

Constraints on the Sequencing and Syllabification of Obstruents

Patricia A. Shaw / shawpa@interchange.ubc.ca
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0. Introduction

(1) **Assumption:** Phonological representations are composed of ‘segments’ that “are linked to each other by relations such as **precedence** and **constituency**”.
(Steriade 2007:139, in de Lacy (ed.), *The Cambridge Handbook of Phonology*.)

(2) Prosodic constituency \Rightarrow **Prosodic Hierarchy:** (sub- σ constituents) $< \sigma < Ft < Cola < PrWd$
Constraint-based formalization: (cf. Strict Layering Hypothesis: Selkirk 1984, Ito 1988, many others)

- a. PARSE-SEG-TO- σ Each Segment must be parsed into a Syllable.
 - b. PARSE- σ -TO-FT Each Syllable must be parsed into a Foot.
- etc.

(3) **Qs for a Theory of Prosodic Parsing:**

- Is upwards parsing within the constituents of the Prosodic Hierarchy necessarily exhaustive?
- If not, what constraints govern the residue?

(4) **Nature of empirical evidence:**

- Common observation: many languages exhibit **asymmetric edge effects**
The properties of segments at word edges are frequently not consistent with generalizations that obtain in word-internal syllabic domains.
- Theoretical responses:
 - (i) Asymmetric edge effects represent greater complexity within an **exhaustive** syllabic parse.
 - (ii) Such effects are more appropriately treated as independent **extra-syllabic** properties.(cf. Harris 1983, Bagemihl 1991, Hayes 1995, Torkenczy & Siptar 1999, Broselow 2003, among others)

\Rightarrow **Enrichment of the database** for evaluation of these issues: whereas the literature offers several cases focussed on the anomalous behaviour of a *single* segment at an edge, the Central Salish language, *hənqəmínəm*, presents cases of *multiple* segments at the left word edge.

(5) Preliminary assumptions regarding **Non-Exhaustive Parsing:**

1. Parsing segments to the σ level is not necessarily exhaustive.
2. PARSE-SEG-TO- σ subsumes a fixed hierarchy of independently violable constraints defined by major classes in the **Sonority Hierarchy**, here simply: V=Vowel $>$ R=Resonant $>$ O=Obstruent:

PARSE-V-to- σ \gg PARSE-R-to- σ \gg PARSE-O-to- σ

In *hənqəmínəm*¹: PARSE-V-to- σ and PARSE-R-to- σ are never violated.

PARSE-O-to- σ is violable, but only in the outermost Prefix domain.

1. Background: Obstruent sequences in Salish

(6) **Nuxalk** (Bella Coola): northernmost, most divergent Salish language; its striking tolerance of Obstruent-only words is renowned (Newman 1947, Hoard 1978, Nader 1984, Bagemihl 1991, etc.):

- a. q̣psttχ *Taste it!* (Hoard 1978:68)
- b. x̣ṭp̣χ̣^wṭṭp̣ṭs ḳ^wč̣ *Then he had had in his possession a bunchberry plant.* (Nader 1984:5)

\Rightarrow Analytical conclusion: Nuxalk does not invoke a [ə]-epenthesis strategy for parsing obstruents (O).

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(7) **Segmental Inventory** of hə́nqə́mihə́m: Musqueam/Downriver dialect.

- parentheses enclose marginal segments, square brackets enclose predictable variants

O	p	t	c	([č])	(k)	k ^w	q	q ^w	h
	p̣	ṭ ^θ	ṭ	č		ḳ ^w	q̣	q̣ ^w	
R		θ	ʃ	s	[š]	x	x ^w	χ	χ ^w
	m	n	l		y		w		ʔ
	ṃ	ṇ	ḷ		ỵ		ẉ		

Vowels	
i	(u)
ε	[ə]
= <e>	
a	

(8) hə́nqə́mihə́m: is subject to more familiar ProperHeadedness constraints that epenthesize a default schwa nucleus to syllabify all lexical category words that do not have an underlying vowel.

