

**Long-term phonological variation and change in Optimality Theory:
From Latin to Modern Italian in less than 45 minutes**

Martin Krämer
University of Tromsø / CASTL
martin.kraemer@hum.uit.no

1 Start

- Connecting language change with a theory of acquisition helps understand the actuation problem (e.g., Bermúdez-Otero & Hogg 2002)
- Phonological change results in reduction of markedness.
- Phonological opacity can arise ‘accidentally’ through subsequent introduction of processes overlapping in input and output configuration
- Grammatical and lexical restructuring is an effect of ‘over-opacification’.

Disclaimer: A. It is not intended that this is IT. There are other factors that play a role in language change, such as speech rate, borrowing etc.

B. The idea that imperfect acquisition is a source of change is not new at all, but a more detailed theory of acquisition can i.) restrict the theoretically possible ways in which grammars change, ii.) be more explanatory rather than just descriptively adequate.

2 Background on Latin and Italian

(1) Latin contrastive consonants (Vincent 1988a: 29)

Labial	Alveolar/ Dental	Velar	Labio-velar	Glottal
p b	t d	k g	k ^w g ^w	
f	s			h
m	n			
	l			
	r			

(2) a. Latin vowels

i:	ɪ		ʊ	u:
e:	ɛ		ɔ	o:
	a:	a		

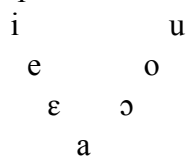
b. Latin Diphthongs

ai	(orthographic AE)
au	
oi	(orthographic OE)
	(Vincent 1988a: 29)

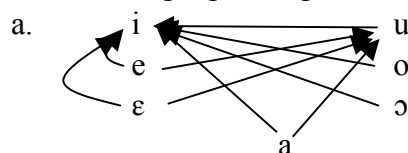
(3) Italian consonant phonemes (Vincent 1988:280)

	Labial	Labio-dental	Dental	Alveolar	Palato-alveolar	Palatal	Velar
Stop	p, b		t, d				k, g
Affricate				ts, dz	tʃ, dʒ		
Fricative		f, v		s, (z)	ʃ		
Nasal	m			n		ɲ	
Lateral				l		ʎ	
Rhotic				r			

(4) Italian simple vowels



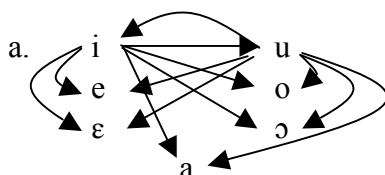
(5) Italian falling diphthongs



b.

	i	u
i	*ij	*iw
e	ej	ew
ε	εj	εw
a	aj	aw
ɔ	ɔj	*ɔw
o	oj	*ow
u	uj	*uw

(6) Italian rising diphthongs



b.

	i	e	ε	a	ɔ	o	u
j		je	jε	ja	jɔ	jo	ju
w	wi	we	wε	wa	wɔ	wo	

3 Acquisition and Markedness reduction

3.1 Acquisition – the BCDA

(7) The Constraint Demotion Algorithm

Learners group the candidate set into winner-loser pairs, mark-data pairs. For each mark-data pair the learner registers for each constraint whether it supports the winner or the loser, after all violation marks shared by both candidates have been cancelled out.

All L-marked constraints have to be dominated by at least one W-marked constraint. This is achieved by demotion of the L-marked constraints.

After every mark-data pair has been used and no ranking argument is left over the algorithm terminates.

(8) The r-measure (Prince & Tesar 2004)

The r-measure for a constraint hierarchy is determined by adding, for each faithfulness constraint in the hierarchy, the number of markedness constraints that dominate that faithfulness constraint. (Tesar & Prince 2004: 252)

(9) Faithfulness Delay (Prince & Tesar 2004)

On each pass, among those constraints suitable for membership in the next stratum, if possible place only *markedness constraints*. Only place faithfulness constraints if no markedness constraints are available to be placed in the hierarchy.

