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Peer Pressure, Phonological Constraints and Contextual Slips of the Tongue*

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Introduction

This talk starts with some connections between two kinds of data, which are by now well-noted in the literature (see esp. Dressler 1979, Hansson 2001ab, Rose and Walker 2004, Walker 2007):

• Long-Distance Consonant Harmony (LDCH)

1) Navajo sibilant harmony (examples from McDonough 2003)
(coronal) sibilants must all be either alveolar or alveopalatal:

a) /0-ʃ-dzĩĩs/ → [yisdzĩĩs] *'I drag it'*

b) /sis-l-dʒool/ → [ʃiʃdʒool] *'I lie huddled'*

• 'Contextual' Slips of the Tongue: (anticipations and) perseverations[1]

2) a) /ˈsɛ.ʃʌn/ → [ˈʃɛ.ʃʌn] *'session'*

b) /ˌpɚʒən fɚ ˈpɚs/ → [ˌpɚʒən fɚ ˈpɚʃ] *'Persian for 'purse'*

c) we could just /tɑs/ → /tʃɑs/ out these /tʃɛks/ *'toss out these checks'*

d) They don't /meʲk peʲmənts/ → [peʲk peʲmənts] on it' *'make payments'*

e) That /saʊndz fʌni/ → [faʊndz fʌni] *'sounds funny'*

f) /deʲ/ → [dʒeʲ] of the [dʒækɬ] *'Day of the Jackal'*

g) 'televitie, uh... televisie' *'television'* (Dutch)

* I would like to especially thank Marnie Krauss, whose joint work with me led to this current project. I also thank Dorie Erickson, Robert Kirchner, Elliott Moreton and Jennifer Smith for useful discussion, as well as Rachel Walker and Gunnar Hansson for input and advice on tangentially-related work – though none of them are responsible for anything I say here.

[1] Errors (2a,b) from Krauss (2008); (2c,f) from Stemberger (1991), (2d,e) from Stemberger 1989, (2g) from Wijnen (1992).

Traditional and/or default view: (1) is competence and (2) is performance. Still, they have a lot (though not everything) in common.

Depending on the nature of the grammar and the way we think its knowledge is used online, a unified account of both might be possible and/or even right.

First half of the talk:

• proposal for how grammatical mechanisms that drive (1) could be fruitfully used to drive (2) (also: Goldrick and Daland 2009, Krauss 2008)

Proposal built from:

• existing, motivated LDCH constraints
• a stochastic constraint-based grammar...
• ... with an inherent and asymmetric IO-Faith-demoting bias

> *In this proposed view, we have slips of the tongue because we have LDCH constraints (plus noise in the grammar)*

However! The connection between (1) and (2) has been used in a few different places in the literature to argue precisely the reverse:

Alternative account (most explicitly in Hansson 2001a,b):

• over time, frequent speech errors are somehow 'phonologized' into LDCH constraints

> *In this alternative view, we have LDCH because we have contextual slips of the tongue, re-interpreted as phonology*

Second half of the talk:

• an attempt to tease apart these two causal accounts of this correlation.

Preview of Conclusions:

• some serious, though perhaps not insurmountable, obstacles to the view that LDCH constraints are 'phonologized' speech errors

• the need for more cross-linguistic data: to expand the typology both of slips of the tongue studies and also *child-specific* harmonies.