O only sequences:	a.	/čq ^w /	čəq ^w	<i>get pierced</i>
		/čq ^w -t/	čq ^w ət	<i>pierce something (-t.transitivizer (-t.tr))</i>
	b.	/čk ^w χ/	čək ^w χ	<i>get fried</i>
		/čk ^w χ-t/	čək ^w χt	<i>fry something (-t.tr)</i>
		/ts-t/	tsət	<i>approach something (-t.tr)</i>
O-R sequences:	d.	/čx ^w /	čəx ^w	<i>to get beaten (in a game, competition)</i>
		/čx ^w -t-m/	čx ^w ətəm	<i>he/she was beaten (-t.tr, -m.intransitive (intr))</i>
	e.	/cč-m/	cčəm	<i>jump (-m.intr)</i>
R-R sequences:	f.	/čn-m/	čənəm	<i>shake (-m.intr)</i>

(9) **Generalizations about parsing Resonants in hə́nqə́mihə́m:**

- R_s do not function as a σ Nucleus. Nor do R_s cluster with any other segment tautosyllabically.
- Only V_s can head a σ in hə́nqə́mihə́m: if there is no lexical V, then [ə] functions as the default Nuc.
- [ə]-epenthesis ensures that all R_s are parsed to σ.
- i.e. PARSE-R-TO-σ is never violated. (see (5.2))

(10) **Parsing Obstruents in hə́nqə́mihə́m is less transparent:**

- The [ə]-epenthesis strategy for parsing Obstruents does not apply across-the-board.
- There are 2 morpho-lexical domains where O_s are not syllabified by an epenthetic [ə].

(10.1) a small set of O-only grammatical clitics systematically surface without vocalic support:
e.g. 2nd position Subject pronoun clitics:

a.	čx ^w	2 s Subject	neḥ čx ^w ya:ys	<i>you go to work!</i>
			Aux 2sSu work	
b.	ct	1 p Subject	čew-ət ct ce?	<i>we'll help him/her</i>
			help-tr 1pSu Fut	

⇒ **Generalization:** [ə]-epenthesis functions in hə́nqə́mihə́m to parse O_s *only in lexical category words*.

Note: the other 2 dialects each have different strategies in this context:

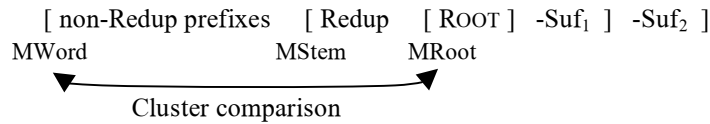
- Upriver Halkomelem (Galloway 1993/77) extends domain of epenthesis: [cəx^w], [cət]
- Island Hul'q'umin'um' truncates the {2sSu} form to [č]

(10.2) *within* lexical category words, there is no surface predictability in **how many** voiceless obstruents may occur at the left margin before encountering an epenthetic [ə] or an underlying V.

a.	tətχt	OəOOO	<i>shake it back and forth</i>
b.	q̣pət	OOəO	<i>gather, put something together</i>
c.	cʰt̪əχtən	OOOəOO...	<i>to die of poison</i> [WS]
d.	šx ^w q̣əstən	OOOOəOO...	<i>ridge pole support</i> [AG]
e.	tx ^w sʔətən	OOOOəOO...	<i>to buy food</i>
f.	tx ^w sχtək ^w	OOOOOeO...	<i>to buy a carving</i>

Hypothesis: The locus of [ə] is fully predictable on the basis of word-internal morphological structure.

(11) **MCat domains** (Shaw 2002, 2008; cf. Suttles 2004):



Explanation for the data in (10.2): There is **no [ə]-epenthesis** in the outermost MWord prefix domain.

(12) **Overview of Structure of the Argumentation:**

O sequences at the MWord vs MRoot edges have significantly different properties.

§2. MRoot domain: Within the domain initiated by the left edge of the Root extending rightward, Os are exhaustively parsed into σ headed by a vocalic Nucleus – either an underlying V or epenthetic [ə].

