Palatalization and Centralization in Samothraki Greek

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Summary of the argument

- We present data from Samothraki Greek on the interaction of *r* loss, palatalisation of velars, and centralization of front vowels
- Constraint-based models are good in describing *conspiracies*, rule-based models are good in describing *opacity*. The Samothraki facts show both
- We argue that a representational solution is to be preferred over a derivational one

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Palatalization

- Like in other Greek dialects velars are palatalized before the front vowels /i,e/:

/fegi/	[feg']	φέγγει	'he beams/shines'	(K 66)
/toki/	[tok']	τόκοι	'(bank) interests'	(K 66)
/kima/	[k'ima]	κύμα	'wave'	(K 62)
/xino/	[x'inu]	χύνω	'pour'	(K 63)
/ɣena/	[ɣ'ena]	γέννα	'birth'	(K 63)

Our data in this paper are from Κατσάνης 1996 (= K)

/r/-deletion and lengthening

- /r/ is deleted in onsets, causing lengthening of the following vowel (K 50-55):

/roɣa/	[oːɣa]	ρώγα	'nipple'
/rema/	[eːma]	ρέμα	'stream'
/xroma/	[xoːma]	χρώμα	'colour'
/mavros/	[mavuːs]	μαύρος	'black'
/krotos/	[koːtus]	κρότος	'bang'

We assume that this shows that onsets in Samothraki Greek are moraic (cf. Topintzi 2006).

Opaque interaction of /r/-deletion and palatalization

- velar + front vowel sequences which are the result of r deletion are not subject to palatalization:

/krima/	[kɪːma]	κρίμα	'shame'	[k'ima]	κύμα	'wave'
/xr'ima/	[xɪːma]	χρήμα	'money'	[x'ima]	χύμα	'bluntly'
/krino/	[kɪːnu]	κρίνω	'judge'	[k'inu]	(ε)κείνο	'that'
/kremnos/	[kəːmnus]	κρεμνός	'cliff'			

Centralization is not due to length

- If the preceding consonant is not velar, we do not find centralization

/prima/	[piːma]	'fine'
/prepi/	[peːp(i)]	'it must'
/tripa/	[tiːpa]	'hole'
/trexo/	[teːxo]	'I run'
/friði/	[fiːð]	'eyebrow'

Opacity

- Opacity is a classical problem for Optimality Theory.
- A rule $A \rightarrow B \ / \ C\_\_D$ is opaque if:
  - We find CAD, or
  - We find an A changed to B outside of context $C\_\_D$
- Palatalization is opaque according to the first part definition: we find non-palatalized consonants next to underlyingly front vowels

Notice that technically the process is not completely opaque, since we do not find plain velars before front vowels; it is an opaque conspiracy.

A derivational analysis

underlying form	krima	kima
palatalization	-	k'ima
r deletion	kiːma	-
centralization	kɪːma	-
output	kɪːma	k'ima

A conspiracy

- However, the derivational analysis runs into a classical problem for rule-based accounts: there is a conspiracy
- Palatalisation and centralisation work on exactly the same environments, viz. a velar obstruent followed by a front vowel
- In other words, both are responses to the same well-formedness requirement (which we will refer to as *ki)

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An opaque conspiracy

- We thus find a (rather unique) example of a process interaction which shows the characteristics both of a conspiracy and of opacity
- Conspiracies are the classical argument for constraints and against rules; opacity is the classical argument for rules and against constraints.
- However, various models have been developed within OT which incorporate a limited form of derivationalism
- Yet also these models fail to capture the generalisation in an elegant way

Comparative Markedness

- One rather weak version of derivationalism in OT is Comparative Markedness
- In this theory, we divide every traditional markedness constraint C into two markedness constraints C_N and C_O
- C_O is violated if the marked structure already exists underlyingly; C_N is violated otherwise
- In this case we could introduce *ki_O (violated by /kima/→[kima]) and *ki_N (violated by /krima/→[kima])
- This is a weak type of derivationalism, since we still only have two levels of representation – input and output.