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Part One: Slips of the tongue via Agreement by Correspondence

1. Long-distance consonant harmony as surface correspondence

1.1 What is LDCH? Working definition from Hansson (2001):

> *Any assimilatory effect of one consonant on another consonant, or assimilatory cooccurrence restriction holding between two consonants, where: (a) the two consonants are separated by a string of segmental material consisting of at the very least a vowel; and (b) intervening segments, in particular vowels, are not audibly affected by the assimilating property.* (p. 42)

Examples:

3) Navajo sibilant harmony (Shaw 1991, McDonough 2003)
(coronal) sibilants must all be either alveolar or alveopalatal:

/0-ʃ-dzīīs/ → [yisdzīīs] *'I drag it'* /ʃ-iz-taɬ/ → [siztaɬ] *'I gave it a kick'*
/sis-l-dʒool/ → [ʃiʃdʒool] /ʃ-ooh-ɬ-zil/ → [soohsiɬ]
'I lie huddled' *'you (two) are grabbing me'*

4) Kikongo nasal harmony (Dereau 1955, Odden 1994, Walker 2007)
nasals trigger nasalization of preceding voiced stops and laterals

a) -suk-i**d**i 'washed' -**n**ik-i**n**i 'ground'
-bud-idi 'hit' -sim-ini 'prohibited'

b) -sakid-il-a 'congratulate for' - nat-in-a 'carry for'
-toot-i**l**-a 'harvest for' -du**m**uk-is-i**n**-a 'cause to jump for'

5) Bukusu liquid harmony (de Blois 1975, Odden 1994)
rhotics trigger rhoticization of preceding laterals

a) teex-e**l**a 'cook for' b) **r**eeb-e**r**a 'ask for'
lim-ila 'cultivate for' kar-rira 'twist'
iil-ila 'send thing' resj-era 'retrieve for'

1.2 Agreement-by-Correspondence: Hansson 2001, Rose & Walker 2004
(also Walker 2000ab, cf Gallagher & Coon 2009, Gallagher 2010: see below)

6) Familiar kind of surface correspondence: reduplication

a) *the English 'ridiculative mood'* (Nevins and Vaux 2003)
'$y_1e_2ll_3o_4w$, $schme_2ll_3o_4w$'
'breakfast, schmeckfast'

b) *Javanese reduplication* (Horne 1961)
/abur/ [a.bʊr]
/RED+ abur/ [a.bʊ.ra.bʊr] = [$a_1.b_2ʊ_3.r_4a_1.b_2ʊ_3r_4$]

If two segments are in correspondence, IDENT constraints can enforce similarity between them on any featural dimension:

7) IDENT-BR[+/-F]:
Base segments must match their reduplicant's corresponding segments for the feature [+/-F]

Now imagine those correspondence relations holding between segments *within a mono-morphemic word* (see also. Zuraw 2000).

8) /ʃ-iz-taɬ/ → [$\mathbf{s_k}$i$\mathbf{z_k}$taɬ] two sibilants *in correspondence,* now *faithful to each other* for [+/-distributed]

Two kinds of constraints to drive LDCH:
• one to bring segments into correspondence if they are sufficiently similar
• one to make segments agree (i.e., be faithful to each other)

Definitions from Rose and Walker (2004):

9) **CORR-[s] ⇔[ʃ]**:
Let S be an output string of segments and let X and Y be segments specified [-sonorant, -continuant, αdist]. If X, Y∈S, then X is in a relation with Y; that is, X and Y are correspondents of one another.

10) **IDENT-CC [DIST]**:
Let C_i be a segment in the output and C_j be any correspondent of C_i in the output. If C_i is [αdist], then C_j is [αdist].

Long distance harmony will happen when both (9) and (10) outrank the right IDENT-IO constraint (see next page):

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11) Ranking that induces LDCH

/ ʃ–iz–taɬ/	CORR-[s] ⇔[ʃ]	IDENT-CC [DIST]	IDENT-IO [DIST]
ʃiztaɬ	*!		
ʃkizktaɬ		*!	
☞ skizktaɬ			*

2. Proposal: contextual slips as one-time LDCH constraint re-rankings[2]

12) /'sɛ.ʃʌn/ → ['ʃɛ.ʃʌn] *session*
/ˌpəɹʒən fəɹ 'pəɹs/ → /ˌpəɹʒən fəɹ 'pəɹʃ/ *Persian for 'purse'*

13) Normal English pronunciation of '*session*': preventing CH

/'sɛ.ʃʌn/ '*session*'	CORR-[s] ⇔[ʃ]	IDENT-IO [DISTRIBUTED]	IDENT-CC [DISTRIBUTED]
'sɛ.ʃʌn	*		
☞ 'skɛ.ʃkʌn			*
'ʃkɛ.ʃkʌn		*!	