- Maximal tautosyllabic onset at MRoot edge is [OO. Properties of [OO onsets are:
 - 2.1. Root-initial [OO clusters have extensive freedom of co-occurrence in PLACE.
 - 2.2. Root-initial [OO clusters have extensive freedom of co-occurrence in MANNER.
 - 2.3. Root-initial [OO cluster is licit, but *[OOO is not. [ə]-epenthesis applies ⇔ [OəOO
 - 2.4. Active derivation of Root-initial [OO clusters through Syncope
 - 2.5. Root-initial [OO cluster is copied in Redup

§3. MWord domain: O+ sequences at the L-edge of MWord differ in 3 major ways:

- 3.1. Word-initial O+ clusters have sequential constraints on MANNER.
- 3.2. Word-initial O+ clusters have sequential constraints on PLACE.
- 3.3. Word-initial [OOO+ clusters are licit.

There is *no* evidence of [ə]-epenthesis to syllabify Os in this domain.

Conclusion: MRoot sequences are parsed into σ constituency, whereas MWord sequences are not.

(13) What about the **MStem domain?**

Os are transparently exhaustively syllabified in this domain, but because all the prefixes here are Reduplicative prefixes, dependent on MRoot content, and subject to Identity and Markedness constraints, the content here is not independently revealing about consonantal edge-effects.

(14) **Root Canons:** all Roots are C-initial, where initial C = any C

a. /CVC/ Roots	cak ^w	<i>far off</i>
	yiχ ^w	<i>to fall apart (e.g. house, bridge)</i>
	cam	<i>to go up to higher ground, away from the beach</i>
	neṃ	<i>to go (mvt. away from speaker)</i>
b. /OOVC/ Root	cʰaq ^w	<i>go through</i>
c. /OO/ Roots with V-initial suffix	χʰ=inəs	<i>have an aching chest</i>
	χəʰ	<i>hurt</i>

Roots, and Words, are preferentially C-final.

2. Obstruent Clusters at the left edge of the MRoot domain

(15) Tautomorphemic MRt-initial OO clusters: rich variety, highly “marked” (= marks a lexical suffix)

- | | | |
|----|--------------------------------------|---|
| a. | [tpaʔ-t | <i>stretch stg on a frame</i> |
| b. | [ʔx ^w =əwʔtx ^w | <i>three houses</i> |
| c. | [ʔk ^w -els | <i>pinch</i> |
| d. | [pʔ ⁰ =əlməx ^w | <i>milk a cow</i> |
| e. | [χʔ=inəs | <i>have an aching chest</i> |
| f. | [qʔ-əm | <i>come loose</i> |
| g. | [pk ^w =e:nx ^w | <i>smoke fish</i> |
| h. | [q̣p-əʔ | <i>gather, put something together</i> |
| i. | [qχ=e:nx ^w | <i>lots of fish</i> |
| j. | [ts-əʔəʔ | <i>approach (-Reflex): get closer</i> |
| k. | [ʔ ⁰ s=əleʔc-t | <i>nail stg (e.g. coffin) up [WS:274]</i> |
| l. | [cʔaq ^w | <i>go through</i> |
| m. | [cʔ-əm | <i>jump</i> |
| n. | [ʔces | <i>island</i> |
| o. | [ʔfe-t | <i>swipe something</i> |

2.1. Root-initial [OO clusters have extensive freedom of co-occurrence in PLACE.

(16) egs. of tautomorphemic clusters: non-derived / derived via syncope ([marks MRt edge)

- | | | |
|----|----------------------------|---|
| a. | COR - LAB/DOR/UVU: | [tp, [ʔp, [ʔk ^w , [c̣q̣ ^w , [tq, ... |
| b. | LAB/DOR/UVU - COR: | [pʔ ⁰ , [pʔ, [k ^w c, [χʔ, [χʔ, [qʔ ... |
| c. | LAB/DOR/UVU - LAB/DOR/UVU: | [px ^w , [pk ^w , [pq ^w , [xp, [qχ, [q̣p ... |
| d. | COR - COR: | [ts, [cʔ, [cʔ, [ʔc, [c̣t, [ʔʔ ... |
| e. | COR - COR-DORS-(LAB): | [ʔx, [ʔx ^w |

(17) **Observations:** *significant* freedom of co-occurrence (above exemplification ≠ exhaustive...)