(10) Least Impact Strategy (freely interpreting Prince & Tesar 2004):

If a learner has the choice between two W-marked F constraint she ranks the one with the least impact. (Not exactly Specific > General)

(11) Free Ride Algorithm (McCarthy 2005) (my informal version)

When a learner detects an alternation of the type /a/ -> [B]/(in context C), all instances of [B] (in context C) are changed to /A/.

Why Free Rides? Because learners do that whenever they can. Even if it doesn't make sense. (Krämer 2008)

(12) For example Germans with /g/ spirantisation

a.	eklig	[ʔe:kliç]	'disgusting'
	eklige	[ʔe:kliçə]	'disgusting'(infl.)
b.	schrecklich	[ʃʀɛkliç]	'awful'
	schreckliche	[ʃʀɛkliçə]	'awful' (infl.)
c.		[ʃʀɛkliçə]	(child rendition)

In felicitous cases, this reduces the underlying segment inventory.

3.2 Applying the BCDA to change: warm-up

Comparing the inventories, this looks like plain wrong.

Markedness reduction on one side is (often) paid for by an increase of markedness elsewhere.

The emergence of the coda condition

(13) Latin syllable-final consonants

a. Internal codas (mostly from Tekavčić 1980:149)

LŪCTUM	‘mourning’
CLAUSTRUM	‘bolt, bar, prison, cloister’
FARCTUS	‘stuffed’

b. Word-final codas

CAMPUM	‘field’
SATIS	‘enough’
CAPUT	‘head; top; leader’
SOL	‘sun’
NOMEN	‘name’
PATER	‘father’
AB, OB	prep.
ISTUD	
REX	‘king’

(14) Italian word-final consonants

a. 'bar	‘bar’	b. le'one	‘lion’
'bus	‘bus’	'fjore	‘flower’
bri'ɔʃ	‘brioche’	ko'lore	‘colour’
'klub	‘club’		
'sprajt	‘Sprite’		
'film	‘film’		

(15) Italian word-internal codas

a. 'patto	‘pact’	c. ampjo	‘ample’
'faʃʃa	‘band, bandage’	tri'omfo	‘triumph’
'dʒemma	‘gem’	'ponte	‘bridge’
'karro	‘cart’	'ʃentsa	‘science’
...		'lintʃe	‘lynx’
b. 'kaspita	‘good gracious!’	'kaŋkro	‘cancer’
'pasta	‘pasta’	d. 'kɔrpo	‘corpse, body’
'kasko	‘helmet’	'kolpo	‘blow, stroke’
		e. 'kɔpto / 'kɔtto	‘Coptic’
		at'lante	‘atlas, book of maps’
		'etna / 'enna	‘Etna (name of a volcano)’
		'kaktus	‘cactus’

(16) Incomplete acquisition

	gato	MARK	FAITH	FAITHONSET
	tato < gato	L	W	W

Faithfulness delay: No option here

Least impact strategy: FAITHONSET >> MARK >> FAITH

(17) Accidental coda neutralisation

	/akto/	FAITHONS	MARK	FAITH
a.	akto		*!	
b.	atto			*

Codas become less marked, but there are more geminates in the language now.

4 Innovation and timing

(18) First palatalisation

FILIA	figlia	[fiʎʎa]	‘daughter’
PALEA	paglia	[paʎʎa]	‘straw’
BALNEU	bagno	[baɲɲo]	‘bath’
UITIU	vezzo	[vetʃo]	‘habit’
MEDIU	mezzo	[meddzo]	‘half’
ERICIU	riccio	[rittʃo]	‘hedgehog’
FAGEU	faggio	[faddzo]	‘beech’
FASCIARE	fasciare	[faʃʃa:re]	‘(to) bandage’
REVERSIARE	rovesciare	[roveʃʃa:re]	‘(to) reverse’

(19) Parasitic onset licensing of features in coda position by fusion

LAXARE	lasciare	[laʃʃa:re]	‘(to) let’ (X = [ks])
LIGNA	legna	[leɲɲa]	‘wood’ (GN = [ɲɲ])