Skimming over some learning details (feel free to ask later):
- I propose that English learners, who get evidence that LDCH does not operate in their target grammar, rank these constraints as in (13)

However, what if:

14) **Demotion of IO-faithfulness** produces '*shession*'

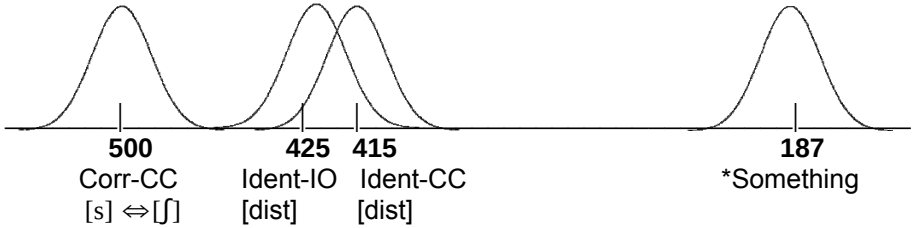
/'sɛ.ʃʌn/ '*session*'	CORR-[s] ⇔ [ʃ]	IDENT-CC [DISTRIBUTED]	IDENT-IO [DISTRIBUTED]
'sɛ.ʃʌn	*!		
'skɛ.ʃkʌn		*!	
☞ 'ʃkɛ.ʃkʌn			*

[2] This section was inspired by a proposal in Krauss (2008), to whose author I am in debt.

2.1 How to cause a one-time re-ranking: Stochastic OT using the GLA
(Boersma 1998 and many subsequent[3])

Three essential components:
i) constraints not ordinal points, but normal distributions along a number line

15) One stochastic version of 13) that English learners can acquire



ii) exact values of each constraint is chosen randomly every time grammar is used, from under its distribution curve:

16) Corr-CC[s] ⇔[ʃ] >> Ident-IO [dist] >> Ident-CC[dist]
501.3 **426** **414.9**

iii) distribution curves are asymptotic to zero:
any constraint value is, in principle, possible – most just not very likely

In (15): Ident-IO[dist] *usually* >> Ident-CC[dist] ... no LDCH
Ident-CC[dist] *occasionally* >> Ident-IO[dist] ... a contextual slip

The idea here: positive asymmetric skew of IO-faith distributions (as in 17 on the next page)

The upshot: the exact value of an IO-faith constraint is *more likely to be lower than higher* within its distribution on any iteration

[3] A small subset of the relevant literature: Boersma and Levelt 2003; Boersma and Pater 2008; Coetzee and Pater 2009, Apoussidou 2007, Jesney and Tessier 2008, 2011.

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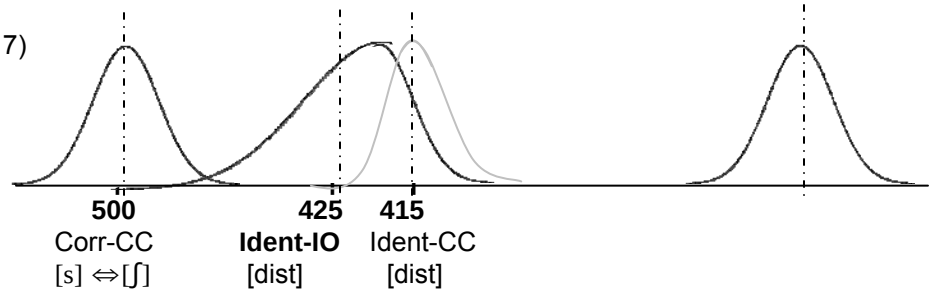
17)



The effect: ranking reversals of Ident-CC[F] and Ident-IO[F] will be more likely than others, despite *absence* of variation in the target

The hope: Simulations will tell which values, how much skew, etc. are right for fitting the proportions of contextual slips.