- | | | |
|----|--|---|
| a. | same PLACE, different MANNER: | [qχ, [ts, [ʔʔ ... |
| b. | same MANNER, different PLACE: | [χʔ, [tq ... |
| c. | no constraints on [CG]: | [tq, [q̣p, [q̣p̣, [p̣q̣, [pk ^w , [c̣q̣ ^w , [k ^w c
[Note: contra Kehrein & Golson (2004: 350), who claim that the laryngeal contrasts available in complex margins ... are the same in a given language as those available in simple margins.] |
| d. | mirror-image same MANNER, same PLACE, distinctive release: | [cʔ, [ʔc |
| e. | What is not possible: | *Identity of PLACE <i>and</i> MANNER <i>and</i> RELEASE |

2.2. Root-initial [OO clusters have extensive freedom of co-occurrence in MANNER.

(18) **Co-occurrence Constraints on MANNER:** T = stop, C = affricate, S = fric

- | | |
|-----|--|
| TT: | [pt, [tp, [tq, [pq ^w , [k ^w t, [q̣p̣, [q̣p̣, [pk ^w , [p̣q̣, [ʔq̣ ^w ... |
| CT: | [ck ^w , [c̣t, [ʔ ⁰ k ^w , [ʔp, [ʔk ^w , [ʔq, [ʔ ⁰ k ^w , [ʔq̣ ^w , [c̣k ^w , [c̣q̣ ^w , ... |
| TC: | [pʔ ⁰ , [pʔ ⁰ , [k ^w c, [qc, [qʔ, [q̣ʔ ⁰ ... |
| CC: | [cʔ, [ʔc, [ʔc̣ |
| TS: | [pʔ, [px, [qχ, [ts, [tx, [pʔ, [ʔχ, [px ^w , [q ^w s, [q ^w ʔ ...
(Note: [tʔ, k ^w s, k ^w ʔ occur in Det) |
| CS: | [cʔ, [cs, [cx ^w , [ʔ ⁰ ʔ. [ʔ ⁰ x ^w , [ʔ ⁰ χ, [ʔ ⁰ χ ^w , [ʔʔ, [ʔx, [ʔx ^w ... |
| ST: | [ʔq, [ʔq ^w , [ʔq̣, [ʔʔ, [ʔk ^w , [sq̣, [ʔq, [ʔq̣, [ʔk ^w , [ʔq̣ ^w , [xp, [χʔ, ... |
| SC: | [ʔc̣, [xc̣, [xʔ, [χʔ ⁰ , [χc, [χʔ ... |
| SS: | [ʔx ^w , [ʔχ, [ʔx ^w , [ʔχ, [ʔx ^w , [χʔ, [χs ... |

(19) **Observations:** *significant* freedom of co-occurrence

- Consider Morelli's (1999) typological class (Delaware, Modern Hebrew) where:
pre-obstruent stops can have any PLACE,
but pre-obstruent fricatives are exclusively COR.

⇒ ST, SC, SS categories in hənḏəmiḥəm are **not** restricted to an initial COR: e.g. [χʰ], [χʰt], [χʰʰ]
Note: also get initial [xO, but /x/ is arguably co-articulated COR/DOR (see (33) below)

(20) **Conclusion:** The absence of general constraints on PLACE/MANNER in Root-initial [OO sequences supports an analysis where O₁ ≠ extra-syllabic edge effect.

⇒ **Hypothesis:** σ[OO is a licit onset cluster in the MR_{root} domain in hənḏəmiḥəm.