(20) 2nd palatalisation

a. CIRCULUS	<i>circolo</i>	[tʃirkolo]	‘circle’
b. GENTE	gente	[dʒente]	‘people’
c. PISCE	pesce	[peʃʃe]	‘fish’

(21) Morphophonological consequences of palatalisation

a. giun[dʒ]ere	giun[g]o	‘(to) join - (I) join’
b. pa[g]are	pa[g]i	‘(to) pay - (you.sg) pay’

(22) Glide fortition

a. PEIUS	peggio	[ˈpeddʒo]	‘worse’
IANUARIUM	gennaio	[dʒenˈna:jo]	‘January’
b. CIUILEM	civile	[tʃiˈvi:le]	‘civil’
UINUM	vino	[ˈvi:ɲo]	‘wine’

(23) Reorganisation of mid vowels and diphthongs

a. ˈkwɔ:ko (COQUUS)	‘chef’	ˈpɔ:ko (PAUCUM)	‘not much’
b. ˈnwɔ:vo (NOUUM)		noviˈta	‘new / news’
c. ˈgɔ:do	‘(I) enjoy’	goˈde:re (GAUDERE)	‘enjoy-inf.’
d. ˈɔ:do	‘(I) hear’	uˈdi:re (AUDIRE)	‘hear-inf.’
e. ˈkjɛ:dere (QUAERERE)	‘ask-inf.’	kjeˈdja:mo	‘(we) ask’
f. dʒɔja GAUDEUM	‘joy’		

(24) Cl to Cj

Latin	Italian	Dialectal	Gloss
CLAUSTRUM	chiostro	?	'cloister'
CLAUIS	chiave	[tʃ]av(e)	'key'
ECCLESIA	chiesa	[tʃ/j]esa	'church'
PLUVIA	pioggia		'rain'
PLENUM	pieno		'full'

(25) (Re-)borrowing (from Latin)

classe	'class'
flauto	'flute'
flotta	'fleet'

(26) For a form like *chiedere* one could assume

1. Diphthong smoothing AE -> e
2. Palatalisation -/- (doesn't apply because of lack of context)
3. /kw/ simplification
4. Vowel breaking

(27) Sequencing (Mostly from Tekavčić 1980)

Metaphony (another source of diphthongs) already in Latin

First palatalisation (before /j/): 1st/2nd century

AE smoothing

Mid vowel breaking: Late Latin

AU smoothing ?

Second palatalisation: Not before fifth century (affects only dorsals before front vowels)

Lateral palatalisation (CIV->CjV): not yet in late Latin, 2nd half of X century

(28) Martinet's chain reaction:

Affricates emerged as reflexes of former dorsals before front vowels because Latin short U became devocalised and non-syllabic.

1. Short U reduces to a glide.
2. Dorsal + glide (Latin QU) are turned into plain dorsals (i.e. /w/ deletes)
3. The plain dorsals before front vowels (already phonetically more front than before back vowels) move to the front to maintain contrast

Maybe.

(29) More plausible

1. palatalisation applies.
2. /kw/ reduces to /k/ (no palatalisation of ex-/kw/ before /e/ 'kjɛ:dere 'to ask'). (But [kw] derived from breaking doesn't reduce. ['kwɔ:ko])
3. Mid vowel breaking
4. Cj derives from Cl
5. Cl clusters reimported

Sequencing of 3 wrt 4 doesn't matter here.

5 The fall and rise of contrasts and opacity

The question wrt (29): When does a phonological process cease to be productive?
E.g., when is palatalisation 'switched off', when is weakening of /l/ in complex onsets switched off?

When do the outputs of (formerly) general processes turn into underlying forms?

5.1 Introducing new non-structure preserving segments

(30) Introducing palatalisation to a hedgehog

	/rikjo/	PAL	*Dors	*Dors&*Cor	FAITH
☞ a.	rittʃo		*	*	*
b.	rikjo	*	*		

(31) Expected ranking

	/rikjo/	*Dors&*Cor	PAL	FAITH	*Dors
a.	rittʃo	*		*	*
☞ b.	rikjo		*		*

(32) Achieved ranking

	/rikjo/	PAL	*Dors&*Cor	FAITH	*Dors
a.	rittʃo		*	*	*
☞ b.	rikjo	*			*

Unnecessary Least Impact Strategy: The constraint with the smaller scope is ranked highest.