Comparative Markedness does not suffice

- One conceptual problem with this approach is that it weakens our understanding of conspiracies: there is no longer one constraint, but there are two
- However, C.M. also has the technical problem that we want the solutions to the problem to be different in both cases
- In order to account for the palatalisation, we would need to state that
  *ki$_O$≫NoCentralization≫NoPalatalization
- But in order to account for the centralization, we need to state that *ki$_N$≫NoPal≫NoCentral

Stratal OT

- Stratal OT is a model in which phonological forms go through a sequence of phonological evaluations, each a parallel OT grammar
- In this case, we could assume that palatalisation applies at one level, and centralisation and *r* deletion at another.

Stratal OT, or Derivational OT is mostly known from work by Kiparsky, Rubach, Bermúdez-Otero et al.

Constraints

- *ki: An onset velar obstruent and a following vowel should agree in palatality (Rubach 2007)
- NoCentral: Unrounded vowels should be front.
- NoPalatal: Velars should not have a palatal secondary articulation.
- *r/Onset: [r] should not occur in the onset
- Max-x: Preserve underlying timing units.
- Max-r: Preserve underlying /r/.

Max-r is used here for convenience; for a full analysis see Topintzi 2006.

Level I

	kima	MAX-r	*r/O	*ki	NOCENTRAL	NOPALATAL
a. ☞	k'ima					*
b.	kima			*!		
c.	kıma				*!	

	krima	MAX-r	*r/O	*ki	NOCENTRAL	NOPALATAL
a. ☞	krima		*			
b.	k'ima	*!				*

The ranking of MAX-x is irrelevant at this level

Level II

	k'ima	*r/O	MAX-r	*ki	NOPALATAL	NOCENTRAL
a. ☞	k'ima				*	
b.	kima			*!		
c.	kɪma					*!

	krima	*r/O	MAX-r	*ki	NOPALATAL	NOCENTRAL
a.	krima	*!				
b.	k'iːma		*		*!	
c. ☞	kɪːma		*			*
d.	kiːma		*	*!		

MAX-x is responsible for lengthening at this level

Evaluation of Stratal Analysis

- The stratal analysis can capture the opacity by ordering, and to some extent the conspiracy effect
- The latter happens by two simultaneous rerankings:
  - NoCentral≫NoPalatal→NoPalatal≫NoCentral
  - *r/O≫Max-r→Max-r≫*r/O
- Notice however that this is still an arbitrary reranking of various constraints
- In particular, there is no evidence that these differences in any way are connected to morphological differences, as Stratal OT would predict

Candidate Chain Theory

- A different way of implementing derivationalism in OT is Candidate Chain Theory (McCarthy 2006)
- This theory makes the claim that there are no arbitrary rerankings (there is only one grammar), and
- it does not need a connection between phonological derivation and morphological structure

How it works

- The Generator function can only make one change at a time (delete one segment, insert one segment, add one association line, etc.)
- Evaluation then proceeds as in standard OT
- The one output is again fed into the Generator function, which can again make one change at a time
- The procedure stops when the input of a loop equals the output (which is guaranteed to happen)

Extrinsic rule ordering

- Input and output and intermediate forms are stored in a 'candidate chain'
- The difference of two adjacent forms in a candidate chains can be described in terms of one faithfulnes violation
- There are constraints on candidate chains, which function as extrinsic rule ordering
- These constraints take roughly the following form:
  - PREC(F1,F2): A violation of faithfulness constraint F2 may not be followed by a violation of faithfulness constraint F1.

CC and Samothraki

- The relevant constraint in this case would be:
  - PREC(NOPALATAL,MAX-r): A violation of faithfulness constraint MAX-r may not be followed by a violation of faithfulness constraint NOPALATAL (r deletion may not be followed by palatalization).

Transparent case

kima	*r/O	MAX-r	*ki	PREC	NOCEN	NOPAL
a. ☞ kima→k'ima						*
b. kima			*!			
c. kima→kıma					*!	

Opaque case

	krima	*r/O	MAX-r	*ki	PREC	NOCEN	NOPAL
a.	krima→kiːma→k'iːma				*!		*
b.	krima→kiːma			*!			
c. ☞	krima→kiːma→kɪːma					*	

Candidates with centralization or palatalization before r deletion are not generated because those feature changes are not optimal in that environment.