2.3. Interaction of ə-Epenthesis and Root-initial *[OOO clusters

(21) **Distribution of schwa** in /OO/ roots

- (21.a, c) show that /OO/ roots surface without a [ə] before a V-initial suffix:
- but (21.b, d) show that /OO/ roots surface as C-final with internal epenthetic [ə] when unsuffixed

a.	t ^h χ ^w =as-əm	wash one's face
	t ^h χ ^w =ecs-əm	wash one's hands
	t ^h χ ^w =əlwət-əm	wash clothes
b.	t ^h əχ ^w	get washed
	*t ^h χ ^w	
c.	qχ=aḥ=məx ^w	many different kinds
	qχ=eʰ	often, many times
d.	qəχ	be many
	*qχ	

⇒ **Conclusion:** Unlike Nuxalk (7), words built on O-only roots in hənḏəmiḥəm *cannot* surface without at least one nuclear-headed σ

- (21.a, c), (14.b, c), (15), etc., show that a Root-initial [OO cluster is licit. Is [OOO ?

(22) /OOO/ roots: surface as [OəOO]

a.	/ʃpχ/	ʃəpχ	spread, scatter
	/ʃpχ-m/	ʃəpχəm	*ʃpχəm it has a habit of scattering
b.	/psk ^w -t/	pəsk ^w t	*psk ^w t call someone names
c.	/ʔtχ-t/	ʔətχt	*ʔtχət shake it back and forth [WS:148]
	/ʔtχ-m/	ʔətχəm	*ʔtχəm he shivered, i.e. from the cold [AG]
cf.		ʔət	flick away, as you would a fly

⇒ **Conclusion:** MR_t-initial [OOO clusters are *not* tolerated without [ə]-epenthesis ⇔ [OəOO].
Maximal tautosyllabic onset at MR_{root} edge is [OO.

(23) corroborated by /OO/ roots followed by a C-initial suffix: *[OO-C... ⇔ [OəO-C...]

	a.	/t ^h χ ^w /	to wash
cf. (21.a)		t ^h χ ^w =as-əm	wash one's face
	b.	t ^h əχ ^w =xen-əm	wash one's feet
		t ^h əχ ^w =ten	cleansing rite
	c.	/qχ/	to be many
cf. (21.c)		qχ=aḥ=məx ^w	many different kinds
	d.	qəχ=mat	many kinds

(24) **Question:** why is epenthesis after the *initial* C in (22) and (23)?

cf. (8.a) /čq̣^w-t/ *čəq̣^wət čq̣^wət pierce something (-t.tr)

(25) **Analysis:** derives from the interaction of 2 independent constraints.

- Universal markedness hierarchy with respect to **length** of Onset O-clusters.
*σ[OOO] >> *σ[OO] >> *σ[O]
- CONTIGRoot_{I-O} Root segments contiguous in the Input string are contiguous in the Output.
- Ranking CONTIGRoot between *[OOO] and *[OO] accounts for the full range of epenthesis sites:
*σ[OOO] >> CONTIGRoot >> *σ[OO]

⇒ **Consequence:** Emergence of the Unmarked

Given the inviolability of *σ[OOO] as a complex onset, there is no way to parse /OOO/ roots without ə-epenthesis disrupting Contiguity: see (26.b, c).

Significantly, the *least* marked onset, i.e. a single O, emerges as optimal:

(= 23.c)	/tχ-t /	*[OOO]	CONTIG	*[OO]	*[O]
a.	.tχ-ət.	*!		*	*
b.	.təχ-t.		*	*!	*
☞ c.	.tətχ-t.		*		*

(Note all candidates equally violate DepNuc; it is therefore not included)

Compare the crucial role of CONTIG in /OO/ roots with single O suffix:

(= 8.a)	/čq̣ ^w -t/	*[OOO]	CONTIG	*[OO]	*[O]
a.	.čq̣ ^w -tə.	*!		*	*
☞ b.	.čq̣ ^w -ət.			*	*
c.	.čəq̣ ^w -t.		*!		*

2.4. Active derivation of Root-initial [OO clusters through Syncope

(28) There is a productive process of V-syncope that applies to /OVO/ roots before lexically footed V-initial suffixes to actively derive initial OO clusters (Shaw 2008):

- fix^w ʃix^w 3 ʃəx^w-ʃəx^w=eɬə 3 people at a time
ʃix^w=əwtx^w *ʃix^w=əwtx^w three houses
- pek^w pək^w=é:nx^w *pək^w=é:nx warm over a fire
pək^w=éls *pək^w=éls smoke fish
warm something
- k^waq^w k^waq^w=əməŋ *k^waq^w=əməŋ hit
ax (hit=clubbing motion)

- Syncope-derived OO clusters have same properties (Place/Manner) as underlying OO clusters.

