Vowel hiatus and Dispersion Theory

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Previous work on Dispersion Theory (DT) and vowels has examined vowel inventories (Flemming 1995, 2004), reduction processes (Padgett 2004) and intrasyllabic sequences (Sands 2004), which all show sensitivity to the degree of perceptual contrast for different combinations of vowels. This paper presents a DT perspective on cross-syllable vowel hiatus in Spanish and Western Catalan, bringing new insight to patterns of hiatus avoidance within and across languages.

I argue that evidence from Spanish and Western Catalan cross-syllable vowel hiatus in determiner-noun sequences points to a scale of sensitivity to perceptual contrast alongside the activity of augmentation in stressed syllables. Stressed and unstressed vowel contexts in both languages show four different patterns of sensitivity to vowel quality in hiatus.

In Spanish determiner-noun sequences, most vowel pairs are tolerated in stressed hiatus conditions (1), and all vowels are tolerated in unstressed conditions (2), but identical *a-a* is disallowed when the noun's *a* is stressed (3).

(1)	*la*$_F$ *era*	[la.ˈe.ɾa]	the era [f]
	la$_F$ *hora*	[la.ˈo.ɾa]	the hour [f]
	la$_F$ *úlcera*	[la.ˈul.se.ɾa]	the ulcer [f]
	la$_F$ *índole*	[la.ˈin.do.le]	the (emotional) character [f]
(2)	*la*$_F$ *amiga*	[la.a.ˈmi.ɣa]	the friend [f]
	la$_F$ *entidad*	[la.en.ti.ˈðad]	the entity [f]
	la$_F$ *hotelera*	[la.o.te.ˈle.ɾa]	the hotelier [f]
	la$_F$ *usurera*	[la.u.su.ˈɾe.ɾa]	the usurer [f]
	la$_F$ *idea*	[la.i.ˈðe.a]	the idea [f]
(3)	*el*$_F$ *agua, *la agua*	[e.ˈla.ɣwa]	the water [f]
	el$_F$ *ala, *la ala*	[e.ˈla.la]	the wing [f]
	el$_F$ *hada, *la hada*	[e.ˈla.ða]	the fairy [f]
	el$_F$ *águila, *la águila*	[e.ˈla.ɣi.la]	the eagle [f]

In Western Catalan, all vowel combinations are disallowed under stress (4), but the pairs *a-i* and *a-u* (and only those pairs) are tolerated in unstressed conditions (5).

(4) Deletion repair	*l'aigua, *la aigua*	[ˈlai.gwa]	the water [f]
	*l'era, *la era*	[ˈle.ɾa]	the era [f]
	*l'èmula, *la èmula*	[ˈlɛ.mu.la]	the rival [f]
	*l'òbra, *la òbra*	[ˈlɔ.bɾa]	the work [f]
	*l'honra, *la honra*	[ˈlon.ɾa]	the honor [f]
	*l'índex, *la índex*	[ˈlin.deks]	the index [f]
	*l'úlcera, *la úlcera*	[ˈlul.se.ɾa]	the ulcer [f]
(5) Hiatus tolerated	*la unitat, *l'unitat*	[la.u.ni.ˈtat]	the unity [f]
	*la idea, *l'idea*	[la.i.ˈde.a]	the idea [f]

The patterns of hiatus tolerance are then: complete tolerance (Spanish unstressed), all but one pair tolerated (Spanish stressed), all but two not tolerated (Catalan unstressed), and complete intolerance (Catalan stressed).

The differences between vowel pairs are addressed via a scale of the F1 dimension, adapted from Flemming (2004) and shown in (6). In this scale of relative perceptual contrast, vowels farther apart are easier to distinguish from one another, and vowels closer together are less distinguishable in their contrast. The vowel pair restricted in the most permissive of the allowed hiatus patterns, Spanish (*a-a*), is the least contrastive, and the vowel pairs tolerated in the least permissive of the allowed hiatus patterns, Catalan (*a-i* and *a-u*), are the most contrastive.

(6)

1	2	3	4	5	6	7
i	ɪ	e̞	e	ɛ	æ	a
u	ʊ	o̞	o	ɐ	ɑ	
			ə	ɔ		

Minimum Distance (MINDIST) constraints specific to adjacent vowels in the determiner-noun context are formulated based on the relative distance of vowels on the F1 scale. Following Flemming (2004), these MINDIST constraints are in a fixed ranking, “to encode the fact that auditory distinctiveness should be maximised” (Flemming 2004, p. 239). That is, more distant contrastive vowel pairs will always be preferred over less distant, and less contrastive pairs. As an example of this constraint type, MINDISTVV=F1:1 requires adjacent vowels to be at least one relative distance point apart on the F1 scale, in effect militating against a sequence of identical vowels, as is the case with Spanish stressed vowel sequences. This constraint is ranked with a FAITH constraint such as IDENT(MORPH), restricting allomorphy repair, to obtain the Spanish pattern of hiatus tolerance in Tableau (7). Candidate (ia) demonstrates the activity of this MINDIST constraint in preventing the feminine vowel-final determiner from surfacing, while allowing candidate (iia) to pass on the basis of having an adjacent vowel sequence that satisfies the level of contrast proposed.

Tableau (7): Spanish stressed vowel pattern

Input	Output	MINDISTVV=F1:1	IDENT(MORPH)	MINDISTVV=F1:2
i. /la$_F$ ˈagwa/[1]	a. la$_F$.a.ɣwa	*!		*
	→ b. e.l$_F$a.ɣwa		*	
ii. /la$_F$ ˈegloga/	→ c. la$_F$.e.ɣlo.ɣa			
	d. e.l$_F$e.ɣlo.ɣa		*!	