At this point, M » F still gives us the right result.

Front vowels cause palatalisation of preceding /k/. Affricates do not allow breaking of following vowel [tʃɛlibe] 'single, unmarried' (CAELIBEM)

5.2 Filling the emergent gap

(33) Glide formation from post-consonantal laterals and opacity

		IDENT(lat) &IDENT(son)	*CIV	PAL	IDENT (lat)	IDENT (son)	IDENT (place)
a.	/okklo/ - okklo		*!				
☞ b.	/okklo/ - okkjo			*	*		
c.	/okklo/ - ottʃo	*!			*	*	
d.	/rikkjo/ - rikkjo			*!			
☞ e.	/rikkjo/ - rittʃo					*	*

Some dialects go the transparent road: [tʃ]esa 'church'

Where does that LC come from?

(34) Least Impact Strategy:

If a learner has the choice between two W-marked F constraint she ranks the one with the least impact. (Not exactly Specific > General)

(35) LISt

	*CIV	PAL	IDENT (lat)	IDENT (son)	IDENT (place)	IDENT(lat) &IDENT(son)
a. /okklo/ okkjo > okklo	W	L	L			
b. /okklo/ okkjo > ottfo		L	L	W	W	W
c. /rikkjo/ rittfo > rikkjo		W				
d. /rikkjo/ rittfo > rikklo	W			L	L	L

Mark-data pair (b): Which W marked F constraint do we pick?
LC has less impact than demotion of the individual constraints.

5.3 Doesn't LC just suck?

(36) Opacity without excessive theoretical machinery?

- Phonologically derived environment effect = F&M
- Phonologically derived environment blocking = F&F
- Morphologically derived environment effect: LINEARITY, CONTIGUITY
- Morphologically derived environment blocking = BO-FAITH

LC is infamously known for its potential for overgeneration and constraint proliferation.

Maybe, coupled with learning principles it can be reigned in?

(37) Stratal approach:

(Palatalisation slides down to level I. Lateral elimination is level II.)

Level I: PAL >> FAITH >> *CI

Level II: *CI >> FAITH >> PAL

Now all inflection in 1st conjugation has to be level II, while it is level I in 2nd conjugation.

Inflection of most nouns shifts to level I. Female infl. is always level I.

Life Cycle? PAL is first top-ranked in Level III, then only in Level II, then only in Level I?

Does top-ranked *Cl drop down to Level I and do new borrowings enter evaluation at Level II?

Collides with high ranking PAL at Level I. All former Cl clusters should palatalise.

Back to the opaquer approach:

5.4 Borrowing and break-down

Next historical step: borrowing of loans from Latin. E.g., *flauto*. Presumably done by educated adults.

Loanword phonology: Indexed Faithfulness causes preservation of offensive structure

(38) Glide formation from post-consonantal laterals and opacity

	ID(lat) &ID(son)	ID _L	*CIV	PAL	ID (lat)	ID (son)	ID (place)
a. /okklo/ - okklo			*!				
☞ b. /okklo/ - okkjo				*	*		
c. /okklo/ - ottʃo	*!				*	*	
d. /rikkjo/ - rikkjo				*!			
☞ e. /rikkjo/ - rittʃo						*	*
☞ f. /klasse _L / - klasse			*				
g. /klasse _L / - kjasse		*!		*	*		
h. /klasse _L / - tʃasse	*!	*			*	*	*

(39) What does a child make of that?

- Exposure to *cena* - *chiesa* - *clerico* - *chilo* // [tʃ] - [kj] - [kl] - [ki]
- Palatalisation still causes alternations. L-weakening doesn't.
 - Even palatalisation alternations cannot cause Free Rides of non-alternating affricates anymore.
 - For former Cl clusters there is no alternation that could trigger a Free Ride.

