Templates

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Overview

Why should templates matter in phonology?

- A *template* is roughly a fixed shape or canonical pattern that morphemes must conform to.

➥ It is a restriction on the size and shape of an affix, stem or word (McCarthy 2006: 182).

- It defines the arrangement of consonants and vowels within morphemes, as well as their quantity.
- In Semitic, templates are viewed as fully-fledged morphemes (McCarthy 1979).
- They convey specific grammatical information (e.g., tense/aspect, mood, valency).

Overview

Why should templates matter in phonology?

- In many languages with nonconcatenative systems, various morphological distinctions are expressed by canonical patterns (templates) that do not vary across the paradigms, despite changes in the quality of vowels.

  E.g., the causative (Form 2) in Classical Arabic:

  ʕallama 'he taught'

  ʕullima 'he was taught'

  ju-ʕallimu 'he is teaching'

  ju-ʕallamu 'he is being taught'

Overview

- *Why should phonology be concerned with templates?*
    1. They are made up of phonological units.
    2. They involve changes in the quantity of segments (gemination, vowel length, reduplication).
    3. They affect the phonological shape and the length of words (e.g. the minimal size of the word)

Overview

Why should templates matter in phonology?

1. **Templates are made up of phonological units**.

- They are defined in terms of the authentic units of prosody: μ, σ, Σ, ω (McCarthy & Prince 1990, 1994 *et seq.*) => *prosodic templates*

- They display a fixed number of C and V positions (CV-skeleton, McCarthy 1979, 1981), CV units (Strict CV model, Guerssel & Lowenstamm 1990, Lowenstamm 2003) => *CV-skeleton templates*

- They emerge from the interaction of specific constraints, particularly those in the alignment constraint family in OT (≠ primitives)

Overview

Why should templates matter in phonology?

1. **Templates are made up of phonological units**.

- The vocabulary is the same as the one used in prosodic theory in general.

- For example, *prosodic circumscription* refers to feet that reflect a weight distinction in syllables just as *stress assignment* does in quantity-sensitive systems.

Overview

Why should templates matter in phonology?

1. **Templates are made up of phonological units**.

- *Prosodic circumscription* in the Arabic plurals and diminutives: e.g. 'soul' nafs > nufuːs (PL), nufajs (DIM) = LH, iambic)

- S*tress assignment:* e.g. Palestinian Arabic: ˈkatabu 'they wrote' / biˈsˁiːr 'he becomes' / jiˈsaːfir 'that he travel' <= stress a heavy syllable when final or penultimate, otherwise stress the antepenultimate (further data and analysis in Faust & Ulfsbjorninn 2018).

Overview

Why should templates matter in phonology?

2. **Templates encode quantity changes**.

- *Gemination* is one type of quantity change that may convey grammatical information. Examples:

  - The imperfective in Tashlhiyt (*l**k**m* → *l**kk**m* 'arrive', cf. Dell & Elmedlaoui 1988, Lahrouchi 2008, 2010) and in Alabama (*ba**l**a:ka* → *bá**ll**a:ka* 'lie down', cf. Heather el al. 1988)

  - The Classical Arabic Form II, causative (*ʕa**l**ima* 'he knew' vs. *ʕa**ll**ama* 'he taught') or intensive (*ka**s**sara* 'he broke' broke' vs. *ka**ss**ara* 'he shattered').

- *Vowel length* may also convey grammatical information (e.g., Classical Arabic Form III *k**a**taba* 'he wrote' vs. *k**a**:taba* 'he corresponded', Alabama imperfective *hofna* → *hó:fna* 'smell', cf. Heather el al. 1988).

Overview

Why should templates matter in phonology?

3. **Templates constrain the size of the word**.

- *Subtraction* or clipping in hypocoristics results in forms that are minimally bimoraic or bisyllabic (binarity condition and word minimality): E.g. Robert > Bob, Robby (1 heavy σ = 2μ), Emily > Emmy (2 light σ = 2μ).

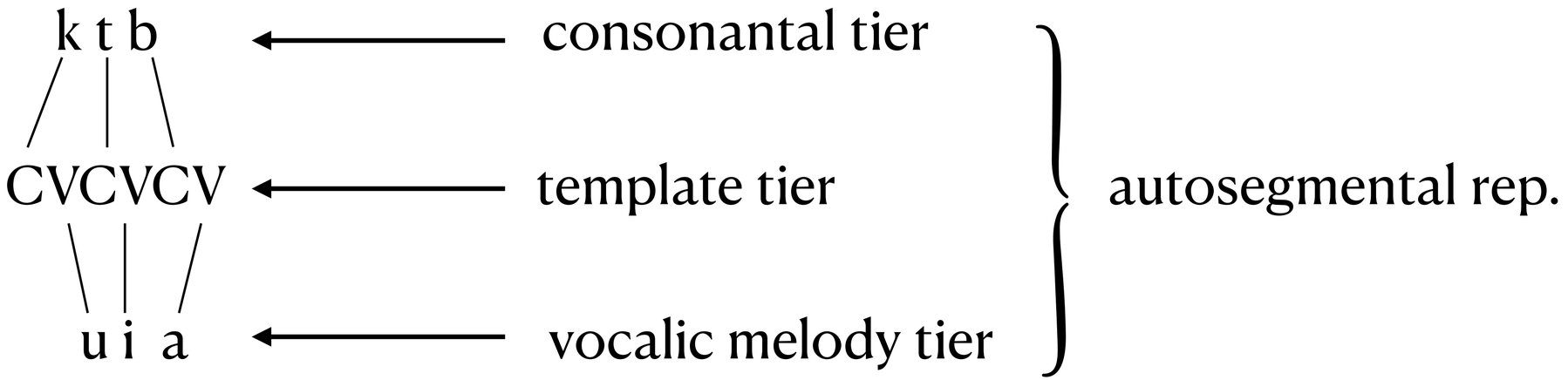
- *Reduplication*, when partial, involves a fixed and templatically-defined portion of the word: E.g., CV-reduplication in Tagalog (*lakad* > ***la****lakad* 'walk', *sulat* > ***su****sulat* 'write') or Swahili (*piga* > ***pi****piga* 'hit', *soma* > ***so****soma* 'read'), conveying the meaning of intensity or repetition.