Evaluation of CC Analysis

- The CC analysis can capture both the opacity and the conspiracy aspects of the phenomenon in one single constraint ranking
- without stipulating a relation to the morphology which is not apparent
- However, it does this at a great theoretical cost, viz. by using a constraint PREC(NOPALATAL,MAX-r), relating two phenomena which are not conceptually related (the opacity effect is basically stipulated)

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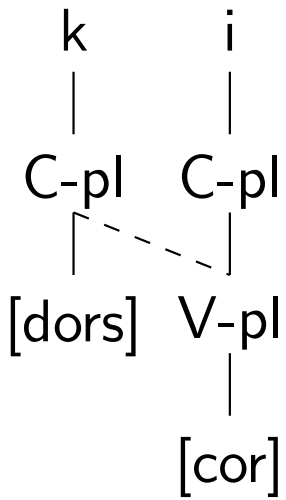
How do the processes look?

- We present a representational approach, in which we try to explain the fact that palatalisation is blocked in exactly those cases in which r is deleted rather than stipulate it.
- The idea is that palatalisation is spreading,
- that deletion of *r* leaves a trace
- and that spreading is not allowed across this trace
- For this reason, *ki has to be satisfied in a different way, viz. by deletion of the palatal feature: centralization

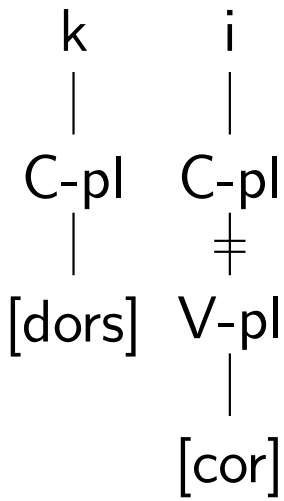
What is palatalization?

- We assume monovalent features and feature geometry.
- Under such a view, palatalization is spreading (due to *ki)
- NoPalatal is a constraint against palatal vowels.



What is centralization?

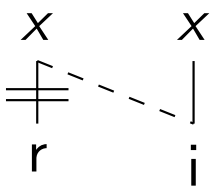
- Centralization on the other hand is feature-loss (due to *ki)
- NoCentral is a constraint against placeless vowels (*Empty).



- We assume that *ki is best satisfied by palatalization because that preserves the underlying features rather than deleting them

What is r deletion?

- An important aspect of r deletion in Samothraki is that it leaves a trace, in the form of a timing slot = lengthening of the vowel

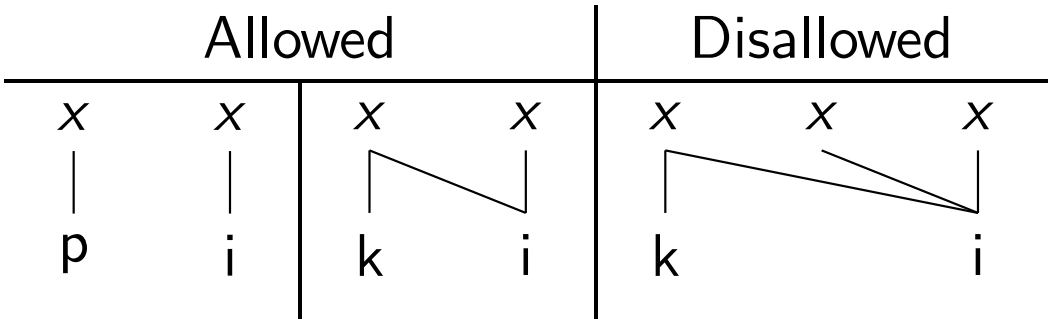


See Topintzi 2006 for more discussion of the relevant faithfulness relation.

Why does r deletion create an environment for centralization?