(40) Lexicon and grammar have to be restructured.

- Previous generation's /kleza/ -> /kjeza/
- Non-alternating [tʃ] now has to be /tʃ/ since the potential trigger configurations all surface faithfully.

(41) LC and indexation are ‘add-ons’

	*CIV	PAL	*Dors&*Cor	IDENT	ID(lat) &ID(son)	ID _L
a. /okkjo/ - okklo	*			*		
☞ b. /okkjo/ - okkjo		*				
c. /okkjo/ - ottfo			*		*	
d. /rittfo/ - rikkjo		*				
☞ e. /rittfo/ - rittfo			*	*		
/rittfo/ - rikklo	*			*		
☞ f. /klasse/ - klasse	*					
g. /klasse/ - kjasse		*				*
h. /klasse/ - tjasse			*	*	*	*

(42) LC and indexation are ‘add-ons’

	*CIV	PAL	*Dors&*Cor	IDENT	ID(lat) &ID(son)	ID _L
a. okkjo › okklo	W			W		
b. okkjo › ottfo		L	W	W	W	
d. rittfo › rikkjo		W	L	W		
e. rittfo › rikklo	W		L	W	W	
f. klasse › kjasse	L	W		W		
g. klasse › tjasse	L		W	W	W	

(43) Faithful parse 1 *Dors&*Cor › PAL

	*CIV	*Dors&*Cor	PAL	IDENT	ID(lat) &ID(son)	ID _L
a. okkjo › okklo	W			W		
b. okkjo › ottfo		W	L	W	W	

(44) Faithful Parse 2 Trouble! PAL › *Dors&*Cor

	*CIV	*Dors&*Cor	PAL	IDENT	ID(lat) &ID(son)	ID _L
d. rittfo › rikkjo		L	W	W		
e. rittfo › rikklo	W	L		W	W	

Rank PAL › *Dors&*Cor

(45) Back to Faithful Parse 1: ID(son) › PAL

	*CIV	PAL	*Dors&*Cor	IDENT	ID(lat) &ID(son)	ID _L
a. okkjo › okklo	W			W		
b. okkjo › ottfo		L	W	W		

(46) Faithful Parse 3: PAL >> *CI

	*CIV	ID (son)	PAL	*Dors&*Cor	ID(lat), ID(cor)	ID(lat) &ID(son)	ID _L
f. klasse > kjasse	L		W		W		
g. klasse > tjasse	L	W		W	W	W	

LC just covers one Mark-Data pair. Id(lat) has to outrank *CI

(47) No ranking information left: Terminate algorithm

	ID(son)	PAL	*CIV	*Dors&*Cor	ID(lat) ID(cor)	ID(lat) &ID(son)	ID _L
a. okkjo > okklo			W		W		
b. okkjo > ottfo	W	L		W	W		
d. rittfo > rikkjo		W			W		
e. rittfo > rikklo	W		W	L	W		
f. klasse > kjasse		W	L		W		
g. klasse > tjasse	W		L	W	W		

Once a learner decomposes morphologically complex forms, the situation looks different again.

Present-day Italians divide into two groups (Krämer, in press a,b):

- Speakers with palatalisation in nouns/adjectives as exception and
- speakers with blocking of palatalisation as exception

Here is why:

5.5 A messy system

(48) Velar palatalisation - idiosyncratic / optional in nouns

- a. a'mi:ko, a'mi:tʃi, a'mi:ke 'friend/pl./fem.pl.'
- b. 'brontʃo, 'brontʃi 'sad face/pl.'
- c. 'kwɔ:ko, 'kwɔ:ki 'cook_N/pl.'
- d. 'maniko, 'manitʃi / 'maniki 'door handle/pl.'

