

Vertical locality and head accessibility

1. Introduction

This paper discusses the question of the proper structural analysis of complex phonetic events in the onset.¹

A ‘phonetic event’ (as a pre-theoretical cover term) is an element or a sequence of elements in the phonetic representation. I take the phonetic representation to be a narrow phonetic transcription. I assume that phonological architecture includes the levels of underlying representation and phonetic representation, distinct from the level of phonetic implementation which lies outside phonology. In general, complexity of events results from the fact that we encounter a sequencing of phonetic features, rather than a co-temporal realization.

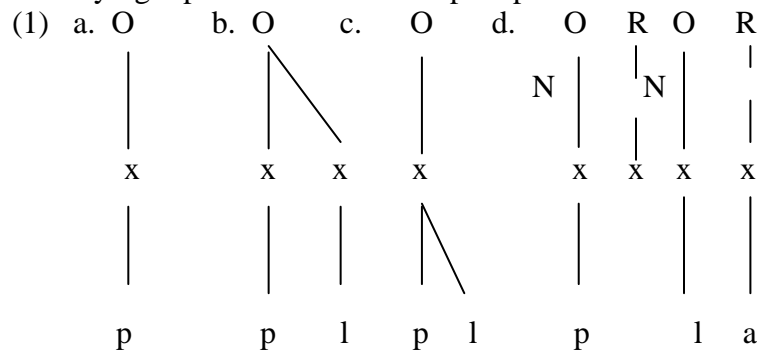
The goals of this paper are

- (i) to establish the criteria for distinguishing complex onsets from complex segments and double onsets;
- (ii) to propose and motivate two locality constraints (the Head Constraint and the Segment Integrity Constraint) which limit the way in which phonological processes can access phonological information.

Most work on locality focuses on the ‘horizontal distance’ between targets and environments. Little attention has been paid in phonology to what I will call ‘vertical locality’: the manner in which rules have access to hierarchical structure.

2. The problem

I assume the major tenets of dependency-based phonologies, i.e. those of GP (Kaye, Lowenstamm and Vergnaud 1990), HDP (van der Hulst and Ritter 1999, van der Hulst 2005), DP (Anderson and Ewen 1987). These can allow (up to) three phonological structures as underlying representations of complex phonetic events in the onset.



¹ I am grateful to Harry van der Hulst and William Snyder for their generous advice and for illuminating discussion of these issues. Many thanks to the organizers of this CUNY conference.

An event's complexity at the phonetic level does not necessarily tell us whether the event is a single segment or a segment sequence in the underlying representation.

The problem:

Given this type of theoretical framework, which structural analyses of a complex phonetic event are permissible and which criteria allow us to select the proper analysis from the set of available analyses for the event in question (see (1) above)?

I will here establish one such criterion. To motivate it, I will now study the reduplication patterns of complex events in three languages.

3. Reduplication patterns of complex events: Gothic, Sanskrit, Klamath

This section describes the patterns following which complex consonantal events reduplicate in Gothic, Sanskrit and Klamath. I will show that in partial copy only the head is copied. Then, I will use this generalization to support the Complex Onset Criterion (see below).

3.1. Reduplication in Gothic

In Gothic (Eastern Germanic), consonantal events in the stem-initial onsets of Gothic strong verbs follow different patterns of reduplication depending on the nature of the event's members. I am presenting the Gothic data in orthographic forms. The data are from Wright (1910).

(2)	<i>Infinitive</i>	<i>Preterite Sg.</i>	<i>gloss</i>	<i>initial event</i>
	a. hetan	hehet	call	simple consonant
	b. aukon	eauk	increase	no onset consonant
	c. gre:tan	gegro:t	weep	obstruent-liquid
	d. xwo:pan	xwexwo:p	boast	obstruent-glide
	e. skedan	skeskeθ	divide	s-obstruent
	f. slepan	seslep	sleep	s-sonorant

3.2. Sanskrit Perfect reduplication

For Sanskrit stems that begin with an obstruent-sonorant event, the corresponding surface reduplicant begins with an obstruent, without the sonorant. The same is true of the stems that begin with a strident-sonorant event: the reduplicant begins with the strident, without the sonorant.

(3)	a. <i>obstruent-sonorant events</i> (Whitney 1889: 222-223)		
	prac ^h	paprac ^h	ask

b. *strident-sonorant events* (Whitney 1889: 223)

sna:	sasna:	bathe
çliş	çiçliş	burn

Strident-sonorant events reduplicate, again, as in Gothic.

(4) *strident-obstruent events* (Macdonnell 1926: 87, Whitney 1889: 223, Steriade 1988)

a. stu	tuştu	praise
b. st ^h a:	tast ^h a:	stand
c. skand	caskand	leap

So, Sanskrit and Gothic treat strident-obstruent events differently. In Gothic, the event is copied as a whole; in Sanskrit, only the obstruent is copied. For strident-sonorant and obstruent-sonorant events, the leftmost member is copied in both.

