Predicting exceptional prosodification effects in Gradient Harmonic Grammar

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Introduction In *exceptional prosodification effects*, individual morphemes pattern phonologically as if they occur in a prosodic structure inconsistent with the regular syntax-prosody mapping. This paper argues that such patterns can be analyzed without positing morpheme-specific prosodic structures (cf. Zec 2005) in Gradient Harmonic Grammar (GHG; Smolensky & Goldrick 2016), a weighted constraint system in which symbols have non-integer degrees of presence (activity) in underlying forms. Apparent exceptional prosodification effects are the predicted result of interaction between two influences on harmony of output candidates: [1] Scaling of constraint violations according to prosodic context (Hsu & Jesney 2016), [2] Contrastive activity levels of identical segments across lexical items (Zimmermann 2017). The interaction is illustrated in an analysis of the distribution of French nasal vowels and liaison with [n].

Regular sensitivity to prosodic structure Standard French shows evidence for increasing strength of restrictions against nasal vowels Ṽ and following segments X according to the size of morphosyntactic juncture between Ṽ and X. Stem-internally, Ṽ precedes obstruents only (Ṽ highly underattested before sonorants ex. [ʒɑ̃ʁ] 'genre', unattested before glides or vowels ex. *[kɑ̃ju]). Across prefix boundaries, Ṽ precede all consonants but not vowels (Tranel 1976); prefixes *en-*, *non-*, *bien-* surface with [Ṽn] before vowel-initial stems (ex. [ɑ̃n-ivʁe] 'to intoxicate') and [Ṽ] before all consonant-initial stems, regardless of sonority (ex. [ɑ̃-kɛse] 'to cash', [ɑ̃-nobliʁ] 'to ennoble'). Across word and phrase boundaries, Ṽ occurs before all segments; a large class of prenominal adjectives always end in [Ṽ] even preceding vowel-initial words, apparently the productive pattern (Sampson 2001), ex. [miɲɔ̃ ɔbʒe] 'cute object', [malɛ̃ ɛspwaʁ] 'clever hope'. Given a standard syntax-prosody mapping of these structures, as more prosodic constituents (PCats) fully contain a ṼX sequence, more restrictions are enforced on possible segments X.

(1) *Stem-internal; ṼX contained in φ, ωmax, ωmin:* *Ṽ before obstruents only*

(((…ṼX…)$_{\omega min}$)$_{\omega max}$)$_{\varphi}$

Word-internal across affix boundary; ṼX contained in φ, ωmax: *Ṽ before consonants only*

((… Ṽ (X …)$_{\omega min}$)$_{\omega max}$)$_{\varphi}$

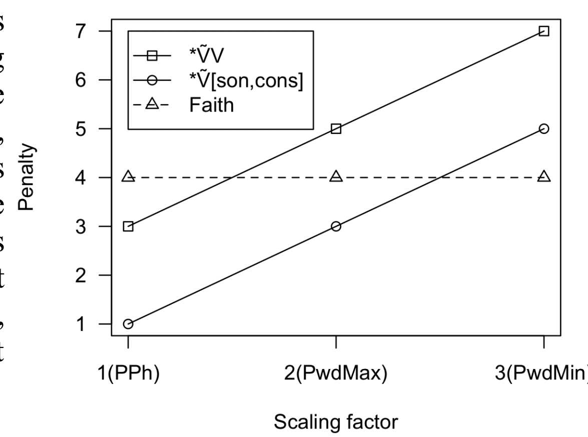
Across word boundaries; ṼX contained in φ only: *Ṽ before all segments*

(((… Ṽ $_{\omega min}$)$_{\omega max}$) ((X…) $_{\omega min}$)$_{\omega max}$)$_{\varphi}$

To capture such patterns with weighted constraints, we define *scalar* markedness constraints *$_P$(M) whose violations increase with the number of PCats *P* that contain the violating structure.

(2) $_P$(*Ṽ[SON]): Given a basic constraint weight *w*, a scale (0, 1, … n) corresponding to some set of prosodic domains, and a scaling factor *s*, for any nasal vowel + sonorant sequence fully contained within a domain $d \in$ D, assign a weighted violation score of $w + s(d)$.

The basic constraint interaction pattern that generates the pattern is shown graphically (simplifying assumptions: non-faithful candidates violate one FAITH constraint, Ṽs are nasalized underlyingly, linking [n] is epenthesized). Points on the X-axis correspond to the smallest PCat that contains the relevant ṼX. Scaling of markedness constraints $_P$(*Ṽ[SON]) and $_P$(*ṼV) alters the relative constraint penalties at each level of prosodic domination, generating the attested pattern of prosodic context sensitivity.

