Segmental Strength: A Typology of Unstable Segments

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Main Claim

- Ghost segments are **weakly active segments** and thus
  1. both **phonological and lexical** factors can contribute to the (non)realization of a ghost segment (→ Catalan).
  2. ghost segments can only **gradiently contribute to markedness** if they surface. (→ Nuu-chah-nulth).
  3. different **types** of ghost segments exist and can coexist in one language (→ Welsh).

Gradient Representations: Assumptions

Background: Gradient Symbolic Representation (=GSR)

- All linguistic symbols have **activity** that can **gradiently** differ with 1=fully active. (Smolensky and Goldrick, 2016; Rosen, 2016)
- Any change in activity is a faithfulness violation – different activities result in **gradient violations of faithfulness**.
- Elements can be weakly active in the output and thus violate **markedness gradiently**. (Zimmermann, 2017*a*,*b*; Faust and Smolensky, 2017)
- Grammatical computation modeled inside **Harmonic Grammar** where constraints are weighted. (Legendre et al., 1990; Potts et al., 2010)

GSR: Gradient Constraint Violations

- Weakly active segments:
  - they are **easier to delete** than 'normal' segments (=MAX-S violated to a lesser degree)
  - it is **costly to realize** them (=activity inserted (1-a) or weak activity in the output (1-b+c))
  - they **violate/satisfy** markedness constraints to a lesser degree

(1) Gradient Activity=gradient constraint violations

$b_1a_1t_1$-$p_{0.5}$	FULL 10	MAX-S 10	DEP-S 10	*CC 10	
a. $b_1a_1t_1p_1$			**-0.5**	**-1**	-15
b. $b_1a_1t_1p_{0.5}$	**-0.5**			**-0.75**	-12.5
c. $b_1a_1p_{0.5}$	-0.5	**-1**			-15
☞ d. $b_1a_1t_1$		**-0.5**			-5

Only fully active S

Faithful realization of weak S

Deletion of fully active S

Deletion of weakly active S

(2) FULL: Assign violation 1-X for every output element with activity X.

Ghost segments: Three case studies

Ghost segments

(3) ‘Segments that only surface in certain contexts.’ (Yang, 2004, 71)
(Archangeli, 1984; Hyman, 1985; Rubach, 1986; Kenstowicz and Rubach, 1987; Szypra, 1992; Yearley, 1995; Tranel, 1995, 1996; Zoll, 1996)

(4)

	/pan/	/tump/
Phonological context 1:	pan	tump
Phonological context 2:	pan**k**-u	tump-u

Ghost segments

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➙ **GSR: Ghost segments are underlyingly weak segments**

- ❄ weak activity is a lexical property of certain segments inside certain morphemes
- ❄ their activity might be too low to be realized without further ‘support’

1. Relevance of Lexical and Phonological factors: Catalan

(5)

	Sg	Pl	
a.	gɔ́t	gɔ́ts	‘glass(es)’ (masc.)
	tákə	tákəs	‘stain(s)’ (fem.)
b.	pás	pás**u**s	‘step(s)’ (masc.)
	gɾás	gɾás**u**s	‘fat’ (masc.)
c.	mos**u**	mos**u**s	‘lad’ (cf. fem. /mos[ə]/)
	monj**u**	monj**u**s	‘monk/nun’ (cf. fem. /monj[ə]/)

(Fabra, 1990; Wheeler, 1999; Hualde, 2002; Bonet et al., 2007)

❄ sibilant-final masc. N’s show /u/ (≠epen. /ə/) before plural-/s/ (6-b)
➙ ghost V **avoids a marked structure** /*SibSib/

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- sibilant-final masc. N's show /u/ (≠epen. /ə/) before plural-/s/ (6-b)
  → ghost V **avoids a marked structure** /*SibSib/
- other N's always show /u/ (6-c)
  → same ghost V is **lexically determined**

1. Catalan Ghost segments: GSR Account

(6) /-u$_{\text{ghost}}$/ unrealized without further support: **0.5x**Dep-V ≫ **0.5x**Max-V

$g_1ɔ_1t_1-u_{0.5}-s_1$	Max-C 50	*SS 40	Full! 30	Dep-V 26	Max-V 20	Int-V 5	
☞ b. $g_1ɔ_1t_1s_1$					-0.5		-10
c. $g_1o_1t_1u_1s_1$				-0.5			-13

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(7) /-u$_{\text{ghost}}$/ realized if markedness avoided: *ss +**0.5x**Max-V ≫ **0.5x**Dep-V

$p_1a_1s_1$–$u_{0.5}$–s_1	Max-C 50	*SS 40	Full! 30	Dep-V 26	Max-V 20	Int-V 5	
b. $p_1a_1s_1s_1$		-1			-0.5		-50
☞ c. $p_1a_1s_1u_1s_1$				-0.5			-13

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(8) /-u👻/ realized if it can coalesce with another /–u👻/

$m_1o_1s_1u^{a}_{0.5}–u^{b}_{0.5}$	Max-C 50	*SS 40	Full! 30	Dep-V 26	Max-V 20	Int-V 5	
a. $m_1o_1s_1$					-1		-20
☞ b. $m_1o_1s_1u_1^{a,b}$						-1	-5

2. Gradient Markedness: Nuuchahnulth

❄ some suffix-initial C's only surface post-vocalically (Kim, 2003, 178)