3.3. The distributive reduplication in Klamath

3.3.1. Patterns

A. Non-obstruent-sonorant events

Klamath (Plateau Penutian subgroup of Penutian) is a language of the Klamath tribe of Southern Oregon. All examples are from Barker (1963, 1964).

(5) *single consonant*

/so:tʃa/	lights a fire	/soso:tʃa/	(d.) light a fire
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(6) *obstruent-obstruent events*

/tqiqla/	puts an elbow on a surface	/tqitqaqla/	(d.) put an elbow on
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(7) *sonorant-obstruent events*

/lto:q'a/	is spotted	/lto:q'atk/	(d.) spotted
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(8) *sonorant-sonorant events*

/wliɬʃkanga/	goes around zigzag	/wliwliɬʃkanga/	(d.) go around zigzag
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To sum up, obstruent-obstruent, sonorant-obstruent and sonorant-sonorant phonetic events in Klamath reduplicate in a single way; that is, they all undergo full copy.

B. Obstruent-sonorant events

Obstruent-liquid and obstruent-nasal events both undergo partial copy in Klamath: only the obstruent part is copied.

- (9) a. /tʃʰlekLa/ puts a massive object down on top
 /tʃʰetʃʰlakLa/ (d.) put a massive obj. down on
 b. /dmetʃʰa/ washes (clothes) /dedmattʃʰa/ (d.) wash
- C. Strident-consonant events in Klamath undergo full copy.

3.3.2. Summary

- (10) *non-reduplicated form* *reduplicated form*
- | | |
|-----|----------|
| TRV | TVTR(V) |
| TTV | TTVTT(V) |
| RTV | RTVRT(V) |
| RRV | RRVRR(V) |
| sCV | sCVsC(V) |

Thus, the complex consonantal events in Klamath fall in two classes based on their reduplicative behavior: the obstruent-sonorant (except strident-sonorant) events and all the rest.

- (11) *A typology of consonantal events under reduplication (in Gothic, Sanskrit and Klamath)*

Event	Gothic		Sanskrit		Klamath	
Reduplicant	Both	One	Both	One	Both	One
OL		H		H		H
ON						H
sL		H (str)		H (str)	Both	
sN				H (str)	Both	
sO	Both			H (O)	Both	
C ^G	Both					
OO					Both	
SS					Both	
SO					Both	

The main generalizations:

1. The events fall into two classes: those that undergo full copy and those that undergo partial copy. In the “partial copy” class, the only pattern is the “head-only” copy (assuming a heterosyllabic analysis for sO in Sanskrit).

2. For obstruent-sonorant events, only the head is copied in all three languages.

4. The Complex Onset Criterion

The “head-only” pattern of reduplication in Sanskrit, Gothic and Klamath, where only the head is copied, motivates the Complex Onset Criterion below:

(12) *The Complex Onset Criterion (COC)*

For a given phonetic event E, if there is a lexical rule that *affects* (but does not delete) E’s head without affecting the dependent, then E is a complex onset.

5. How COC is applied

I illustrate the Complex Onset Criterion with examples from a different process (Gorgia) in a language (Florentine Italian) other than those used to motivate the COC.

I draw on data from Giannelli and Savoia (1978), Brun-Trigaud and Scheer (2008).

1. Florentine Gorgia is a process of obstruentization in the environment V(#)_V. When spirantized, /p/ yields [ɸ], /t/ yields [θ] or [h], and /k/ yields [x] or [h].

(13)	<i>context</i>	<i>Italian</i>		<i>Florentine</i>	<i>gloss</i>
	V#_V	le korna		le horna	the horns
		la kas:et:a		la xas:et:a, la as:et:a	the box

Gorgia also affects /p t k/ followed by a liquid or a glide in the same environments.

(14)	<i>context</i>	<i>Italian</i>	<i>gloss</i>	<i>Florentine</i>	<i>gloss</i>
a.	V_{L,G}V	pietra	stone	piθra	stone
b.	V#_{L,G}V	kwɔʃe	cooks	la lo hwɔʃe lei	he cooks it
		kwat:rini	money	i xwat:rini	the money
		kreðe	(he) believes	e ʃi hreðe ɸoxo	he barely believes it
		tiene	keeps	e lo θjene η kasa	and keeps it at home
		preso	taken	el ano ɸreso	she has taken it

Thus, the head of an obstruent-sonorant event is affected just as a simple onset. Applying COC to these events allows us to conclude that they are complex onsets.

2. The restriction in the COC on lexical rules that they should not be *deletion* rules is important. Here are the examples of rules that delete the head of a complex segment.