Overview

- Semitic languages are probably the best known templatic languages.
- Languages wherein *templates* refer to fixed sequences of consonantal and vocalic positions, arranged in a specific way so that they convey grammatical information (e.g. verb conjugation types "forms" in Semitic, aspect (perf vs. imperf), mood, nominal forms, etc.)

Overview

- The novelty with McCarthy is the way he extends the proposal of autosegmental phonology (Goldsmith 1976, Leben 1973) to Classical Arabic verb conjugation.
- The various forms of the verb are obtained from the association of a consonantal root with vocalic melodies to predefined prosodic templates (McCarthy 1979, 1981).



Overview

- Templatic activity also exists in languages that are deemed entirely concatenative, in which grammar barely uses any template to convey morphological information:
- Language acquisition, early templates: Children go through stages where their productions display fixed-shape forms (e.g. VCV template in French: *maʁto* > *ato* 'hammer', *elefɑ̃* > *afɔ* 'elephant', *lapjœvr* > *apø* 'the octopus' (Wauquier 2014: 225).
- Variable shape templates (Scheer 2003, 2016): e.g. vowel lengthening or shortening in Czech verbs as a consequence of the length requirement (exactly 3 μ) on the iterative forms (e.g., s[**a**]d-i-t *vs*. s[**a**ː]z-e-t 'to plant' / c[**i**ː]t-i-t *vs*. c[**i**]t-ova-t 'to feel').

Roadmap

1. Template: a tentative definition and an overview of the concept's history
2. CV- skeleton templates
    - Arabic (triliteral / biliterals / quadriliterals)
    - Berber (nominal templates)
    - Other languages
3. Template satisfaction
    - Automatic association and directionality
    - Word minimality
    - Reduplication (partial vs. full)
4. Prosodic templates
    - Pre-OT (templates are genuine morphemes)
    - Within OT (templates emerge from constraints interaction)

Roadmap

5. Strict CV templates: a complex internal structure
6. Templates in languages with concatenative morphology
7. Templates at the interface with morphosyntax
    - Templatic positions computed within the verb's internal structure (Arbaoui 2010)
    - The word-initial position (the initial CV): Berber causatives, reciprocals, combinations, gender exponence in nouns.
    - Automatic association vs. association under grammatical control (the construct state and the like)
    - Plurals and diminutives in Moroccan Arabic
8. Templates in relation to the theory of affixation (prespecified derivational positions / mora infixation using alignment constraints / pivots).

Templates

A historical overview

- Well before McCarthy (1979, 1981), who formally established the morphemic status of templates, medieval "Arab" grammarians such as Sibawayh and Ibn Jinni had used the root {fʕl} "to do" and its various related forms as derivational patterns (see Bohas & Guillaume 1984, Owens 2000).
- The same method was used in the Medieval Biblical studies (see Zwiep 1996 for an overview of the Biblical linguistic studies in the Middle Ages).
- In Europe, neogrammarians (cf. Brockelmann 1908) and structuralists (cf. Cantineau 1947, 1950, Cohen 1961, and Galand 2002) refer to templates as "schemes" or "patterns."

Templates

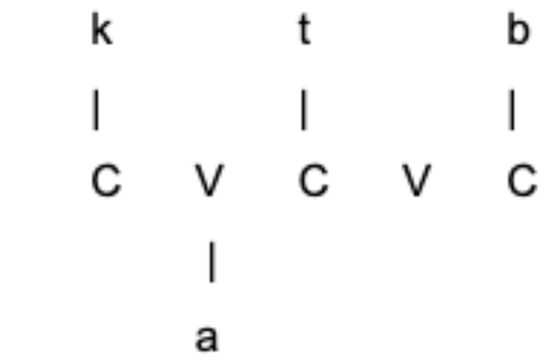
A historical overview

- According to Galand (2002: 81), a pattern “is a form (Gestalt), a configuration that also includes slots for radicals, represented as 1, 2, and 3.”
- In Berber for example, [kriz], the negative form of the verb [krz] “to plow”, is derived by associating √**krz** with the scheme **12i3**. The same root, associated with the scheme **m12a3** and the prefixal vowel **a-**, yields the agent noun [amkraz].
- From this perspective, the template consists of a sequence of prespecified positions for the root consonants and positions for the affixes.
- In the late 1970s, McCarthy's groundbreaking dissertation introduced the concept into Generative Phonology.