2.5. Root-initial [OO cluster is copied in Redup

(29) 'participant pluractionality' Redup prefix (Shaw *et al.* 2002)

- /ʃix^w/ ʃix^w 3 ʃəx^w-ʃəx^w=eɬə 3 people at a time
- /t^əaʔk^ws/ t^əaʔk^ws 7 t^əək^w-t^əək^ws=eɬə 7 people at a time
- /t^ɪχm / t^ɪχəm 6 t^ɪχəm-t^ɪχəm=eɬə 6 people at a time
/čk^wx/ čk^wəx 20 čk^wəx-čk^wəx=eɬə 20 people at a time

- (30) a. Redup is partial, anchored at L-edge;
 (29.b) 7 *people at a time* shows that a complex coda is not copied into Redup: *t^θə̀k^ws-t^θək^ws=élə
 b. Emergence of the Unmarked (TETU) effects:
 • simplex coda: markedness constraint *CC]σ
 • emergence of unmarked [ə]: *[features]/Nuc
 • deletion of non-initial [ʔ]: *[ʔ] (outranked by Anchor-L)
 ⇨ c. Maximal σ in Redup maintains initial [OO: ṭχ and čk^w copied intact

- (31) **Major conclusions:** properties of tautomorphemic O-clusters at **L-edge of MRt** domain:
 §2.1, 2.2. [OO clusters abound, with extensive freedom of co-occurrence in PLACE and MANNER.
 §2.3. Despite availability of ə-epenthesis, σ[OO onset clusters persist.
 §2.3. *σ[OOO clusters are actively prohibited, and are subject to ə-epenthesis.
 §2.4. Active derivation of Root-initial [OO clusters through a process of V-syncope
 §2.5. Root-initial [OO clusters are copied intact in mono-σ Redup pattern.

- ⇨ **Claims:** • O₁ ≠ extra-syllabic edge effect in MRt-initial [OO clusters
 • σ[OO is a licit onset cluster in the MRoot domain.

3. Obstruent-only Prefixes in the MWd Domain (see MCat domains (11))

O+ sequences at the L-edge of MWord differ in 3 major ways:

- 3.1. Word-initial O+ clusters have sequential constraints on MANNER.
- 3.2. Word-initial O+ clusters have sequential constraints on PLACE.
- 3.3. Word-initial [OOO+ clusters are licit.

There is *no* evidence of [ə]-epenthesis to syllabify Os in this domain.

3.1. Word-initial O+ clusters have sequential constraints on MANNER.

(32) Obstruent clusters: O-only [MWd domain prefixes concatenated with [MRt.

Major MANNER classifications: S = fricative, C = affricate, T = stop.

a. [S-	[ST	sχfēk ^w	[s-[χfēk ^w	<i>carving</i> (nom.)
[C-	[TS	ɛpx ^w iq ^w	[c-[px ^w =iq ^w	<i>blond haired</i>
[S-	[CS	x ^w λxexət	[x ^w -[λx=exən-t	<i>break stg. open, shuck</i>
[S-	[CT	x ^w čq ^w iwən	[x ^w -[čq ^w =iwən	<i>get pricked in the rear</i>
b. [CS-	[S	čt ^w əlməx ^w	[čt-[x ^w əlməx ^w	<i>fellow First Nations people</i>
[C-S-	[C	ɛt ^θ əχtən	[c-t-[t ^θ əχ=tən	<i>to die of poison</i> [WS:249]
[S-S-	[ST	x ^w sʔpaλəm	[x ^w s-[ʔpaλ-əm	<i>habitual smoker</i> [WS:237]
c. [TS-S-	[T	tx ^w sʔəʔtən	[tx ^w -s-[ʔəʔtən	<i>to buy food</i>
[CS-S-	[T	čtsteʔəx ^w əʔ	[čt-s-[teʔəx ^w əʔ	<i>co-kids, other children</i>
[TS-S-	[R	tx ^w x ^w nəčáyəq	[tx ^w -x ^w -[nəč=áyəq	<i>to buy a single-barreled gun</i>
[S-S-S-	[R	šx ^w sweʔ	[s-x ^w -s-[weʔ	<i>master, owner</i> [WS: 242]
d. [TS-S-	[ST	tx ^w sχfēk ^w	[tx ^w -s-[χfēk ^w	<i>to buy a carving</i>

Observations: It is generally the case that prosodic properties like syllabification cross internal morphological boundaries.

