy and Prince (1993). It involves both the distance-insensitive FootL and FootR, repeated in (34a,b) and the distance-sensitive AllFeetL and AllFeetR, repeated in (34c,d).

(34) a. FootL: *⟨ω, F⟩ / ω
   σ F

b. FootR: *⟨ω, F⟩ / ω
   F σ

c. AllFeetL: *⟨ω, F, σ⟩ / ω
   σ F

d. AllFeetR: *⟨ω, F, σ⟩ / ω
   F σ

Since they can affect the position of a single foot only, FootL and FootR are used to anchor a single foot at one edge of the prosodic word. Since AllFeetL and AllFeetR can affect the position every foot, they are used to draw any remaining feet towards the opposite edge.

As (35) illustrates, the ranking FootL >> AllFeetR produces an initial dactyl pattern in a trochaic system.

(35)

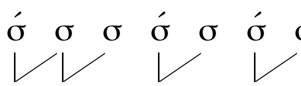
	FootL	AllFeetR
a. (σ́σ)(σ́σ)(σ́σ)σ	* *	***** ***! *
b. (σ́σ)(σ́σ)σ(σ́σ)	* *	***** ***!
☞ c. (σ́σ)σ(σ́σ)(σ́σ)	* *	***** **
d. σ(σ́σ)(σ́σ)(σ́σ)	* * *!	**** **

Although every misaligned foot incurs a violation, the distance-insensitive FootL can only influence the position of the leftmost foot. It excludes (35d) because its leftmost foot is misaligned, resulting in one more violation overall than in the other candidates. The distance-sensitive AllFeetR determines the position of the remaining feet. It excludes (35a) and (35b) because the noninitial feet are not packed as tightly against the right edge as they are in (35c), where the degree of misalignment for each foot is minimized. Candidate (35c) emerges as the winner.

In a similar fashion, the ranking FOOTR >> ALLFEETL would produce a bidirectional pattern where a single foot is anchored at the right edge and any remaining feet are drawn to the left. I omit the additional tableau.

Before moving on, it should be noted that whether or not bidirectional parsing is necessary to produce initial dactyl patterns depends on the theory's structural assumptions. Under the standard Weak Layering approach (Itô and Mester 1992) to prosodic layering, and the standardly assumed one-to-one correspondence between feet and stress (Selkirk 1980), bidirectionality is necessary. Under the approach of Hyde (2001, 2002), however, which takes a Weak Bracketing approach to prosodic layering and does not insist on a one-to-one correspondence between feet and stress, initial dactyl patterns emerge from the type of unidirectional footing illustrated in (36).

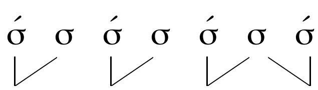
(36) Leftward Foot-Head Alignment



In (36), all head syllables (indicated with vertical association lines) have been aligned with the left edge of the prosodic word. The result is trochaic footing with a pair of overlapping feet at the left edge. Leaving the second foot stressless creates the internal lapse configuration characteristic of the initial dactyl pattern.

It is also important to note, however, that bidirectionality – and, thus, distance-sensitive alignment – still plays an important role in the alternative approach. For example, to create a trochaic pattern were stress occurs on every odd-numbered syllable, one head syllable is anchored at the left edge of the prosodic word and all others are aligned to the right.

(37) Bidirectional Foot-Head Alignment



The same stress pattern is created under the standard approach with unidirectional parsing.

The upshot, then, is that the standard Weak Layering approach and the alternative Weak Bracketing approach both require bidirectionality, though the patterns that involve bidirectionality in the two approaches are different.

3.2.2 Primary Stress

A second type of situation that requires distance-sensitive alignment arises when it is necessary to fix the position of a primary stress at some distance from either edge of the prosodic word. A foot extrametricality effect, where the head foot cannot be the final foot, but nevertheless has a rightward orientation, is an example.

Consider the foot extrametricality effects in Paumari (Everett 2003) and Banawá (Buller, Buller, and Everett 1993, Everett 1996, 1997). In forms long enough to contain two stresses, the primary stress is always the second stress from the right, meaning that the head foot is always the penultimate foot.

(38) Foot Extrametricality in Paumari

a.	kabáhakì	'to get rained on'
b.	àhakábarà	'dew'
c.	athànarárikì	'sticky consistency'
d.	bikànathàrarávinì	'to cave in, to fall apart quickly'

(39) Foot Extrametricality in Banawá

a.	abárikò	'moon'
b.	mètuwásimà	'find them'
c.	tìnarífabùne	'you are going to work'

Though head feet in Paumari and Banawá avoid final position, they still exhibit a clear rightward orientation. When multiple nonfinal feet are possible, the head foot is always the rightmost.

To account for this situation, we can rank the NONFINALITY constraint in (40a) above the distance-sensitive HEADFOOTR in (40b).

(40) a. NONFINALITY: The head foot is not final in the prosodic word.

b. HEADFOOTR: *⟨ω, Hd-F, σ⟩ / [ω Hd-F σ]

As (41) illustrates, the higher-ranked NONFINALITY prevents the head foot from being the final foot, but HEADFOOTR can still ensure that it is the rightmost of the remaining feet.