Palatalising: 6-10 stems only?,

Vacillating: 6-10 stems (of which 5 palatalise 90%)

(49) Velar palatalisation in 2nd and 3rd conjugation verbs

- a. di'ri:dzere, di'ri:go, di'ri:dzi, di'ri:dze 'direct_V inf./1/2/3sg.'
- 'vintʃere, 'viŋko, 'vintʃi, 'vintʃe 'win_V inf./1/2/3sg.'
- b. 'kwɔ:tʃere, 'kwɔ:tʃo, 'kwɔ:tʃi, 'kwɔ:tʃe 'cook_V inf./1/2/3sg.'
- c. *tokere, toko, toki, toke unattested
- *tochere, toco, tochi, toche
- a'. fudz'dzi:re, 'fuggo, 'fudzdzi, 'fudzdze 'escape_V inf./1/2/3sg.'
- b'. ku'tʃi:re, 'kurtʃo, 'kurtʃi, 'kurtʃe 'sew_V inf./1/2/3sg.'
- b''. a'dzi:re, a'dzisko, a'dziʃʃi, a'dziʃʃe 'act_V inf./1/2/3sg.'

c'. arik'ki:re, arik'kisko, arik'kifsi 'enrich_v inf./1/2sg.'

(50) 1st conjugation verbs never show velar palatalisation

- a. le'ga:re, 'le:gi, 'le:ga, 'le:go 'tie_v inf./1/2/3sg.'
 b. komin'tʃa:re, ko'mintʃo, ko'mintʃi, ko'mintʃa 'begin_v inf./1/2/3sg.'
 c. *gru'ka:re, 'gru:ko, 'gru:tʃi, 'gru:ka unattested

(51) Velar palatalisation with derivational affixes

- | | | | | |
|----|------------|-----------|---------------|------------------------------------|
| a. | pedagogo | pedagoghi | pedagogia | 'pedagogue/s pedagogics' |
| | opaco | opachi | opacità | 'opaque (m.sg/m.pl) / opacity' |
| | analogo | analoghi | analogismo | 'analogue (m.sg/m.pl) analogism' |
| | pedagogo | pedagoghi | pedagogismo | 'educationism' |
| | -- | -- | pedagogista | 'educationist' |
| | | | pedagogico | 'pedagogic' |
| b. | fuoco | fuochi | fuochista | 'fire (sg/pl) / pyrotechnist' |
| | antico | antichi | antichità | 'antique (sg.pl) / antiquity' |
| c. | cattolico | cattolici | cattolicesimo | 'catholic (sg/pl) / catholicism' |
| | sporco | sporchi | sporchissimo | 'dirt (sg/pl) / very dirty' |
| | greco | greci | grecizzare | 'Greek (sg/pl) / make Greek' |
| | turco | turchi | turchizzare | 'Turkish (sg/pl) / make Turkish' |
| d. | gioco | | giochino | 'game / dim.' |
| | greco | | grecheggiare | 'Greek / to use Greek expressions' |
| e. | Costa Rica | | costaricense | 'Costa Rican' |
| | cresco | crece | crescenza | 'I grow, you grow, growth' |

Morpheme-initial/-internal unpredictability coupled with alternations at root-affix junctures will persuade learners to swap the above IDENT constraints with sth like CONTIGUITY(F) ('No changes inside strings')

...

5.6 How could this happen? Some speculation

1st (and not so much any more 3rd) conjugation are productive:

Nouns and adjectives -> V-are

If verbs are derived from output forms BO-Faith enters the stage.

All forms have to be faithful to the base or when there is none the infinitive or 3rd singular present indicative.

I.e., BO-Faith is overgeneralised to inflection also in N class.

Least Impact Strategy might actually favour lexically indexed constraints to be ranked first. Leads to lexical exceptions...

6 Conclusions

Grown ups borrow and are faithful to the borrowed via indexed F constraints.

Least Impact Strategy leads to over-opacification of the grammar.

URs become unretrievable.

Children overgeneralise faithfulness and restructure.

$H_0 = M \gg F + BCD$

- explains initiation problem.

Children ‘forget’ a constraint in the top stratum and/or
demote the wrong constraint

- OK, we still don’t know why they get it wrong...

(lack of attention to signal, deliberate attempt to not be like grown-ups...)