(9) a.	V__	ʔatɬa–(q)umɬ	ʔatɬa**q**umɬ	'two dollars'
	C__	tɬ'is–(q)umɬ	tɬ'isumɬ	'sth. white and round'
b.	V__	ʔu–(k)ɬaː–siʃ Eun-Sook	ʔu**k**aːsiʃ	'My name is Eun-Sook'
	C__	kʷis–(k)ɬaː–k'uk–ʔiʃ	kʷisɬaːk'ukʔiʃ	'It seems like he has a different name'

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❄ a ghost C only surfaces if it does **not create a marked structure**:

- Avoidance of a coda for /–C$_{\text{ghost}}$V (9-a): *VC.**C**$_{\text{ghost}}$V
- Avoidance of a cluster for –C$_{\text{ghost}}$CV (9-b): *VC**C**$_{\text{ghost}}$.CV

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- Avoidance of a cluster for –C$_{\text{ghost}}$CV (9-b): *VC**C**$_{\text{ghost}}$.CV

But realization in (9-b) creates the marked structure (=Coda) that non-realization in (9-a) avoids!

➞ a ranking paradox for OT emerges:
*Coda ≫ Max$_{\text{ghost}}$ for (9-a) but
Max$_{\text{ghost}}$ ≫ *Coda for (9-b)

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2. Nuuchahnulth Ghost segments: GSR Account

(10) /–C$_{\text{ghost}}$V/: C$_{\text{ghost}}$ not realized after a C (=C$_{\text{ghost}}$ forces C into coda position)

tɬ$_1$i$_1$s$_1$–q$_{0.5}$u$_1$	MAX-S 20	FULL! 12	*CC 10	*CODA 7	
a. tɬ$_1$i$_1$s$_1$.q$_{0.5}$u$_1$		-0.5	-1	**-1**	-30
☞ b. tɬ$_1$i$_1$.s$_1$u$_1$	-0.5		-1		-27

0.5xFULL! + *CODA ≫ **0.5x**MAX-S

(11) /–C$_{\text{ghost}}$CV/: C$_{\text{ghost}}$ realized after a V (=C$_{\text{ghost}}$ is itself in coda position)

ʔ$_1$u$_1$–k$_{0.5}$ɬ$_1$aː$_1$	MAX-S 20	FULL! 12	*CC 10	*CODA 7	
☞ a. ʔ$_1$u$_1$k$_{0.5}$.ɬ$_1$aː$_1$		-0.5		**-0.5**	-9.5
b. ʔ$_1$u$_1$.ɬ$_1$aː$_1$	-0.5				-10

0.5xMAX-S ≫ **0.5x**FULL! + **0.5x***CODA

3. Different ghost segments within one language: Welsh

- some C's only surface before a vowel (12-a)
- definite marker alternates: /yr/ (__ V), /y/ (__ C), /'r/ (V__) (12-b)

(12)

a.	guda**g** eraill	'with others'	
	guda gwên	'with a smile'	
b.	**yr** afon	'the river'	yr (=ər) __ V
	y llyfr	'the book'	y (=ə) __ C
	o**'r** afon	'from the river'	/'r/ (=r) V__, overriding a.+b.
	o**'r** llyfr	'from the book'	
c.	guda**'r** nod	'with the aim'	(*guda**g** **y** nod)

(Hannahs and Tallerman, 2006)

- combination of both shows **different default states** for ghost C's:
  - /**g**👻/ only realized if it does not avoid a hiatus (='appearing ghost')
  - /**y**👻**r**👻/ only deleted if they create a hiatus/coda ('disappearing ghosts')

3. Welsh Ghost segments: GSR Account

- different realization thresholds:
  - $g_{0.2}$ is never realized unless it avoids a *Hiat violation
  - $y_{0.6}r_{0.6}$ are always realized unless they create a *Hiat/*Coda violation

(13)

$g_1u_1d_1a_1g_{0.2}\ y_{0.6}r_{0.6}\ C_1V_1\ldots$	RM 100	Max-S 10	Dep-S 10	*[CC 8	*Hiat 7	*Coda 5	
a. $g_1u_{.1}d_1a_1.g_1y_1r_1.C_1V_1$			-1.6			-1	-21
b. $g_1u_{.1}d_1a_1.y_1r_1.C_1V_1$		-0.2	-0.8		-1	-1	-22
☞ c. $g_1u_{.1}d_1a_1r_1.C_1V_1$		-0.8	-0.4			-1	-17
d. $g_1u_{.1}d_1a_1.g_1y_1.C_1V_1$		-0.6	-1.2				-18

- vs. (13-d): /$g_{0.2}$/ is never realized to avoid a *Coda violation ($0.8\times$Dep-S $\gg$ *Coda)
- vs. (13-a): /$g_{0.2}$/'s default state is to not be realized ($0.8\times$Dep-S $\gg 0.2\times$Max-S)

Discussion

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- the GSR assumption that segments differ in their underlying presence allows to account for the typology of ghost segments

- in contrast to accounts where weakness is autosegmental defectivity: (e.g. Spencer, 1986; Szypra, 1992; Tranel, 1995, 1996; Faust, 2013)
  - it predicts **gradient markedness** (cf. Nuu-chah-nulth)
  - it predicts **true gradience** (cf. Welsh)

- future research: Weakness in the output predicts **phonetic effects** that correlate with phonological weakness (=possible but not necessary!)

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