(41)

	NONFINALITY	HEADFOOTR
a. (σσ̀)(σσ̀)(σσ̀)(σσ́)	*!	
☞ b. (σσ̀)(σσ̀)(σσ́)(σσ̀)		**
c. (σσ̀)(σσ́)(σσ̀)(σσ̀)		***!*
d. (σσ́)(σσ̀)(σσ̀)(σσ̀)		***!***

When NONFINALITY excludes (41a), where the head foot occurs in final position, multiple nonfinal positions are still available. HEADFOOTR can distinguish between these positions because it is sensitive to the distance that separates the head foot from the right edge of the prosodic word. It excludes (41c,d), where the head foot occurs further to the left than necessary to avoid final position. Candidate (41b), where the head foot is the rightmost nonfinal foot, correctly emerges as the winner.

If HEADFOOTR were not sensitive to distance, it would not have produced the desired result in (41). It could not have distinguished a head foot that occurs two syllables from the right edge from a head foot that occurs four syllables from the right edge, so it could not have determined the head foot's position.

Several other languages also require distance-sensitive alignment to position a nonperipheral primary stress. In Buriat and Khalka Mongolian (Walker 1997), stress occurs on the initial syllable and every heavy syllable. The rightmost stress is the primary stress, unless it occupies the final syllable. If it occupies the final syllable, the second stress from the right is primary.

(42) Buriat Pattern

a.	H̀H́LLL	tàːrúːlagdaxa	'to be adapted to'
b.	L̀H̀H́L	nàmàːtúːlxa	'to cause to be covered with leaves'
c.	L̀H́LH̀	xùdáːlingdàː	'to the husband's parents' (collective)
d.	H̀LH́H̀	xỳːxengéːrèː	'by one's own girl'

(43) Khalka Pattern

a.	H̀H́LL	bàegúːlagdax	'to be organized'
b.	L̀H̀H́L	xø̀ndı̀ːrýːlen	'to separate' (modal)
c.	H̀H́LH̀	bàigúːllagàːr	'by means of the organization'
d.	L̀H̀H́LH̀	ùlàːnbáːtaràːs	'Ulaanbaatar' (ablative)

Primary stress exhibits a clear rightward orientation, then, but the primary stress is not always the final stress. In those situations where it is not, only distance-sensitive alignment can distinguish among the various nonfinal positions in which it might occur and ensure that it occurs in the rightmost. I omit the additional tableau.

See Piggott (2006) for a more thorough discussion of nonperipheral primary stress and additional examples.

3.3 Summary

In this part of the discussion, we have seen how the same-edge, distance-insensitive alignment schemas can be extended to provide distance-sensitive constraints by including the separator category in the locus of violation. The containment requirement of the same-edge schemas makes them sensitive to the order of misaligned edges, allowing the additional constraints to avoid the Midpoint Pathology despite their distance-sensitivity. Distance-sensitive alignment is necessary to produce certain types of bidirectional stress patterns and to correctly position primary stress in certain languages. In Section 4, I extend the proposed schemas further to allow for opposite-edge alignment constraints.

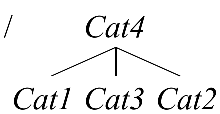
4 Opposite-Edge Alignment

In the schemas for opposite-edge alignment, *Cat1* no longer pulls double duty as one of the aligned categories and the domain in which alignment applies. *Cat1* is simply one of the aligned categories, and the domain is supplied by a fourth category, *Cat4*. *Cat2* is still the second aligned category, and *Cat3* is still the separator category. The schema for opposite-edge, distance-insensitive alignment is given in (44a), and the schema for opposite-edge, distance-sensitive alignment is given in (44b).

(44) Opposite-Edge Alignment

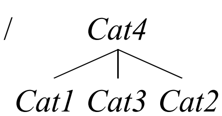
a. Distance-Insensitive

*⟨*Cat1*, *Cat2*⟩ /



b. Distance-Sensitive

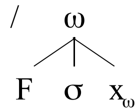
*⟨*Cat1*, *Cat2, Cat3*⟩ /



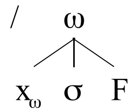
In both schemas, the prohibited configuration is one where the separator category, *Cat3*, intervenes between a preceding aligned category, *Cat1*, and a following aligned category, *Cat2*, within the domain of *Cat4*. In (44a), assessment of violations is distance-insensitive because a single violation is assessed for each pair of misaligned categories, *Cat1* and *Cat2*, without regard to the number of separator categories, *Cat3*, that intervene. In (44b), assessment is distance-sensitive because it does take into account instances of the separator category.

To get a clearer picture of how violations are assessed under the distance-insensitive schema, we can consider a pair of constraints that align feet with a primary stress.