- But here, there are no generalizations with respect to clusters that *cross* the MWd-MRt boundary.

⇨ **Generalizations** strictly *within* the MWd domain:

- MANNER: Only the initial segment may be stop (T) or affricate (C);
 All non-initial Os are fricatives (S).

3.2. Word-initial O+ clusters have sequential constraints on PLACE.

The only segments attested are: /t c ç ʃ s ʈ/ plus /x xʷ/

Hyp: All segments within the MWd prefix domain are COR

(33) Place behaviour of /x/ = COR-DOR; /xʷ/ = COR-DOR-LAB

a. Phonetic realization of /x/ is palatal [ç] /_V, /V_-, /C_.

xeʈ	[çɛʈ]	<i>door, path</i>
xap-əs	[çapəs]	<i>to whistle at someone</i>
s-qaʔ-xən	[sqaʔçən]	<i>walking companion</i>
tex-t	[tɛçt]	<i>combing stg.</i>
wel-x	[wɛlç]	<i>throw stg.</i>
hə-ɰx-t	[həɰçt]	<i>turning stg on its edge</i>

b. Phonetic realization of /x/ is [x] only /_C

xpalst	[xpalst]	<i>to peel stg. with a knife</i>
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c. Adjacent Island Hufqumiñum dialect has fully shifted *x to /ʃ/

Msq	celəx	[çɛlɪç]	<i>hand</i>
IsHalk	čeləš	[çɛlɪʃ]	

d. Phonetic realization of [ə] is systematically coloured by adjacent Cs.

/x/ raises a preceding unspecified [ə] to hi, front (COR) articulation:

celəx	[çɛlɪç]	<i>hand</i>
nəpəx	[nəpɪç]	<i>to eat something</i>

Note: if LAB is present, it dominates over COR:

xʷəlməxʷ	[xʷəlmɔxʷ]	<i>hand</i>
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e. Both /x/ and /xʷ/ palatalize a preceding /s/ to [š], and /c/ to [č]

tu:xʷ-əʃsxe	[tu:xʷ-əʃsxe]	
s-xʷ-qʷəl-tən	[šxʷqʷəltən]	<i>voice, someone's speech</i>
cxʷ	[čxʷ]	<i>you (2sSu pro)</i>

⇒ **Conclusion:** /x/ and /xʷ/ are co-articulated: COR - DOR (-LAB)

(34) Familiar cross-linguistic observation: 'extra' segments at the margins of a σ domain are characteristically COR (Steriade 1982, Clements 1990, etc.).

cf. Morelli (1999) Takelma: both fricatives and stops in pre-Obstruent position are exclusively COR.

3.3. No manifest length restrictions on O clusters in MWd domain: there is *no* epenthesis.

Whereas *[OOO is inviolable at the [MRoot edge, such sequences are licit at the #MWord edge:

cf. (10.2) a.	ʈətχt	OəOOO		[ʈətχt	<i>shake it back and forth</i>
b.	q̄pət	OOəO		[q̄pət	<i>gather, put something together</i>
c.	cʈtʰəχtən	OOOəOO...	# cʈ-	[tʰəχ-tən	<i>to die of poison</i> [WS]
d.	šxʷθq̄əstən	OOOOəOO...	# š-xʷ-	[θq̄-əs-tən	<i>ridge pole support</i> [AG]
e.	txʷsʔəʈtən	OOOOəOO...	# txʷ-s-	[ʔəʈtən	<i>to buy food</i>
f.	txʷsχfəkʷ	OOOOOeO	# txʷ-s-	[χfəkʷ	<i>to buy a carving</i>