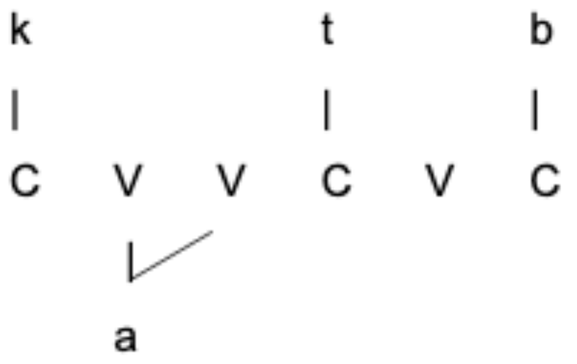
Templates

CV-Skeleton

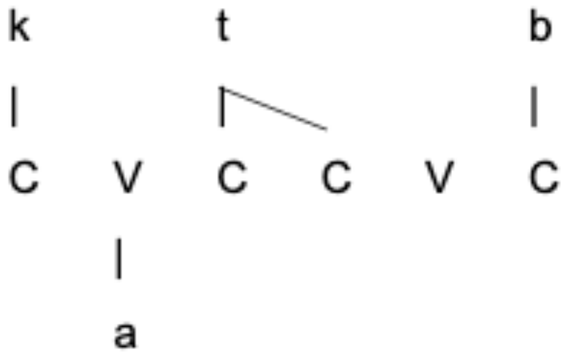
- McCarthy's work took advantage of the autosegmental program (Leben 1973, Goldsmith 1976).
- The template is represented on an separate tier ('CV skeleton').
- The root and the affixes are associated to it in accordance with the universal association conventions.
- One-to-one, from left to right until the whole template is filled (template satisfaction).



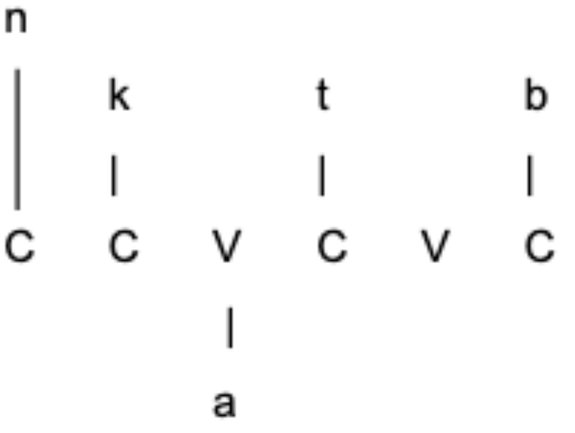
Form I *katab* "write"



Form III *ka:tab* "correspond with"



Form II *kattab* "make write"



Form IV *nkatab* "write (reflexive)"

Templates

CV-Skeleton

		√fʕl	√ktb
I	CVCVC	faʕala	kataba
II	CVCCVC	faʕʕala	kattaba
III	CVVCVC	fa:ʕala	ka:taba
IV	CVCCVC	ʔafʕala	ʔaktaba
V	CVCVCCVC	tafaʕʕala	takattaba
VI	CVCVVCVC	tafa:ʕala	taka:taba
VII	CCVCVC	nfaʕala	nkataba
VIII	CCVCVC	ftaʕala	ktataba
IX	CCVCVC	fʕalala	ktababa
X	CCVCCVC	stafʕal	staktaba

Templates

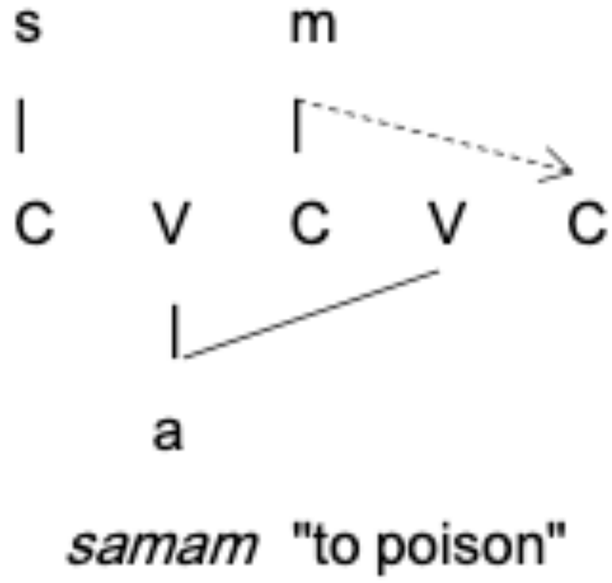
CV-Skeleton

- If there are fewer segments than there are skeletal positions, the final segment spreads into the empty position(s), just like tones do.

=> $C_1VC_2VC_2$ (*samam*) / * $C_1VC_1VC_2$ (**sasam*).

- If there are more segments than there are positions, then deletion occurs:

e.g. Ar. *ʕankabu:**t*** (SG) > *ʕana:kib* (PL) 'spider'



Templates

CV-Skeleton

- <u>Quadrilliterals</u>
- McCarthy (1981: 394) distinguished 2 forms in this type of verbs: QI (form 1) QII (form 2).
- Quadriliterals do not undergo neither gemination (*Form II) nor v-lengthening (*Form III).

daħraʒa	'to roll'	**tadaħraja**	'to roll down'
ʕarqala	'to trip up'	**taʕarqala**	'to stumble'
dahwara	'to throw'	**tadahwara**	to decline'
balwara	'to cristalize'	**tabalwara**	'to cristalize (ref.)'
maħwara	'to turn sth around'	**tamaħwara**	'to revolve

- What do you think the reason might be?

Templates

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- Their Q1 is formed on a CVCCVC template, the same one that triliterals use in Form II (kattab).
- Their Q2 is equivalent to Form V in triliteral verbs (ta-da**ħr**aj vs. ta-ka**tt**ab).

Templates

CV-Skeleton

- <u>Specific triliterals</u>: **ħmarar** type (colour and physical traits).

- 3 Radicals, the last of which spreads to C3.
- Formed on the root √ħmr 'read' associated to the CCVCVC template (Form IX in McCarthy's list).