Least Impact Strategy

- helps learner to solve subset problem

- explains the emergence of F&F LCs

Opacity (at least some of it)

- emerges as a side effect of

- sequencing of rule innovation

- conservative learning (see above)

- should historically behave in cycles (slow rise, sudden fall, slow rise...)

(See Bermúdez-Otero’s work)

References

- Allen, W. S. (1970). *Vox Latina*. Cambridge: Cambridge University Press.
- Bermúdez-Otero, Ricardo (2006). ‘Phonological change in Optimality Theory’, in K. Brown (ed.), *Encyclopedia of language and linguistics*. 2nd edn. vol. 9. Oxford: Elsevier, 497-505.
- (2007). ‘Diachronic phonology’, in P. de Lacy (ed.), *The Cambridge handbook of phonology*. Cambridge: Cambridge University Press, 497-517.
- (forthcoming). *Stratal Optimality Theory*. Oxford: Oxford University Press.
- Bermúdez-Otero, Ricardo & Richard M. Hogg (2003). The actuation problem in Optimality Theory: Phonologization, rule inversion and rule loss. In D. Eric Holt (ed.) *Optimality Theory and Language Change*. Kluwer Academic Publishers.91-119.
- Bertinetto, Pier Marco, and Loporcaro, Michele (2005). ‘The sound pattern of Standard Italian, as compared with the varieties spoken in Florence, Milan and Rome’, *Journal of the International Phonetic Association* 35: 131-151.
- Calabrese, Andrea (1993). ‘Palatalization processes in the history of Romance languages: A theoretical study’, in W. J. Ashby, M. Mithun, G. Perissinotto,

- and E. Raposo (eds.), *Linguistic perspectives on the Romance languages*. Amsterdam, Philadelphia: John Benjamins, 65-83.
- Fikkert, Paula (2007). Acquiring Phonology. In Paul de Lacy (ed.), *The Cambridge Handbook of Phonology*. Cambridge: Cambridge University Press. 537-554.
- Hayes, Bruce, and Steriade, Donca (2004). 'Introduction: the phonetic bases of phonological markedness', in B. Hayes, R. Kirchner, and D. Steriade (eds.), *Phonetically based Phonology*. Cambridge: Cambridge University Press, 1-33.
- Kiparsky, Paul (1988). 'Phonological change', in F. J. Newmeyer (ed.), *Linguistics: The Cambridge Survey*. Vol. 1: Linguistic Theory: Foundations. Cambridge: Cambridge University Press, 363-415.
- (1995). 'The phonological basis of sound change', in J. A. Goldsmith (ed.), *The Handbook of Phonological Theory*. Oxford: Blackwell, 640-670.
- Krämer, Martin (2008) 'Taking a Free Ride can cau[r]se severe hyperrhoticity. Talk given at the 16th Manchester Phonology Meeting.
- (in press a) *The Phonology of Italian*. Oxford University Press.
- (in press b) 'Crypto-variation in Italian velar palatalisation', in P. J. Masullo, E. O'Rourke, and C.-H. Huang (eds.) *Romance Linguistics: Structures, Interfaces, and Microparametric Variation*. Amsterdam: John Benjamins.
- McCarthy, John (2005) 'Taking a free ride in morphophonemic learning', in M.-R. Lloret, and J. Jiménez (eds.), 'Morphology in Phonology', thematic issue of *Catalan Journal of Linguistics* 4, 19-55.
- Prince, Alan & Bruce Tesar (2004). Learning phonotactic distributions. In René Kager et al (eds.) *Constraints in Phonological acquisition*. Cambridge: Cambridge University Press. 245-291.
- Tekavčić, Pavao (1980). *Grammatica storica dell'italiano. I. Fonematica*. Bologna: Il Mulino.
- Vincent, Nigel (1988a). 'Latin', in M. Harris, and N. Vincent (eds.), *The Romance Languages*. London and New York: Routledge, 26-78.
- (1988b). 'Italian', in M. Harris, and N. Vincent (eds.), *The Romance Languages*. London and New York: Routledge, 279-313