Sidenote: Connections and alternatives

Hayes (2004): The idea of using an asymmetric bias lowering IO-faith w/o evidence

Goldrick and Daland (2009): The idea of using a stochastic phonology to cause on-line errors to mirror grammatical tendencies (e.g. k→t more than t→k)

Gallagher (2011): Laryngeal LDCH comes from systemic contrast-type constraints. Question: what would those constraints do here? Observation: voicing errors are rather uncommon sips of the tongue.

3. Why this proposal? The connections between LDCH and slips

3.1 The biggest connection is *similarity*

18) Example: LDCH nasal harmony (see refs. in Hansson 2001a)[4]
Sawai: nasality affects oral sonorants [r]
Hausa: nasality affects oral sonorants [l]
LuGanda: nasality affects homorganic voiced/voiceless stops
Kikongo, Yaka: nasalilty affects voiced stops and oral sonorants [l]

In *long-distance* nasal consonant harmony:
- targets are susceptible by virtue of *similarity to the trigger*
- *more similar* sounds are more likely to participate in LDCH

With respect to this nasal harmony data, Walker (2007) points out:
- [n] and [d] share [+voice], [-continuant and [alveolar place] ... etc.
- [n] and [b] share [+voice] and [–continuant]

Contextual slips of the tongue, like LDCH, are all about similarity (Shattuck-Hufnagel and Klatt 1979, Stemberger 1991, Vousden et al 2000, Broecke et al 1980, Goldrick 2004, etc. etc.)

Experimental question: *Does similarity predict speech error rates and LDCH patterns in all the same ways?*
Results so far: ***Yes**, if we calculate similarity in the right ways.*

Samples from the experimental literature: On general similarity: Stemberger (1991a); Frisch (1996); on LD nasal agreement: Walker (2007); on English sibilants in particular: Krauss (2008); see also Rose and King (2007)

3.2 Two other connections

3.2.1 Directionality of harmony

LDCH: if not stem controlled, then R-to-L or all directions (Hansson 2001a)

Errors: other things being equal, anticipatory errors are usually far more common than perseveratory errors (e.g. Schwartz et al 1994; Dell et al 1997)

3.2.2 Asymmetries between targets and intruders

LDCH: of all the sibilant harmony systems that were asymmetric in Hannson (2001b)'s survey,
- **16** are s → ʃ only
- **1** is ʃ → s only

Errors: also show this bias for s → ʃ errors rather than the reverse (e.g. Shattuck-Hufnagel and Klatt 1979; Stemberger 1991; c.f. Frisch 1996)

[4] Two notes: 1. In the Agreement-by-Correspondence approach, this connection between similarity and agreement is encoded using fixed rankings2. The centrality of similarity is in sharp contrast to local nasal assimilation ('spreading'), in which the likelyhood of a feature spreading onto a target is a function of how compatible that feature is with the trigger's other properties – see e.g. Walker 1998 on local nasal assimilation. On this point see especially Walker (2007).

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Part Two: Which comes first? Errors or LDCH?