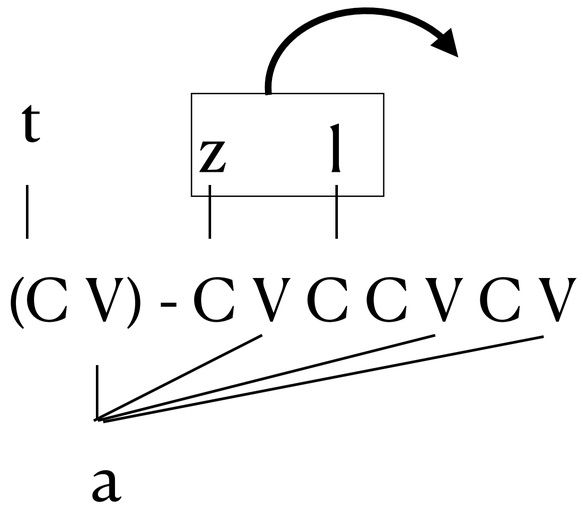
I	CVCVCV	*ħamara	-	**baːdˤa**	'lay an egg'
II	CVCCVCV	**ħammara**	'to redden'	**bajjadˤa**	'to whiten'
IX	CCVCCV	**ħmarra**	'to turn red'	**bjaddˤa**	'to turn white'

- Not all roots undergo all verbal derivations (Forms).
- The reason might be morphological (as for *daħraʒa* and as will be seen for biliterals) and perhaps syntactic-semantic.

Templates

CV-Skeleton

- biliterals

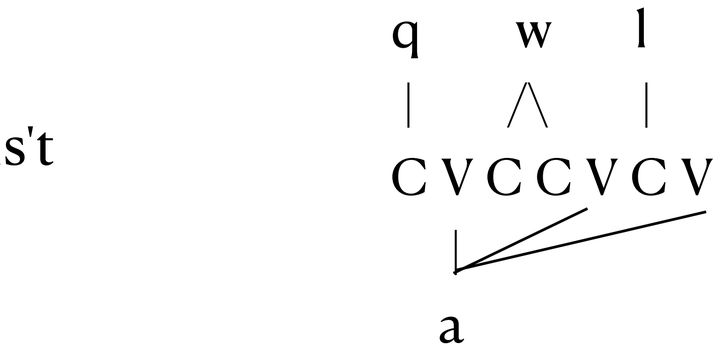


zalzala	'to shake, quake'	**tazalzala**	'to quake (refl.)'
waswasa	'to whisper'	**tawaswasa**	'to be anxious'
zaʕzaʕa	'to disturb'	**tazaʕzaʕa**	'to shake'
rafrafa	'to flutter, flap'	**tarafrafa**	'to flutter about (refl.)'

A preview

- Hollow biliterals
- [qa:l] <= /qwl/
- Underlying /w/ surfaces in some forms only.
- Templates explains why /w/ surfaces in forms 2, 3, 5 and 6.
- Not clear why Form 1 isn't *[qawala], nor why Form 4 ins't *[ʔaqwala] and Form 10 *[staqwala]

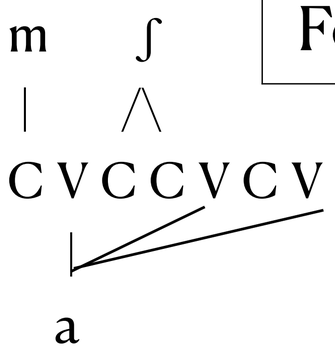
Form 1	CVCVCV	qa:la	'to say'
Form 2	CVCCVCV	qawwala	'to make s/one say'
Form 3	CVVCVCV	qa:wala	'to negociate'
Form 4	VCCVCV	ʔaqa:la	'to dismiss'
Form 5	CVCVCCVCV	taqawwala	'to fabricate lies'
Form 6	CVCVVCVCV	taqa:wala	'to argue'
Form 10	CCVCCVCV	staqa:la	'to resign'



A preview

- Defective √**mʃj** 'to walk'
  - /j/ surfaces only in Form 1
  - Either [vː] compensates for the absence of /j/, or /j/ cannot be realized because no empty C position is available in the template.

Form 1	CVCVCV	maʃija	'he walked'
Form 2	CVCCVCV	maʃʃaː	'he made walk'
Form 3	CVVCVCV	maːʃaː	'to go along with'
Form 5	CVCVCCVCV	tamaʃʃaː	'to walk with'
Form 6	CVCVVCVCV	tamaːʃaː	'be compatible with'



A preview

- Defective √**smø** 'to rise, name'
- None of the attested forms reveal the true nature of R3.
- In the impf, either [j] or [w] surface, depending on the Form

sama: (pf) / ja-sm**u**: (impf)

samma: (pf) / ju-samm**i**: '(impf)

Action noun: [sumuww]

Form 1	CVCVCV	sama:	'he rose up'
Form 2	CVCCVCV	samma:	'he named'
Form 5	CVCVCCVCV	tasamma:	'he was named'
Form 6	CVCVVCVCV	tasa:ma:	'be compatible with'

Compared to:

maʃa: (pf) / ja-mʃi: (impf) 'to walk'

maʃʃa: (pf) / ju-maʃʃi: (impf) 'to make walk'; action noun: maʃj

Templates

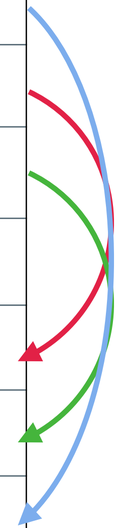
CV-Skeleton

- The template is a central ingredient in the root-and-pattern morphology, a model particularly designed for nonconcatenative languages like Semitic.