(15) *Florentine Gorgia*

tʃe:na ʃe:na dinner

In Basque, stop segments (16 a) and stop head members of affricates (16 b) are deleted word-finally (in specific syntactic contexts).

(16) *Basque Stop Deletion*

a. ba/t k/urri	ba[k]urri	run one
gu/k p/iztu	gu[p]iztu	we light
b. hi/tʃ k/eta	hi[ʧk]eta	conversation
hi/tʃ t/egi/	hi[ʧt]egi	dictionary
hari/tʃ k/i	hari[ʧk]i	oak wood

3. There is also a special situation where certain words have one phonetic form that results from head deletion and another resulting from head change, as in the example of Florentine Gorgia:

(17)	Italian		Florentine Gorgia	
a.	tjene	keeps	[e lo jene ŋ kasa]	and keeps it at home
b.	tjene	keeps	[e lo θjene ŋ kasa]	and keeps it at home

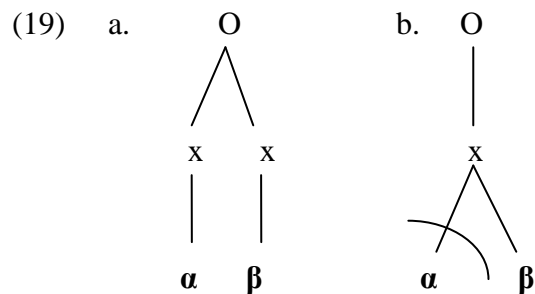
The existence of phonetic forms resulting from head change for the same words, like here, allow to apply COC and thus to conclude that [tj] is a complex onset.

6. The Head Constraint

The COC implies that for complex segments, there is no lexical rule that would access the head of the event without accessing the dependent:

(18) *Head Constraint*

No lexical rule may access the head of a complex segment.



Lexical rules cannot freely access the complex segments, unlike complex onsets. Accessing the entire segment seems to be the only way in which a complex segment may be affected by a *lexical* rule. In that way, complex segments are characterized by the property of “segmental integrity”. This idea leads to the following hypothesis:

(20) *Segmental Integrity Hypothesis*

All the rules that have access to the internal structure of segments (in terms of features or elements) are postlexical rules.

Thus, under the Segmental Integrity Hypothesis, all rules that have access to the internal structure of segments (in terms of features or elements) are *postlexical* rules. This predicts that the rules that access complex segments have the phonological properties that characterize postlexical rules (as opposed to lexical rules). Notably, it is expected that

- (i) they do not have to be structure-preserving;
- (ii) they are exceptionless;
- (iii) they do not make reference to the morphological structure of words

Lexical rules have varying structural depth depending on whether we are dealing with complex onsets or complex segments. In other words, complex onsets differ from complex segments with respect to the property of Vertical Locality. By “vertical locality”, I understand that, in a representation of a given segment, only that part of its phonological content that is located on the tier adjacent to the skeletal tier can be accessed by a rule.

7. Conclusion

1. I have formulated the Complex Onset Criterion that allows to draw a line between complex onsets and complex segments.
2. Illustration: Florentine Italian.
3. This paper suggests the Segmental Integrity Hypothesis and the Head Constraint for complex segments.
4. I have specified the phonological properties of rules that may affect complex onsets (properties of postlexical rules as opposed to lexical ones).
5. In Vaxman (2011), based on the criteria presented here, the structural analysis of complex consonantal events in Gothic, Sanskrit, Klamath and Florentine Italian is provided.

References

Brun-Trigaud, Guylaine and Tobias Scheer (2008). Lenition of Latin branching Onsets in Gallo-Romance (French, Occitan, Franco-Provencal). Paper presented at the conference “*Early European Languages in the Eyes of Modern Linguistics*”. Brno, September 28 - October 1, 2008.

Giannelli, Luciano and Leonardo M. Savoia (1978). L’indebolimento consonantico in Toscana, (I.). *Rivista Italiana Dialettologia*, 2, Scuola società territorio, 23-58.

van der Hulst, Harry and Nancy A. Ritter (1999). Head-Driven Phonology. In van der Hulst and Ritter (eds.), 113-167.

Macdonnell, Arthur Anthony (1927). *Sanskrit grammar for students*. 3rd edition. Oxford: Oxford University Press.

Wright, Joseph (1910). *Grammar of the Gothic language and the Gospel of St. Mark, selections from the other Gospels and the Second epistle to Timothy with notes and glossary* by Joseph Wright. Oxford: Clarendon Press.

Whitney, William Dwight (1889). *Sanskrit grammar including both the classical language, and the older Dialects, of Veda and Brahmana*. 2nd edition, Cambridge: Harvard University Press.