On the other hand, MINDISTVV=F1:6 requires adjacent vowels to be at least six relative distance points apart on the F1 scale, allowing only the most contrastive pairs *a-i* and *a-u*, as is the case with Catalan unstressed vowel sequences. Candidates (ia) and (iic) of Tableau (8) satisfy the requirement for maximum adjacent vowel contrast, and do not require repair. They are

[1] Due to the appearance of *la$_F$* as the ‘elsewhere’ form in other syntactic contexts with these ˈ*a*-words (such as with intervening adjectives), and the closed class of definite articles, I will assume that /la$_F$/ is the underlying form, and not morphologically deviant [el$_F$] or syntactically disagreeing masculine /el$_M$/. For more discussion on the morpho-phonological exponence of the determiner, see Varis (2010).

compared to candidate (iiie), which fails to maintain a wide enough relative distance between the adjacent vowels and triggers deletion repair.

Tableau (8): Catalan unstressed vowel pattern with MAX-V restricting vowel deletion.

Input	Output	MINDISTVV=F1:6	MAX-V	MINDISTVV=F1:7
i. /la uniˈtat/	→ a. la.u.ni.ˈtat			*
	b. lu.ni.ˈtat		*!	
ii. /la iˈdea/	→ c. la.i.ˈde.a			*
	d. li.ˈde.a		*!	
iii. /la ˈonra/	e. la.ˈon.ɾa	*!		*
	→ f. ˈlon.ɾa		*	

In addressing the role of stress in these patterns, I follow Smith (2002) in the use of the markedness augmentation constraint ONSET/STRESS, which requires an onset for stressed syllables. Ranked equally with MINDISTVV=F1:6, ONSET/STRESS prevents stressed *a-i* and *a-u* pairs from manifesting with hiatus in Catalan. Although candidate (ia) of Tableau (9) satisfies the minimum distance requirement between adjacent vowels, it incurs a violation of ONSET/STRESS and undergoes repair. This is compared to unstressed candidate (iia), which satisfies both constraints.

Tableau (9): Catalan pattern with ONSET/STRESS with MINDISTVV=F1:6

Input	Output	MINDISTVV=F1:6	ONSET/ STRESS	MAX-V	MINDISTVV=F1:7
i. /la ˈindeks/	a. la.ˈin.deks		*!		*
	→ b. ˈlin.deks			*	
ii. /la iˈdea/	→ c. la.i.ˈde.a				*
	d. li.ˈde.a			*!	

In the Spanish pattern, ONSET/STRESS is locally conjoined (Smolensky 1993) with MINDISTVV=F1:1, representing the requirement of both minimum distance and stress violation on the same adjacent vowel sequence to trigger allomorphy. Candidate (ia) in Tableau (10) incurs a violation of MINDIST in the identical a-ˈa sequence and it incurs a violation of Onset/stress. Candidate (iia) on the other hand, violates only MINDIST but not ONSET/STRESS, and thus does not trigger the locally conjoined constraint. The ranking of locally conjoined MINDIST markedness >> FAITH >> MINDIST allows a pattern reflecting both MINDIST >> FAITH restricted hiatus and FAITH >> MINDIST hiatus tolerance to emerge.

Tableau (10): Spanish pattern with local conjunction of ONSET/STRESS and MINDISTVV=F1:1

Input	Output	{MINDISTVV=F1:1 $\&_l$ ONSET/STRESS}	IDENT (MORPH)	MINDISTVV=F1:1
i. /la$_F$ ˈagwa/	a. la.ˈa.ɣwa	*!		*
	→ b. eˈl$_F$a.ɣwa		*	
ii. /la$_F$ aˈmiga/	→ c. la.a.ˈmi.ɣa			*
	d. e.l$_F$a.ˈmi.ɣa		*!	

Both languages demonstrate a similar behavior with respect to stress, preferring more dispersed vowel hiatus in general, with increased hiatus restrictions in the presence of stress. Spanish allows all vowel hiatus in the unstressed condition, but in the presence of stress, repair occurs on the worst (identical) hiatus. Catalan allows the best (most dispersed) hiatus in the unstressed condition, but in the presence of stress, repair occurs on all hiatus.

The MINDIST constraints predict a typology of vowel hiatus tolerance that coincides well with the patterns of Spanish and Western Catalan. FAITH >> MINDISTVV=F1:1 produces complete hiatus tolerance, MINDISTVV=F1:1>>FAITH produces tolerance of all pairs except *a-a*, MINDISTVV=F1:6>>FAITH produces intolerance of all pairs except *a-i* and *a-u*, and MINDISTVV=F1:7>>FAITH produces complete intolerance of any vowel hiatus. In general, if a language does not tolerate a particular vowel sequence, it is predicted that all sequences less contrastive will also be forbidden. Thus, when a language like Western Catalan forbids *i-a* in the stressed condition, all other vowel combinations are also repaired.

In sum, comparison of Spanish and Western Catalan determiner-noun sequences in this paper reveals a scale of hiatus tolerance/intolerance, captured by Minimum Distance and stress augmentation constraints. Dispersion Theory and Minimum Distance is theoretically expanded to adjacent intersyllabic vowel sequences, producing typological predictions about the degree of hiatus sensitivity depending on vocalic quality. In addition, the presence of stress is explored as a restricting factor on hiatus tolerance. This work shows a new set of phenomena to which Dispersion Theory brings insight, with well-defined typological predictions for vowel hiatus sensitivity and increased contrast in cases of adjacency to stressed vowels.

Selected References

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