- However, the morphological system of Semitic displays concatenative operations within templates.
- Derivational relationships may be stated between the verbals forms:

  Form 5 = ta+Form 2
  Form 6 = ta+Form 3
  Form 7 = n+Form 1
  Forms 4, 10 = Form 1+ affix and/or vowels rearranged

Form 1	CVCVC	faʕal
Form 2	CVCCVC	faʕʕal
Form 3	CVVCVC	faːʕal
Form 4	CVCCVC	ʔafʕal
Form 5	CVCVCCVC	tafaʕʕal
Form 6	CVCVVCVC	tafaːʕal
Form 7	CCVCVC	nfaʕal
Form 10	CCVCCVC	stafʕal



Templates

Measure #	Triliteral	Analysis
I	faʃal	LL prosodic template
VII	nfaʃal	*n* + Measure I
VIII	ftaʃal	*t* + Measure I mod O/Φ(C, Left)
IV	ʔafʃal	*ʔa* + Measure I
X	staʃal	*sta* + Measure I
II	faʃʃal	*μ* + Measure I mod O/Φ(*μ*, Left)
V	tafaʃʃal	*ta* + Measure II
III	faaʃal	*μ* + Measure I
VI	tafaaʃal	*ta* + Measure III
	Quadriliteral	
QI	dahraj	A-templatic
QII	tadahraj	*ta* + Measure QI

McCarthy, John (1993) “Template Form in Prosodic Morphology,” in Laurel Smith Stvan et al.,eds., Papers from the Third Annual Formal Linguistics Society of Mid-America Conference, Indiana University Linguistics Club, Bloomington.

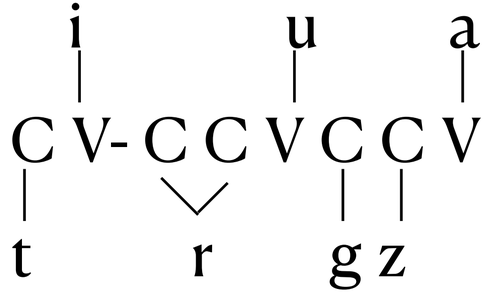
Templates

CV-Skeleton

- Berber nominal templates (Dell & Elmedlaoui 1992)

- UKRIS template (meaning "the condition of someone who is an X").
- **Observations**:
  - The template begins with prefix ti- (/t/ is a FM marker).
  - 3 radical consonants, R1 is geminated
  - Vocalic pattern: i-u-a (which overwrites the base's vowels)
- **Hypotheses**:
  1. The base is mapped onto the CICiCiUCCA template
  2. The content of the vocalic tier is unavailable to template mapping
  3. The vowels are available to the mapping, they do not surface because the template has no empty position to accommodate them (alternative to (2))

Base	Derivative	Gloss
arqaz	tirruqza	'man'
amaziʁ	timmuzʁa	'free man'
rks	tirruksa	'to hide'
ʃrk	tiʃʃurka	'to share'
inbqi	tinnubqa	'quest'
warq	tiwwurqa	'to dream'
lḥsab	tiḥḥusba	'account'



Templates

CV-Skeleton

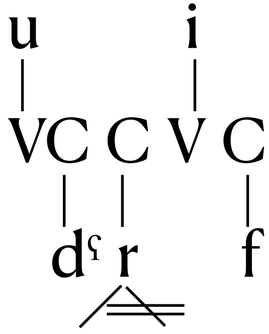
- Berber nominal templates (Dell & Elmedlaoui 1992)

- **UKRIS** template.
  - Maximally 3 radicals.
  - Vocalic pattern: u-i (which overwrites the base's vowels).
  - Template satisfaction imposes degemination of the input geminates.
    - The input geminate can degeminate and spread over two positions

Base	Derivative	Gloss
krs	ukris	'tie'
ʒlχ	uʒliχ	'be dirty'
χʷʃn	uχʃin	'be ugly'
dˤrrf	udˤrif	be nice'
mllul	umlil	'be white'
gzzˤ	ugzˤizˤ	'to chew'

- **TIRRUGZA** problematic data : Quantitative transfer
  - ama**zz**al 'errand man' > timmu**zz**la
  - amdda**kk**ʷl 'friend' > tiddu**kk**ʷla
  - ama**tt**al 'embezzier' > timmu**tt**la

Dell & Elmedlaoui (1992: 104) "The template should be reformulated so as to allow its penultimate C slot to expanded as CC just in case the penultimate consonant of the base is a geminate. We do not know at present how his should be done."



Templates

CV-Skeleton

- Denominal verbs Modern Hebrew (Bat-El 1994, Ussishkin 2000, Faust & Lampitelli 2023)

	SOURCE N		VERB	
a.	abstʁákti	‘abstract (ADJ)	ibstʁekt	‘make abstract’
b.	kompʁésoʁ	‘compressor’	kimpʁes	‘compress’
c.	tʁansféʁ	‘population| transfer’	tʁinsfeʁ	‘to transfer (population)’
d.	χantaʁíʃ	‘nonsense’	χintʁeʃ	‘talk nonsense’
e.	sùpeʁmáʁket	‘supermarket’	*	

- They involve more consonants than regular triliterals verbs
- They should use the QITEL template.
- They are used as evidence against (abstract) root-based derivations.

Templates

CV-Skeleton

- Templates operate on the syntagmatic dimension: They regulate the quantity variation of segments, the length of morphemes (shorter ones undergo spreading or epenthesis / longer ones undergo truncation), and the shape of reduplicants.
- In the early version of the theory, templates are fully-fledged morphological objects (i.e. morphemes), part of the speakers' lexical knowledge alongside roots, vowel melodies, and other affixes.
- The theory then evolved into *Prosodic Morphology* (McCarthy & Prince 1986, 1990 et seq.), which is part of a broader theory of prosody (Selkirk 1982, 1984, Nespor & Vogel 1986, Hayes 1981, among others).