4.1 Two Differing Predictions of the two approaches

19) ***If LDCH constraints create speech errors (online):***
- (i) then *any* LDCH constraint could in principle cause a speech error
  ...in fact any *markedness* constraint might do so
  ... though other pressure can (and surely do) also create errors

- (ii) children do not create, or at least do not *innovate,* the constraints that cause adult LDCH… so child-specific consonant harmonies needn't resemble speech errors in any systematic way

20) ***If speech errors create LDCH constraints (over time):***[5]
- (i) then ANY error could in principle cause an LDCH constraint
  ... though other things can/will still create constraints

- (iii) since children are presumably the innovators of LDCH constraints, at least some of their *innovative* harmony constraints should be LDCH precursors

4.2 Do all LDCH constraints imply errors? I think so.

Hansson (2001b)'s list of kinds of long-distance consonant harmonies:

(1) Examples of non-coronal CH phenomena discussed in Hansson (2001)
- Nasal consonant harmony (nasals vs. oral stops/sonorants)
- Voicing harmony (voiced vs. voiceless obstruents)
- Stricture harmony (stops vs. fricatives, fricatives vs. affricates, etc.)
- Dorsal consonant harmony (velars vs. uvulars)
- Liquid harmony (laterals vs. rhotics, liquids vs. glides)
- Secondary-articulation harmony (e.g., pharyngealized vs. plain sibilants)

Errors of each type are, I think, quite easy to find in corpora (except impossibilities given English's segmental inventory, e.g. dorsal harmony, although cf discussion of voicing harmony above?)

[5] The view that speech errors cause harmony constraints is the production-based version of John Ohala's (1981, 1983) view of phonologization as perception-based, whereby local co-articulation is re-interpreted as phonological targets. In some case, the distance between harmony loci makes this unlikely; see also Gallagher (2010 §4.4)

4.3 Do all contextual errors imply agreement constraints? No.

Two kinds of common speech errors that are NOT phonologized
(Error examples below from Stemberger 1989)

Type 1: Addition errors

21) Error examples
a) 'Three d**r**awers' [d**ɹ**aʊn] 'down'
b) 'We have to b**r**ing sleeping' [b**r**ægz] 'bags'

22) Unattested: An affix that alternates between e.g. [i'la] and [i.'pla] depending on whether the root contains a [pl] cluster:

/bat + ila/ → [bati'**l**a] /plat + ila/ → [plati'**pl**a]
/pinob + ila/ → [pi**ˌ**nobi'**l**a] /toplu + ila/ → [toplui'**pl**a]

Type 2: Exchange errors

23) Error examples
a) 'I got that [**g***a***ɬ**] for [**p**rɪsməs] 'ball for christmas'
b) 'Why don't we [st*a***f**] [*a***p**]'... 'stop off'

24) Unattested: An affix that alternates between e.g. [i'la] and [i.'ra] depending on whether it *metathesizes* with a root [r]:

/bat + ila/ → [bati'**l**a] /p**r**at + i**l**a/ → [p**l**ati'**r**a]
/plinob + ila/ → [pli**ˌ**nobi'**l**a] /top**r**u + i**l**a/ → [top**l**ui'**r**a]

If some contextual speech errors create LDCH constraints, why don't those in (21) and (23) create other phonological constraints?

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4.4 Do child-specific harmony constraints look like pre-LDCH?

Child-specific consonant harmony is robustly attested in many languages and certainly very well studied in English (Smith 1973, Vihman 1978, Goad 1996, Pater 1997, Pater and Werle 2001 *interalia*)

From the current perspective (and as is well-acknowledged):
- child consonant harmony looks mostly like the *complement* of LDCH!
- one notable exception: some (L1 English-learning) children show long-distance nasal harmony – e.g. [minz] for 'beans' (Menn 1983)

Place harmony in adult grammars targets *secondary place:*
- within dorsal (velar vs. uvular)
- within coronal (most notably sibilant harmony)
- palatalization harmony, pharyngealization harmony...