- If palatalization is usually preferred, why is it dispreferred after r deletion?
- Notice that one independent difference between [kima] and [kiːma] is the length of the vowel
- We propose that palatality can spread from a short vowel, but not from a long vowel, maybe due to a binarity constraint on feature association:
  - BinAss(F): A feature F can be associated to maximally two positions (see McCarthy 2004, Key 2005)

Allowed and disallowed



No r deletion

	kima	*r/O	Max-x	*ki	BinAss	*NoCentral	NoPal
a. ☞	k'ima						*
b.	kima			*!			
c.	kıma					*!	

r deletion

	krima	*r/O	Max-x	*ki	BinAss	*NoCentral	NoPal
a.	krima	*!					
b.	k'ima		*!				*
c.	k'iːma				*!		*
d.	kiːma			*!			
e. ☞	kɪːma					*	

Independent evidence for BinAss

- BinAss(F) gives us a representational way of understanding non-iterative rule application
- Examples from this can be given both for other phonological phenomena in Samothraki, in other Greek dialect and elsewhere

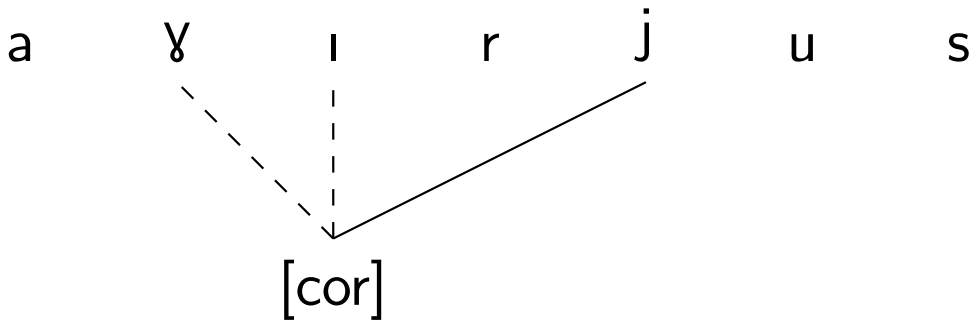
More binarity in Samothraki

- There is independent evidence in Samothraki that there is a binary requirement
- This comes from *r* metathesis.
- In words with velar+*r*+front vowel+another vowel (/aɣrius/ 'wild') we find metathesis of r rather than deletion ([aɣırjus])
- Presumably this serves to avoid superlong vowel sequences
- Also here we find centralization, but this cannot be due directly to coda *r*, since underlying coda *r* does not have this effect ([adirfós, *adırfós] 'brother')
- Also, if the preceding consonant is not velar, we do not find the centralisation: (/priakóni/ → [pirjákon'] 'jagged file used to sharpen knives', /alétria/ → [alétirja] 'plough Pl', /tria/ → [tirjá] 'three')

R metathesis

- /aɣrius/ → [aɣırjus]
- Note that the *r* occurs in the coda of the syllable (otherwise metathesis would not lead to onset avoidance)
- and a palatal glide occurs in the onset following it
- We suppose that the palatality of the glide comes from the underlyingly front vowel
- Thus result of the *r* metathesis is the following (Topintzi 2006)

Picture of R metathesis



- [j] really needs the feature, because there is no back glide
- We cannot assign [cor] only to ɪ, because of *ki
- But we cannot assign it to both either, because of BinAss.
- We thus only assign it to [j]

Binary spans in Cappadocian

- In Cappadocian dialects, bisyllabic harmonic spans are built at the end of the word: both vowels are the same
- Construction of the final spans is insensitive to morphological structure and (mostly) to stress
- There thus seems to be a real phonological binarity requirement

/tésera/	→	[tésara]	'four'
/ánem-os/	→	[ánomos]	'wind'
/faɣ-o/	→	[fóɣo]	'eat'+1Sg.Pres

Data and basic analysis from Revithiadou et al.

Non-iterative spreading

- Non-iterative spreading is a well-known phenomenon for more languages
- It has been analyzed in terms of Comparative Markedness (which approach fails completely for Samothraki)
- But there are few other approaches on the market
- The following example is from Ekegusii (Bickmore 1996)
- This can be seen as the result of some constraint promoting spreading, and BinAss

/kór-a/	→	[kórá]	'to do'
/kór-er-a/	→	[kóréra]	'to do for'
/káan-er-a/	→	[káánera]	'to deny for'
/símek-er-a/	→	[símékera]	'to plant for'