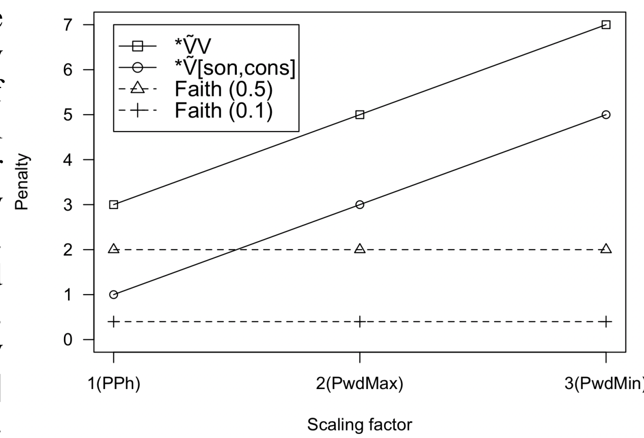


Interaction between scalar markedness and contrastive activity in GHG In addition to the productive no-liaison case across ωmax boundaries, two exceptional patterns arise when prenominal adjectives with final Ṽ in isolation precede a vowel-initial word: Insertion of linking [n] while maintaining vowel nasalization (b), linking [n] with an oral vowel (c):

(3) a. No liaison: ex. *mignon ami* 'cute friend' [miɲɔ̃]+[ami] → [miɲ**ɔ̃** ami]
b. Nasal vowel + [n]: ex. *commun ami* 'common friend' [komɛ̃]+[ami]→[kom**ɛ̃ n**ami]
c. Oral vowel + [n]: ex. *bon objet* 'good object' [bɔ̃]+[ami]→[b**ɔ n**ami]

(b) resembles the patterning of ṼX across prefix boundaries while (c) resembles the stem-internal patterning of ṼX. Rather than posit an exceptional prosodic structure, or different underlying segments (Tranel 1976) for the two groups of exceptions, I show that each pattern can be generated with uniform UR segments and surface prosody if underlying elements differ in non-integer levels of activity, which proportionally affect penalties of faithfulness violations on output candidates. Changes in activity of otherwise identical URs are predicted to replicate effects of prosodic scaling.

Keeping constraints and weights from the previous figure, suppose that gradient activity of exceptional items reduces the penalties of corresponding FAITH violations. At the φ level of scaling, 0.5 activity generates the regular pattern at ωmax scaling (3b), 0.1 activity generates the regular pattern at φ scaling (3c). With full constraint set, the pattern is generated with a /Ṽn/ UR for all nasal vowels; Exceptional items differ from regular ones only in the relative activity of /n/ and the [NASAL] feature of Ṽ, not in their prosodic organization.



(4) Regular activity pattern: *mignon objet*

/miɲɔ̃$_{\text{[NASAL]}0.75}$ n$_{0.25}$ ɔbʒe/	MAX w=4	ID[NAS] w=15	*Ṽ[SON,CONS] w=5.5, s=3	*ṼV w=4, s=7	*H*
☞ a. (((miɲɔ̃)$_{\omega mn}$)$_{\omega mx}$ ((ɔbʒe)$_{\omega mn}$)$_{\omega mx}$)$_{\varphi}$	-0.25(n)			-1$_{\varphi}$	-5
b. (((miɲɔ̃)$_{\omega mn}$)$_{\omega mx}$((nɔbʒe)$_{\omega mn}$)$_{\omega mx}$)$_{\varphi}$			-1$_{\varphi}$		-5.5
c. (((miɲɔ)$_{\omega mn}$)$_{\omega mx}$ ((nɔbʒe)$_{\omega mn}$)$_{\omega mx}$)$_{\varphi}$		-0.75(ɔ̃)			-11.25

(5) Exceptional pattern 1: *commun objet* (resembles regular pattern within ωmax)

/kɔmɛ̃$_{\text{[NASAL]}0.5}$ n$_{0.5}$ ɔbʒe/	MAX w=4	ID[NAS] w=15	*Ṽ[SON,CONS] w=5.5, s=3	*ṼV w=4, s=7	*H*
a. (((kɔmɛ̃)$_{\omega mn}$)$_{\omega mx}$ ((ɔbʒe)$_{\omega mn}$)$_{\omega mx}$)$_{\varphi}$	-0.5(n)			-1$_{\varphi}$	-6
☞ b. (((kɔmɛ̃)$_{\omega mn}$)$_{\omega mx}$ ((nɔbʒe)$_{\omega mn}$)$_{\omega mx}$)$_{\varphi}$			-1$_{\varphi}$		-5.5
c. (((kɔmy)$_{\omega mn}$)$_{\omega mx}$ ((nɔbʒe)$_{\omega mn}$)$_{\omega mx}$)$_{\varphi}$		-0.5(ɛ̃)			-7.5

The analysis is extended to the exceptional prefix *in-*, which is sensitive to the sonority of stem-initial consonants, ex. [**in**abil] 'unskillful', [**ɛ̃**fekɔ̃] 'unfruitful', [**i**legal] 'illegal' (Tranel 1976), respecting stem-internal restrictions on ṼX. This is generated if the prefix has the same exceptional activity values as (5), while markedness penalties are scaled to the expected ωmax context.

References [1] Hsu, B. & K. Jesney. 2016. Scalar positional markedness and faithfulness in Harmonic Grammar. In *Proc. of CLS 51*, 241–255. [2] Legendre, G., Y. Miyata & P. Smolensky. 1990. Can connectionism contribute to syntax?: Harmonic Grammar, with an application. In *Proc. of CLS 26*, 237–252. [3] Smolensky, P. & M. Goldrick. 2016. Gradient symbolic representations in grammar: The case of French liaison. *ROA 1286*. [4] Tranel, B. 1976. A generative treatment of the prefix in- of Modern French. *Language* 52: 345–369. [5] Zec, D. 2005. Prosodic differences among function words. *Phonology* 22: 77–112. [6] Zimmermann, Eva. 2017. Gradient symbolic representations in the output: a typology of lexical exceptions. Paper presented at *NELS 48*, University of Iceland.