Child harmony in child grammars almost always targets *primary place:*
- dorsal harmony (e.g. 'duck' → [guk]: Trevor, Pater 1997)
- labial harmony (Clara: Rose 2000)[6]

25) Examples of Clara's regressive labial CH (from Rose 2000)

	Word	Target form	Child's output	Age	Gloss
i) [Dor…Lab] 93% of potential targets	*Gaspard*	[gaspɑʁ]	[ba'pæ:]	1;03.07	'Gaspard'
	capable	[kapab]	[pa'pæb]	1;09.01	'capable'
	café	[kafe]	[pə'fɛ]	1;10.04	'coffee'
	Gaspard	[gaspɑʁ]	[pæ'pæ:]	2;00.02	'Gaspard'

[6] Children do show both local AND non-local consonant harmonies: see e.g. Gwendolyn (Stemberger 1988, Hansson 2001a) whose labial harmony shows the strict influence of intervening blocking segments, and thus looks local, like the nasal spreading noted in section 3.

Reasonable argument:
- child CH targets primary Place features because that's how much Place children have!
- Vihman (1978) (quoted by Hansson 2001):

> *"It may be that* s-ʃ *(and other combinations of the alveolar and palato-alveolar fricatives) represent, for adults, the same kind of difficulty that* p - t, t - k*, etc. apparently present for children."* (p. 324)

Empirical question:
At the stage of consonant harmony, do children have surface contrasts that could show evidence of end-state consonant harmonies?

Some evidence that the answer is yes: from Clara
(all data taken from Rose 2000)

26) Some of Clara's output at 1;07-1;10 (during labial harmony)

Word	*Target*	*Child*	*Age*	*Gloss*
'cafe'	kaˈfe	**p**əˈ**f**ɛ	1;10.04	*coffee*
'citrouille'	siˈtχuj	**θ**əˈ**t**χuːj	1;10.04	*pumpkin*
'dame'	dam	**d**a**m**	1;07.27	*lady*
'capable'	kaˈpab	kaˈ**pæb**	1;09.01	*capable*

Clara's outputs in (34) show:
- multiple labial PoA (p and f in *cafe*)
- multiple degrees of homo-org. stricture (t and θ in *citrouille*)
- multiple voicing values among homo-org. stops (p and b in *capable*)

In fact:

27) Clara's possible pattern of strictly local coronal place harmony:

	Word	*Target*	*Child*	*Age*	*Gloss*
local assimilation: /sj/ → [ç**j**]	'chien'	ʃ**j**ɛ̃	**ç**j**æ**	1;07.27	*dog*
no LD harmony: [s…ç], *[s…s]	'sorcière'	**s**ɔʁ**s**jaʁ	**s**ɔ**ç**jæː	1;07.27	*witch*

(local pattern not ATB though: 'attention' = [æta:**sj**õ])

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5. Tentative Conclusions

1. With the right structure of grammar and phonological knowledge, it is possible to understand long-distance consonant harmony as either the *cause* or the *result* of contextual slips of the tongue.

2. I have proposed pursuing the former option, in which a grammar's stochastic noise could produce the one-time re-rankings necessary to produce LDCH-like effects, construed as errors.

3. I have suggested some directions in which we could try to tease apart this proposal from the reverse idea, namely that LDCH constraints are in some way the result of erroneous speech planning.

4. The conclusion I draw from these investigation is that, at best, some very clever proposals will be necessary to understand how the 'phonologization' of speech errors could bring about all and only the attested facets of long-distance consonant harmonies.

5. ... not that I am the first to note this:

"[Earlier on], it was suggested that consonant harmony effects could be regarded, loosely speaking, as 'phonologized speech errors'. This phrase should not be taken too literally. Given how relatively rare errorful productions of a given word is, as compared to productions without error, it seems rather unlikely that sporadic on-line errors would be able to spawn regular sound changes, yielding systematic phonological patterns. [...] If considerations of planning and phonological encoding are involved in consonant harmony phenomena, as I have argued here, then this connection must hold at a relatively grammaticalized cognitive level." (Hansson 2001: 512)

6. Many further questions need answers – e.g., about how the present account interacts with the more 'performance' properties of speech errors, including the effects of task and wordhood...

7. ... and more data on the cross-linguistic facts of speech errors as well as child harmony patterns in other languages.

Thank you very much.

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