(45) a. INITIALWINDOW: $*\langle F, x_\omega \rangle$ /



b. FINALWINDOW: $*\langle x_\omega, F \rangle$ /



The INITIALWINDOW constraint detects pairs consisting of an individual foot and an individual stress, where the foot precedes the stress, with a syllable intervening, within the prosodic word. In the example in (46), only the first foot can be paired with a stress such that they occur in the prohibited configuration. The single locus of violation is $\langle F_1, x_1 \rangle$, and a single violation is assessed.

(46)

	INITIALWINDOW	FINALWINDOW
σ(σσ)σσ́σ(σσ)(σσ)	*	* *

The FINALWINDOW constraint detects pairs consisting of an individual stress and an individual foot, where the stress precedes the foot, with a syllable intervening, within a prosodic word. In (46), the stress can be paired with two feet such that they occur in the prohibited configuration. The resulting loci of violation are $\langle x_1, F_2 \rangle$ and $\langle x_1, F_3 \rangle$. Two violations are assessed overall.

With opposite-edge alignment constraints, sensitivity to the order of misaligned edges produces an interesting result: one of the aligned categories can be drawn into a window established by a peripheral instance of the second aligned category. The effect is illustrated in (47).

(47)

	INITIALWINDOW		FINALWINDOW	
a. (σ́σ)(σσ)(σσ)	☜			**
b. (σσ́)(σσ)(σσ)	☜			*
c. (σσ)(σ́σ)(σσ)	☜			*
d. (σσ)(σσ́)(σσ)		*	☜	
e. (σσ)(σσ)(σ́σ)		*	☜	
f. (σσ)(σσ)(σσ́)		**	☜	

One way to prevent violations of INITIALWINDOW is to avoid configurations where a misaligned foot follows the stress. This is accomplished when the stress is aligned with the right edge of the leftmost foot, as in (47c), or precedes the right edge of the leftmost foot, as in (47a,b). Since the leftmost foot in this case occurs at the left edge of the form, INITIALWINDOW effectively confines the stress to one of the first three syllables. Similarly, violations of FINALWINDOW can be prevented by avoiding configurations where a misaligned foot precedes the stress, either by aligning the stress with the left edge of the rightmost foot, as in (47d), or positioning so that follows the left edge of the rightmost foot, as in (47e,f). When the rightmost foot occurs at the right edge of the form, the effect is to confine stress to one of the final three syllables.

To illustrate how violations are assessed under the distance-sensitive schema, consider the following distance-sensitive versions of the WINDOW constraints.

(48) a. DS-INITIALWINDOW: $*\langle F, \sigma, x_\omega \rangle$ / ω

F σ x_ω

b. DS-FINALWINDOW: $*\langle x_\omega, \sigma, F \rangle$ / ω

x_ω σ F

DS-INITIALWINDOW detects triplets consisting of a foot, stress, and syllable, where the foot precedes the stress, with the syllable intervening, within the prosodic word. In the example in (49), the single loci of violation is $\langle F_1, x_1, \sigma_4 \rangle$, and a single violation mark is assessed.

(49)

	DS-INITIALWINDOW	DS-FINALWINDOW
σ(σσ)σσ́σ(σσ)(σσ)	*	* ***

DS-FINALWINDOW detects triplets consisting of a stress, foot, and syllable, where the stress precedes the foot, with the syllable intervening, within a prosodic word. In (49), the loci of violation are $\langle x_1, F_2, \sigma_6 \rangle$, $\langle x_1, F_3, \sigma_6 \rangle$, $\langle x_1, F_3, \sigma_7 \rangle$, and $\langle x_1, F_3, \sigma_8 \rangle$. Four violations are assessed overall.

Like the distance-insensitive WINDOW constraints, the distance-sensitive versions can have the effect of creating a window for one of the aligned categories at the edge of the alignment domain.

(50)

	DS-INITIALWINDOW		DS-FINALWINDOW	
a. (σ́σ)(σσ)(σσ)	☜			* ***
b. (σσ́)(σσ)(σσ)	☜			**
c. (σσ)(σ́σ)(σσ)	☜			*
d. (σσ)(σσ́)(σσ)		*	☜	
e. (σσ)(σσ)(σ́σ)		**	☜	
f. (σσ)(σσ)(σσ́)		*** *	☜	

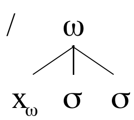
As (50) illustrates, there are two ways to avoid violations of DS-InitialWindow. The stress can be exactly aligned with right edge of the leftmost foot, as in (50c), or it can precede the right edge of the leftmost foot, as in (50a,b). When the constraint is satisfied, stress is confined to a three-syllable window at the left edge of the form. Similarly, violations of DS-FinalWindow can be avoided when the stress is exactly aligned with the rightmost foot, as in (50d), or when it follows the right edge of the rightmost foot, as in (50e,f). As a result, DS-FinalWindow confines stress to a three-syllable window at the right edge of the form.

4.1 Avoiding the Midpoint Pathology: The Precedence Requirement

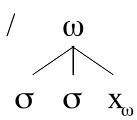
Like the distance-sensitive versions of same-edge constraints, the distance-sensitive versions of opposite-edge constraints avoid the Midpoint Pathology because they are sensitive to the order of misaligned edges. The order-sensitivity of the opposite-edge constraints is somewhat different, however, in that it results from specifying the linear order of the aligned categories rather than requiring that one of the aligned categories contain the other. To violate a constraint formulated under the schemas in (44), the right edge of a *Cat1* must precede the left edge of *Cat2*. If the edges do not occur in this order, they do not incur a violation, regardless of the degree of misalignment.