Templates

CV-Skeleton

- Ilokano (Philippines) reduplicative CVC- morpheme (McCarthy & Prince 1994: 319, Hayes & Abad 1989)

kaldíŋ	"goat"	kal-kaldíŋ	"goats"
púsa	"cat"	pus-púsa	"cats"
kláse	"class"	klas-kláse	"classes"
jyánitor	"janitor"	jyan-jyánitor	"janitors"
róʔot	"litter"	roː-róʔot	"litter" (pl.)
trák	"truck"	traː-trák	"trucks"

Templates

CV-Skeleton

- How about progressive forms (same language)? (McCarthy & Prince 1986: 10)

Base	Progressive	Gloss
basa	agbasbasa	'be reading'
dait	agda:dait	'be studying'
adal	agadadal	'be studying'
takder	agtaktakder	'be standing'
trabaho	agtrabtrabaho	'be working'

Templates

CV-Skeleton

- Tigre, Ethio-Semitic (Lowenstamm 2003: 8)

SG	PL	Gloss
färäs	ʔäfras	'horse'
näfɪs	ʔänfas	'soul'
bɪrɪk	ʔäbrak	'knee'
ʃoqät	ʔäʃwaq	'thorn'
nɪbät	ʔänjab	'canine
lɪggät	ʔälgag	'dark hole'
kis	ʔäkjas	'pocket'
sɪr	ʔäsrar	'vein'
dɪs	ʔädjas	'plate'
sɪm	ʔäsmaj	'name'

Templates

CV-Skeleton

- Plural template: VCCVC
- Vocalic pattern: a
- ä-epenthesis to avoid #CC (also found in Arabic)
- ʔ-epenthesis to avoid #V.
- -ät is a suffix (dropped in the plural), hence w/j surfacing in the plural.
- Some biradicals may have similar forms in the singular (C_1C) but different strategies to compensate for the missing radical in the plural:
  - R2 spreading into C_3
  - j-epenthesis in C_2 or C_3

SG	PL	Gloss
färäs	ʔäfras	'horse'
näfɪs	ʔänfas	'soul'
bɪrɪk	ʔäbrak	'knee'
ʃoqät	ʔäʃwaq	'thorn'
nɪbät	ʔänjab	'canine
lɪggät	ʔälgag	'dark hole'
kis	ʔäkjas	'pocket'
sɪr	ʔäsrar	'vein'
dɪs	ʔädjas	'plate'
sɪm	ʔäsmaj	'name'

Templates

CV-Skeleton

Urmi Neo-Aramaic (Khan 2008, Faust & Lampitelli 2023)

	‘kill’	‘wash’	‘kill (caus.)’	‘heal’	‘throw’	*Pattern*
-PST	qatəl	χalәl	maqtəl	manxəp	partəf	<a,ə>
+PST	qtəl-	χlәl-	məqtəl-	mənxəp-	pərtəf-	<ə>
IMP	qtul	χlul	məqtul	mənxup	pərtuf	<u>
INF	qatol-e	χalol-e	maqtol-e	manxop-e	partof-e	<a,o,e>
PTCP	qatl-an-a	χall-an-e	maqtl-an-a	manxp-an-a	partf-an-a	<a,-an-a>

Templates

CV-Skeleton

	‘kill’	‘wash’	‘kill (caus.)’	‘heal’	‘throw’	*Pattern*
-PST	qatəl	χ̣alal	maqtəl	manxəp	partəf	<a,ə>
+PST	qtəl-	χ̣ləl-	məqtəl-	mənxəp-	pərtəf-	<ə>
IMP	qtul	χ̣lul	məqtul	mənxup	pərtuf	<u>
INF	qatol-e	χ̣alol-e	maqtol-e	manxop-e	partof-e	<a,o,e>
PTCP	qatl-an-a	χ̣all-an-e	maqtl-an-a	manxp-an-a	partf-an-a	<a,-an-a>

- All of the verbs share the same vocalic patterns.
- Only the set of consonants distinguishes one verb from another
- Each tense of mood category is associated with a specific template:

  -PST <-> CVCC (where [ə] is epenthetic)

  +PST <-> CCC (where [ə] is epenthetic)

  IMP <-> CCVC

  INF <-> CVCVC

  PTCP <-> CVCC

Templates

Prosodic hierarchy

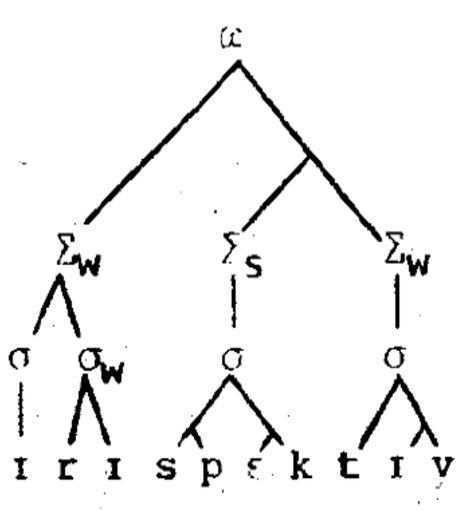
- Prosodic templates refer to those templates made up of the authentic units of prosody.
- *Prosodic* isn't the appropriate label because McCarthy's (1979) templates are also prosodic.
- Prosodic units are organized in a hierarchical structure (Selkirk 1980):