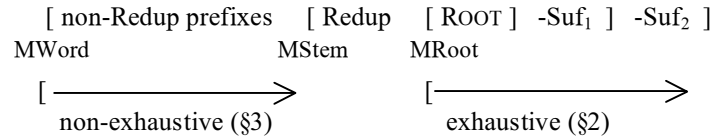
4. Implications

Summary: there are 4 significant differences in O-clusters at the MWd edge vs. the MRt edge:

(35)		<u>MWd</u>	<u>MRt</u>
	Constraints on PLACE:	COR	none
	Constraints on MANNER:	non-initial O = fricative	none
	Maximal sequence:	[OOO+	[OO
	[ə]-epenthesis to parse Os:	no	yes

⇒ O sequences at the MWd edge exhibit no prosodic attachment to the rest of the word.

see (11) **MCat domains:**



(36) **Hypotheses** regarding **Non-Exhaustive Parsing:**

Non-exhaustive parsing is formally interpretable (Shaw 2002) in terms of the progressively higher ranking of DEPNUC along a PARSE-SEG-TO- σ schema that is more finely articulated with respect to each of the two major dimensions at the prosody-morphology interface:

- (i) the V-R-O sonority hierarchy, and
- (ii) the Root-Stem-Word hierarchy.

In həŋqəmiŋəŋ: a. PARSE-V-to- σ and PARSE-R-to- σ are never violated.

b. PARSE-O-to- σ is violable, but only in the prefixal MWD domain.

c. PARSE-R-to- σ , PARSE-O-to- σ /MRoot \gg DepNuc \gg PARSE-O-to- σ /MWord

Within the possible range of exhaustive/non-exhaustive parsing systems that are characterized by this set of hypotheses are the following:

a. exhaustive parsing through ə-epenthesis:

PARSE-V-to- σ \gg PARSE-R-to- σ \gg PARSE-O-to- σ \gg **DepNuc**

b. ə-epenthesis does not parse Obstruents in the MWord domain: həŋqəmiŋəŋ

... PARSE-O-to- σ /MRoot \gg **DepNuc** \gg PARSE-O-to- σ /MWord

c. ə-epenthesis does not function as a syllable parsing strategy: Nuxalk

DepNuc, PARSE-V-to- σ \gg PARSE-R-to- σ \gg PARSE-O-to- σ

(37) a. **Why edge effects?** By incorporating the Root-Stem-Word as a fixed-ranked hierarchy that may intersect with Parsing constraints, this framework seeks to explain why it is most frequently the case that ‘stray’ segments occur in the context of affixal morphology at the margins of words.

- Further, it entails the claim that the opposite is not possible: that is, no language could be constrained to parse Os at word edges without also parsing them in internal lexical domains.
- Corelatively, a language not constrained to syllabically parse Os within the Root domain defines precisely the apparent extreme of human language variation attested in Nuxalk: where the Faithfulness constraint DepNuc has advanced to the top of the PARSE hierarchy.

b. **Why obstruents?** By formalizing the inherent subclassifications of the Sonority Hierarchy (V > R > O) as the basis of a fixed ranking of Parse-Seg-to- σ constraints, where Parse-O-to- σ is consistently the lowest ranked and most violable constraint, the cross-linguistic fact that it is Obstruents that characteristically manifest asymmetric edge effects is systematically accounted for.

(38) **What constraints govern unparsed segments?**

Proposal: Where *not* governed by **constituency**, phonological segments are bound only by **precedence** relations:

1. Such relations are edge-defined, where edge refers to an **MCat** domain, e.g. MWord.
2. Featural content and adjacency (phonotactic constraints) are constrained in **Place** and **Manner** by Markedness Theory.
3. Because the sequencing of unparsed segments is independent of prosodic constituency constraints that function to delimit ‘onset’, ‘nucleus’, and ‘coda’ complexity, **string length** is in principle phonologically unbounded.
Rather, it is morpho-syntactic constraints on concatenation, interacting with lexical choice in the prefix domain, that function to delimit the potential length of obstruent sequences.

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