In Section 1, we saw how OffsetLeft and OffsetRight, opposite-edge constraints formulated under the original definition, could draw a stress to the edge of a medial syllable, resulting in a Midpoint Pathology effect. The closest approximations of OffsetLeft and OffsetRight under the proposed schemas are given in (51).

(51) a. Stress-Syllable: $*\langle x_\omega, \sigma, \sigma \rangle$ /



b. Syllable-Stress: $*\langle \sigma, \sigma, x_\omega \rangle$ /



The difference between the two formulations is illustrated in (52) using OffsetLeft and Stress-Syll as the examples.

(52)

	OffsetLeft	Stress-Syllable
a. σ́σσσσσσ	* * ** *** **** *****	* ** *** **** *****
b. σσ́σσσσσ	** * * ** *** ****	* ** *** ****
c. σσσ́σσσσ	☞ *** ** * * ** ***	* ** ***
d. σσσσ́σσσ	**** *** ** * * **	* **
e. σσσσσ́σσ	***** **** *** ** * *	*
f. σσσσσσ́σ	****** ***** **** *** ** *	☞
g. σσσσσσσ́	******* ****** ***** **** *** ** *	☞

Both OffsetLeft and Stress-Syll are distance-sensitive, assessing violations based on the degree of misalignment. OffsetLeft assesses violations for misaligned syllables that occur on either side of the primary stress. As a result, it draws the primary stress toward the center of the form. In contrast, Stress-Syll only assesses violations for misaligned syllables that occur to the right of the primary stress. As a result, it confines the primary stress to the final two syllables. Where OffsetLeft produces a Midpoint Pathology effect, then, Stress-Syll avoids the Midpoint Pathology and, instead, establishes a disyllabic window for primary stress at the right edge of the form.

The proposed opposite-edge alignment schemas, then, replace Midpoint Pathology effects with stress window effects. While the significance of Stress-Syll and Syll-Stress's ability to establish disyllabic stress windows is limited – disyllabic windows can also be established simply by confining stress to a peripheral foot – the ability of InitialWindow and FinalWindow to establish three-syllables windows is potentially quite important. As we shall see next, it presents the possibility of providing a general account of trisyllabic stress windows.

4.2 A general account of stress windows

Substantial support for the proposed opposite-edge alignment schemas comes from their ability to provide a general account of trisyllabic stress windows. While specific examples of trisyllabic windows have been analyzed using nonfinality (Prince and Smolensky 1993) and extended lapse avoidance (Kager 1994, 2005, Green 1995, Green and Kenstowicz 1995, Gordon 2002), neither analysis provides a general account of the phenomenon. In this section, I focus on the stress windows of Macedonian (Comrie 1976), which resists a nonfinality analysis, and Maithili (Jha 1940-1944, 1958, Hayes 1995), which resists an extended lapse avoidance analysis, to demonstrate the potential of the proposed alignment schemas.

4.2.1 Macedonian

As indicated in (53, 54), many Macedonian forms exhibit a regular, predictable stress pattern, but there are also numerous cases of irregular, lexical stress. In the regular pattern, primary stress occurs on the antepenult in words longer than two syllables and on the initial syllable in shorter words. There appears to be no evidence of secondary stress.

(53) Macedonian Regular Pattern

a. zbór ‘word’
zbórot
zbórovi
zboróvite

b. vodéničar ‘miller’
vodeníčarot
vodeníčari
vodeničárite

(54) Macedonian Irregular Pattern

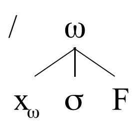
a. citát ‘quotation’
citátot
citáti
citátite

b. romántik ‘romantic’
romántikot
romántici
romantícite

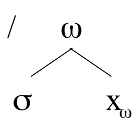
In the irregular pattern, primary stress occurs on a lexically specified syllable as long as it is also one of the final three. If suffixation pushes the stress beyond the three-syllable window, it returns to the antepenult by default.

Alignment constraints based on the proposed opposite-edge schemas easily account both for the regular antepenultimate stress and for the restrictions on lexical stress. Antepenultimate stress is obtained by establishing a three-syllable window at the right edge of a word and then aligning the primary stress as far to the left within the window as possible.

(55) a. FINALWINDOW: $*\langle x_\omega, F\rangle$ /



b. MAINSTRESSL: $*\langle \omega, x_\omega, \sigma\rangle$ /



In particular, FINALWINDOW, repeated in (55a), restricts stress to the final foot or to the syllable immediately preceding the final foot, effectively establishing a trisyllabic window at the right edge. MAINSTRESSL, given in (55b), pushes primary stress as far to the left within the window as possible, ensuring that it occurs over the antepenult.