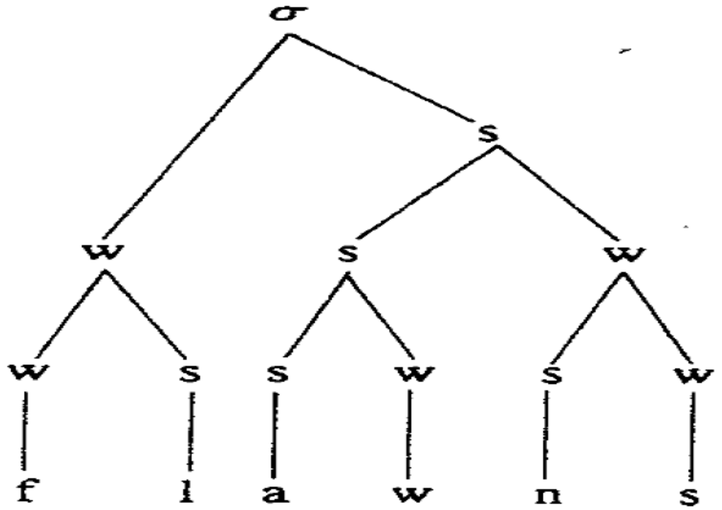
Phonological word ω
|
Foot Σ
|
Syllable σ
|
mora μ

Templates

Prosodic hierarchy

- Prosodic units has been used first in accounting for stress patterns.
- Selkik's (1980) representation of *irrespective* [ɪ(r)rəˈspɛktɪv] and *flounce* [ˈflawns]:





Templates

Prosodic hierarchy

Reduplication as an illustration

- Inspired by McCarthy (1981, 1979), Marantz (1982) claimed that:
    1. Reduplication is the affixation of an empty **skeletal morpheme** (a C-V skeleton) to a stem.
    2. The skeletal affix is identified the **segments** copied from the stem.
    3. All segments of the stem are copied into the skeletal morpheme, but only a subset is realized.
    4. Universal association conventions (one-to-one from left to right without crossing lines) determines which segments are realized onto the skeletal morpheme.All segments of the root are copied into the skeletal morpheme, but only a subset is realized.
    5. Once the whole skeletal morpheme is filled, the remaining unassociated segments are discarded.

Templates

Prosodic hierarchy

Example: CVC-red in Agta (Austronesian):

- takki > taktakki 'legs'

t a k ~~k i~~ + t a k k i
| | | | | | | |
C V C + C V C C V

- ulu > ululu 'heads'

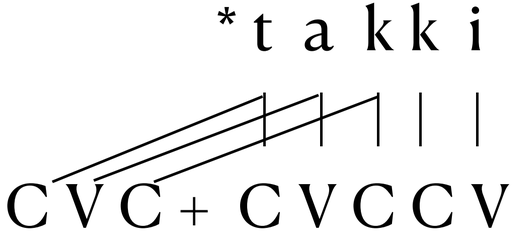
u l u + u l u
| | | | | |
~~C~~ V C V + V C V

Templates

Prosodic hierarchy

Example: CVC-red in Agta (Austronesian):

- takki > taktakki 'legs'



- Ilformed representation because of some association lines cross each other (Marantz 1982: 446).

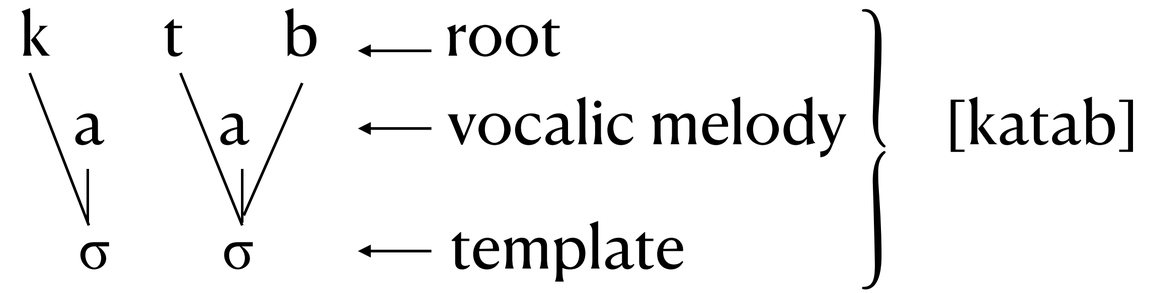
Templates

Prosodic hierarchy

- Many of the skeletal morphemes, including the reduplicant CVC in Agta and the Semitic-like morphemes, correspond to more common prosodic units.
- McCarthy & Prince (1986) propose that empty skeletal templates can be accounted for with the authentic units of prosody, namely the syllables, the moras and the feet.
- A verb like [katab] is no more formed on the CVCVC template, but rather on LH syllabic template (an iambic foot).