Following Hyde (2001, 2002), I assume that syllables are exhaustively parsed into feet but that feet can occur without stress. This provides the final foot necessary to establish the stress window without requiring that there be any stress other than the primary stress. As (56) illustrates, the ranking FinalWindow >> MainStressL locates the primary stress just to left of a final stressless foot.[4]

(56)

	FinalWindow	MainStressL
a. (σσ)(σσ)(σσ́)		****!*
b. (σσ)(σσ)(σ́σ)		****!
☞ c. (σσ)(σσ́)(σσ)		***
d. (σσ)(σ́σ)(σσ)	*!	**
e. (σσ́)(σσ)(σσ)	*!	*
f. (σ́σ)(σσ)(σσ)	*! *	

FinalWindow excludes candidates (56d-f), where the primary stress fails to occur either within the final foot or adjacent to the final foot. Of the remaining candidates, MainStressL prefers (56c), where the stress is adjacent to the final foot, because it positions primary stress as far to the left within the stress window as possible. The stress correctly emerges on the antepenult.

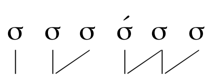
The same ranking establishes the appropriate restrictions on irregular stress when the constraint that requires faithfulness to the lexically specified syllable is inserted between FinalWindow and MainStressL.

(57) FaithStress: A stress in the input occurs on the same syllable in the output.

As (58a) illustrates, FinalWindow must dominate FaithStress to prevent the stress from following the lexically specified syllable beyond the three-syllable window. FinalWindow excludes the faithful candidate in such cases and, in conjunction with the low-ranked MainStressL, returns stress to its default position over the antepenult.

[4] In (56), each candidate has the minimum number of feet necessary for exhaustive binary footing. As a result, the head foot is an iamb in the optimal candidate (56c). If the head foot must actually be a trochee, a likely requirement given the overwhelming preference for trochees among the world's languages, then the positions of the feet would have to be slightly different in order to position the primary stress just to the left of the final foot. In particular, the head foot would have to overlap the final foot, as in (i).

(i)



See Hyde 2001, 2002, 2008 for evidence supporting the possibility of overlapping feet. Since it is not central to the discussion of the alignment formulation, I do not address the issue here.

(58)

a. σσσ́σσσ	FINALWINDOW	FAITHSTRESS	MAINSTRESSL
i. (σσ)(σσ)(σσ́)		*	****!*
ii. (σσ)(σσ)(σ́σ)		*	****!
☞ iii. (σσ)(σσ́)(σσ)		*	***
iv. (σσ)(σ́σ)(σσ)	*!		**
b. σσσσσ́σ	**FINALWINDOW**	**FAITHSTRESS**	**MAINSTRESSL**
i. (σσ)(σσ)(σσ́)		*!	*****
☞ ii. (σσ)(σσ)(σ́σ)			****
iii. (σσ)(σσ́)(σσ)		*!	***
iv. (σσ)(σ́σ)(σσ)	*!	*	**
c. σσσσσσ́	**FINALWINDOW**	**FAITHSTRESS**	**MAINSTRESSL**
☞ i. (σσ)(σσ)(σσ́)			*****
ii. (σσ)(σσ)(σ́σ)		*!	****
iii. (σσ)(σσ́)(σσ)		*!	***
iv. (σσ)(σ́σ)(σσ)	*!	*	**

As illustrated in (58b,c), FAITHSTRESS must dominate MAINSTRESSL to allow the lexically specified syllable to retain the stress when it is penultimate or final. In such cases, FAITHSTRESS prevents MAINSTRESSL from pushing the stress to the left edge of the stress window.

In this part of the discussion, then, we have seen that the proposed approach to opposite-edge alignment can establish the type of stress window appropriate for the Macedonian patterns. The ranking FINALWINDOW >> FAITHSTRESS >> MAINSTRESSL establishes antepenultimate stress in the regular pattern, and it confines lexical stress to a three-syllable window in the irregular pattern.

4.2.2 Maithili

The trochaic language Maithili (Jha 1940-1944, 1958, Hayes 1995) offers one of the clearest examples of a trisyllabic window on primary stress accompanied by a pattern of secondary stresses.[5] The basic pattern locates stress on the initial syllable and every even-numbered syllable counting from the right with the rightmost stress being primary. This basic pattern can be altered, however, by the preference of primary stress to occur on a heavy syllable.

[5] Norwegian appears to be another case where a window restricting primary stress is accompanied by a pattern of secondary stresses. See Rice 2006 and Lunden 2006 for a description of the primary stress pattern and Lorentz 1996 for a description of the secondary stress pattern.

(59) Maithili Pattern

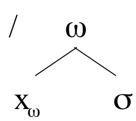
a.	L̀ĹL	bìndúlə̆	‘a fabulous horse’
b.	H̀LĹL	bɑ̀ːɟ̆ĭtɒ́tʰĭ	‘speak-3 FUT.’
c.	L̀L̀LH́L	dɑ̀hìnə̆bɑ́ːrĭ	‘the right one’
d.	H̀H́L	dèːkʰɑ́ːrə̆	‘seen’
e.	L̀L̀LH́L̀L	ɟ̆ìmùtə̆bɑ́ːhɒ̀nə̆	(proper name)

As illustrated in (59c,d), if the penult is heavy, it carries the primary stress, and the overall pattern is the same as if both the penult and the antepenult were light. In contrast, as illustrated in (59e), if the penult is light and the antepenult heavy, primary stress shifts to the antepenult, leaving the penult with a secondary stress, and any secondary stress between the antepenult and the initial syllable shifts one syllable to the left.

To focus on the implementation of the stress window, I will take the pattern of secondary stresses as given and consider only the most relevant possible variations in the position of primary stress. Given the pattern of secondary stresses, we can see that primary stress prefers to fall on the rightmost nonfinal heavy syllable, as long as it is one of the final three. If there is no nonfinal heavy syllable among the final three, then primary stress occurs on the rightmost nonfinal syllable.

As in Macedonian, we can use the alignment constraint FINALWINDOW to produce the stress window in Maithili. The rightward orientation of the primary stress can be captured with the alignment constraint, MAINSTRESSR, given in (60a), and the preference of primary stress to fall on a heavy syllable can be captured with the STRESS-TO-WEIGHT constraint, given in (60b).

(60) a. MAINSTRESSR: $*\langle \omega, x_\omega, \sigma \rangle$ /



b. STRESS-TO-WEIGHT: No prosodic word-level gridmark occurs over a syllable-final mora.[6]

The Maithili primary stress pattern emerges when FINALWINDOW dominates STRESS-TO-WEIGHT and STRESS-TO-WEIGHT dominates MAINSTRESSR.

As (61) demonstrates, ranking FINALWINDOW above STRESS-TO-WEIGHT prevents the weight of syllables that occur outside the trisyllabic window from affecting the position of primary stress.

[6] STRESS-TO-WEIGHT is formulated here as a nonfinality constraint. If primary stress cannot occur on the final mora of a syllable, then a syllable must have at least two moras to support a primary stress. See Hyde 2007 for arguments supporting this approach.

(61)

H̀LL̀L	FinalWindow	Stress-to-Weight
☞ a. (H̀L)(ĹL)		*
b. (H́L)(L̀L)	*!	

The higher-ranked FinalWindow prevents primary stress from moving to the left of the antepenult in order to satisfy the lower-ranked Stress-to-Weight.

Ranking Stress-to-Weight above MainStressR allows the presence of heavy syllables to restrict the primary stress's basic rightward orientation. As (62a) demonstrates, the higher-ranked Stress-to-Weight prevents MainStressR from drawing primary stress from a heavy antepenult onto a light penult.

(62)

a. L̀L̀LH̀L̀L	Stress-to-Weight	MainStressR
☞ i. (L̀)(L̀L)(H́)(L̀L)		**
ii. (L̀)(L̀L)(H̀)(ĹL)	*!	*
b. H̀H̀L	Stress-to-Weight	MainStressR
i. (H́)(H̀L)		**!
☞ ii. (H̀)(H́L)		*
c. L̀L̀L	Stress-to-Weight	MainStressR
i. (Ĺ)(L̀L)	*	**!
☞ ii. (L̀)(ĹL)	*	*

As (62b,c) demonstrate, however, the lower-ranked MainStressR is able to draw primary stress onto the penult when the penult and the antepenult are both the same weight.

We have seen in this part of the discussion, then, that the proposed approach to opposite edge alignment also establishes the type of stress window appropriate for Maithili. Even in the presence of a secondary stress pattern, the ranking FinalWindow >> Stress-to-Weight >> MainStressR restricts primary stress to the final three syllables.

4.2.3 Alternative methods for establishing stress windows

In this section, I briefly demonstrate that two prominent alternatives cannot provide a general approach to stress windows because they fail to account for one of the two examples above. A nonfinality approach, used by Prince and Smolensky (1993) to produce the stress window of Latin, fails to account for the restrictions on irregular stress in Macedonian. An extended lapse avoidance approach (Kager 1994, 2005, Green 1995, Green and Kenstowicz 1995, Gordon 2002) fails to account for the restrictions on primary stress in Maithili.

First, consider the role that NonFinality, repeated in (63a), can play in establishing regular antepenultimate stress in a trochaic language.

(63) a. NonFinality: The head foot is not final in the prosodic word.

b. HeadFootR: *⟨ω, Hd-F, σ⟩ / [ω Hd-F σ]

ω
Hd-F σ

Since NonFinality prohibits a head foot from including the final syllable, it prevents a trochaic head foot from positioning its stress any closer to the right edge than the antepenult. When NonFinality dominates HeadFootR, repeated in (63b), then, it ensures that the primary stress occurs no closer to the right edge than the antepenult while HeadFootR ensures that it occurs no further to the left.

(64)

	NonFinality	HeadFootR
a. σσ(σ́σ)σσ		**!
☞ b. σσσ(σ́σ)σ		*
c. σσσσ(σ́σ)	*!	

The result is the regular antepenultimate stress pattern of Macedonian.

A ranking conflict arises, however, when we attempt to use NonFinality to restrict the position of irregular stress. As (65) indicates, FaithStress must dominate NonFinality in order to allow irregular stress on the penult or the ultima.

(65)

a. σσσσσ́σ	FaithStress	NonFinality
i. σσσ(σ́σ)σ	*!	
☞ ii. σσσσ(σ́σ)		*
b. σσσσσσ́	**FaithStress**	**NonFinality**
i. σσσ(σ́σ)σ	*!	
☞ ii. σσσσσ(σ́)		*

As (66) indicates, however, the ranking NonFinality >> HeadFootR >> FaithStress is necessary to return stress to its default location on the antepenult when the lexically specified syllable has drifted further to the left.

(66)

σσσ́σσσ	NonFinality	HeadFootR	FaithStress
a. σσ(σ́σ)σσ		**!	
☞ b. σσσ(σ́σ)σ		*	*
c. σσσσ(σ́σ)	*!		*

To account for the restrictions on irregular stress, then, FAITHSTRESS must dominate NONFINALITY in order to allow stress to occur in every position within the window, but NONFINALITY must dominate FAITHSTRESS in order to return stress to its default location when it drifts outside the window. These conflicting ranking requirements make it impossible to implement the analysis, demonstrating that nonfinality is inadequate as a general approach to stress windows.

The demonstration that extended lapse avoidance is also inadequate is even more straightforward. Some stress windows, like the one found in Maithili, are accompanied by a pattern of secondary stresses with binary alternation. Since the distance between stresses is already shorter than that allowed by extended lapse avoidance, extended lapse avoidance cannot be used to establish the stress window.

To illustrate, two different approaches might be used to enforce a two-syllable limit on the distance between the rightmost stress and the right edge of the word.

(67) a. *EXTENDED LAPSE RIGHT: A maximum of two unstressed syllables separates the rightmost stress from the right edge of the stress domain.

b. WEAK LOCAL PARSING: For every two adjacent syllables, one must be parsed into a foot.

The *EXTENDED LAPSE RIGHT constraint (Gordon 2002, Kager 2005) is the most direct, simply prohibiting configurations where the final three syllables of a form are all be stressless.[7] As (68) indicates, assuming that the primary stress is the only stress, *EXTENDED LAPSE RIGHT can only be satisfied when the primary stress occurs over one of the final three syllables, effectively establishing a trisyllabic window.

(68)

	*EXTENDED LAPSE RIGHT
a. σσσσσσ́	☜
b. σσσσσ́σ	☜
c. σσσσ́σσ	☜
d. σσσ́σσσ	*
e. σσ́σσσσ	*

The WEAK LOCAL PARSING constraint (Kager 1994, Green 1995, Green and Kenstowicz 1995) is less direct, requiring that a form contain no strings of two adjacent unfooted syllables.[8] As (69) indicates, assuming that the primary stress is the only stress, the con-

[7] The constraint is *EXTENDED LAPSE RIGHT in Gordon 2002 and *FINAL-LONG-LAPSE in Kager 2006.
[8] WEAK LOCAL PARSING represents the LAPSE constraint of Green (1995) and Green and Kenstowicz (1995) and the PARSE-2 constraint of Kager (1994). Though there is a slight difference between the two constraints, both essentially insist on weak local parsing (see Hayes 1995 for discussion).

straint can be satisfied only when the final foot occurs no more than one syllable away from the right edge. If the final foot is the head foot, Weak Local Parsing effectively establishes a trisyllabic window for the primary stress.

(69)

	Weak Local Parsing
a. σ(σσ)σ(σ́σ)	☞
b. (σσ)σ(σ́σ)σ	☞
c. (σσ)(σ́σ)σσ	*

Notice that this approach sometimes requires the assumption of stressless feet, much like the proposed analysis of Macedonian above, but it does not, and crucially cannot, require exhaustive parsing.

The problem for these approaches arises when other considerations impose more severe restrictions on stresses or feet than those imposed by *Extended Lapse Right or Weak Local Parsing. If *Extended Lapse Right and Weak Local Parsing do not actually play a role in establishing the maximum distance allowed between the rightmost stress and the right edge of the word, they cannot establish a stress window. In the case of Maithili, for example, neither *Extended Lapse Right nor Weak Local Parsing can restrict the position of the primary stress.

(70)

L̀L̀LH̀L̀L	*Extended Lapse Right	Weak Local Parsing
a. (L̀)(L̀L)(H̀)(ĹL)		
b. (L̀)(L̀L)(H́)(L̀L)		
c. (L̀)(ĹL)(H̀)(L̀L)		
d. (Ĺ)(L̀L)(H̀)(L̀L)		

Since no more than one syllable ever occurs between the rightmost stress and the end of the word, *Extended Lapse Right has no influence over the position of primary stress. It is satisfied regardless of which stress is primary. Similarly, since parsing is exhaustive, Weak Local Parsing has no influence over the position of the primary stress. It is satisfied no matter which stress is primary.

Since *Extended Lapse Right and Weak Local Parsing cannot effectively restrict the position of primary stress in languages that have a binary pattern of secondary stresses, neither offers a general approach to stress windows.

4.3 Summary

In this part of the discussion, we first saw how the same-edge alignment schemas can be extended to allow for opposite-edge alignment by separating both of the aligned categories from the alignment domain. Since these new schemas specify the order in which the aligned categories occur in the prohibited configuration, they are sensitive to the order of misaligned edges and exhibit no Midpoint Pathology effects. The opposite-edge schemas very naturally provide for a general account of trisyllabic stress windows. They can account for restrictions on irregular stress in Macedonian, where a nonfinality approach cannot. They can also account for restrictions on primary stress in the presence of a pattern of secondary stresses, the situation in Maithili, where extended lapse avoidance approaches cannot.

5 Summary, Conclusions, and Generalizations

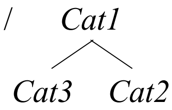
The aim of this paper has been to present an approach to alignment that avoids the Midpoint Pathology but that also maintains the possibility of distance-sensitive alignment constraints. First identified by Eisner (1997), the Midpoint Pathology is the prediction of languages where stress, tone, or some other structure is drawn to the center of a form. In Section 1, we saw that two conditions are necessary for Midpoint Pathology effects to emerge: alignment must be sensitive to the distance between misaligned edges, and it must be insensitive to the order in which misaligned edges occur. The proposed approach maintains the possibility of distance-sensitive constraints but avoids the Midpoint Pathology by making alignment sensitive to the order of misaligned edges.

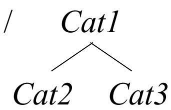
Section 2 introduced McCarthy's (2003) same-edge alignment schemas. Section 3 extended these basic schemas to allow for distance-sensitive violation assessment. It demonstrated that the resulting constraint formulations avoid the Midpoint Pathology, despite their distance-sensitivity, because they require that one of the aligned categories contain the other aligned category, making them sensitive to the order in which misaligned edges occur. Finally, Section 3 presented evidence that distance-sensitivity is necessary to account for bidirectional stress patterns and the correct positioning of non-peripheral head feet and primary stresses.

Section 4 extended the proposed alignment schemas to allow for opposite-edge alignment. It demonstrated that the opposite-edge constraints avoid the Midpoint Pathology because they specify a particular linear order in which misaligned categories must occur in order to produce violations. It also demonstrated that the proposed opposite-edge schemas could be used to provide a general account of trisyllabic stress windows.

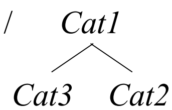
Although I will not attempt at this point to reduce the proposed schemas, repeated in (71), to a single, more general form, in conclusion, it is possible to make some significant generalizations about the formulation of alignment constraints.

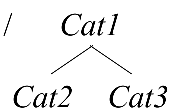
(71) a. Same-Edge, Distance-Insensitive Schemas

i. *⟨*Cat1*, *Cat2*⟩ / 

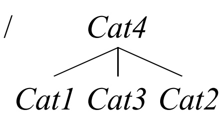
ii. *⟨*Cat1*, *Cat2*⟩ / 

b. Same-Edge, Distance-Sensitive Schemas

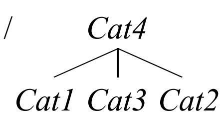
i. *⟨*Cat1*, *Cat2, Cat3*⟩ / 

ii. *⟨*Cat1*, *Cat2, Cat3*⟩ / 

c. Opposite-Edge, Distance-Insensitive Schema

*⟨*Cat1*, *Cat2*⟩ / 

d. Opposite-Edge, Distance-Sensitive Schema

*⟨*Cat1*, *Cat2, Cat3*⟩ / 

The first generalization concerns the categories involved in specifying prohibited configurations.

(72) The prohibited configuration in an alignment constraint contains a domain category, two aligned categories, and a separator category.

The prohibited configuration is comprised of a maximum of four categories. The set of categories must include the following and only the following: a domain category, two aligned categories, and a separator category. Each of the schemas in (71) meets this requirement.

The second generalization concerns the possibility of one category fulfilling multiple roles.

(73) The domain category in an alignment constraint may also be one of the aligned categories.

This statement allows for the possibility of both opposite-edge alignment and same-edge alignment. In the opposite-edge schemas of (71c,d), the domain category is distinct from the aligned categories. In same-edge schemas of (71a,b), one of the aligned categories is also the domain category.

Finally, the generalization in (74) addresses the definition of the locus of violation.

(74) The locus of violation in an alignment constraint includes both of the aligned categories and may optionally include the separator category.

The optional inclusion of the separator category allows for both distance-insensitive and distance-sensitive alignment constraints. Constraints that omit the separator category from the locus, as in (71a,c) are distance-insensitive. Constraints that include the separator category in the locus, as in (71b,d), are distance-sensitive.

The generalizations in (72-74) exclude schemas beyond those listed in (71) and set a limit on the types of alignment constraints that can be formulated. While they allow for both same-edge and opposite-edge alignment, and both distance-insensitive and distance-sensitive alignment, they make violation assessment sensitive to the order of misaligned edges and, thus, avoid the Midpoint Pathology.

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