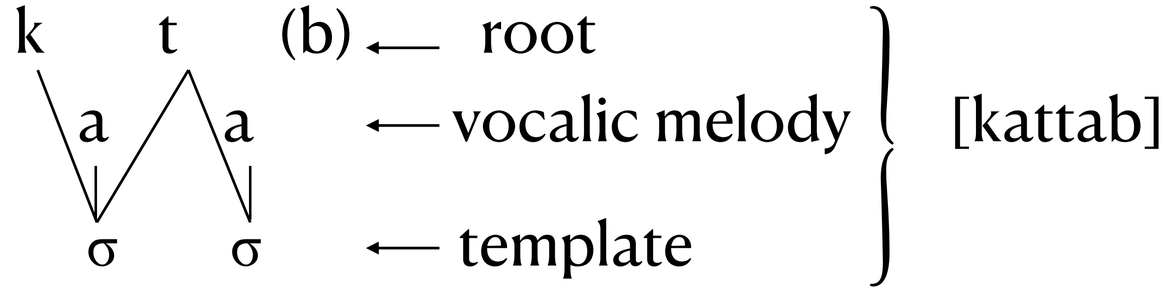
Templates

Prosodic hierarchy



Templates

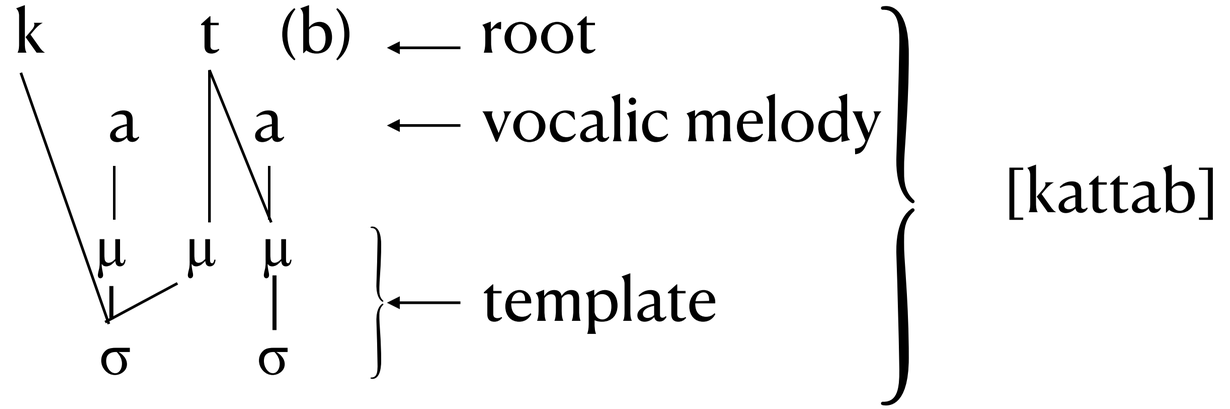
Prosodic hierarchy



- In Arabic, word-final consonants are viewed as extraprosodic.

Templates

Prosodic hierarchy



- Adding the moraic level results in: [$\sigma_{\mu\mu}$ σ_{μ}]

Templates

Prosodic hierarchy

- Principles of Prosodic Morphology (McCarthy & Prince 1986, 1990: 209, 2006: 182):
  1. **Prosodic Morphology Hypothesis**

     Templates are defined in terms of the authentic units of prosody: mora (μ), syllable (σ), foot (Ft), prosodic word (ω) and so one.
  2. **Template Satisfaction Condition**

     Satisfaction of templatic constraints is obligatory and is determined by the principles of prosody, both universal and language specific.
  3. **Prosodic Circumscription of Domains**

     The domain to which morphological operations apply may be circumscribed by prosodic criteria as well as by the more familiar morphological ones. In particular, the **Minimal Word** within a domain may be selected as the locus of morphological transformation.

Templates

Prosodic hierarchy

- Prosodic units:
    1. The mora is a unit of phonological weight (Prince 1980, Hyman 1985, Hayes 1989, among others) that sorts syllables into Light (1μ) and Heavy (2μ): CV is light, CVV and CVC are heavy. Onsets do not contribute to syllabic weight (but see Topinzi 2008, 2010, Lahrouchi 2022).

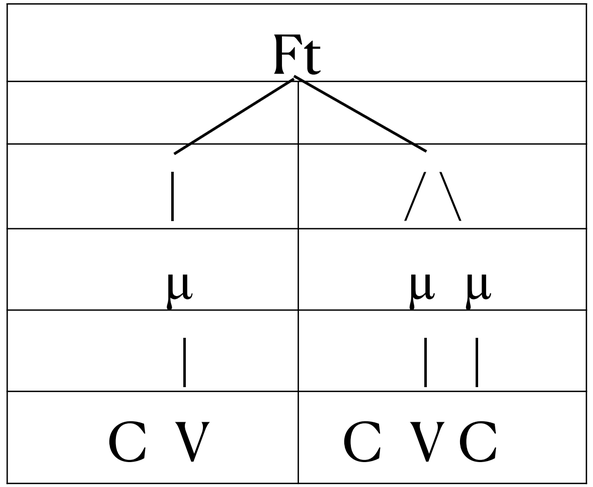
Heavy		Light
μ μ	μ μ	μ
\ /	| |	|
V:	V C	(CC) V

Templates

Prosodic hierarchy

- Prosodic units:
    2. The Foot (Ft, Σ) is a metrical or prosodic unit that groups syllables and moras into chunks on which stress, prosodic weight, prosodic circumscription, and templates operate. It is bisyllabic or bimoraic (foot binarity)

    E.g., iambic foot =>



Templates

Prosodic hierarchy

- Foot typology (McCarthy & Prince 1986, McCarthy 1993, 2006: 183)

- HL is not part of M&P's typology (but see Hayes 1980, Halle and Vergnaud 1987, Halle and Kenstowicz 1991).
- Degenerate Ft (L) may play a role in stress assignment (see Kager 1989, Hayes 1991).
- Quantity-insensitive systems use disyllabic feet.

Iambic	Trochaic	Degenerate	Syllabic
LH	(HL)	L	σσ
LL	LL		
H	H		

Templates

Prosodic hierarchy

Latin stress is syllable-based:

- Stress assigned to the penultimate if heavy (b, c), otherwise stress the antepenultimate (a)

a.	mínimus	b.	reféctus	c.	incú:dis
	múrmuris		volúptas		relá:tus
	exístimo		de:léctat		inimí:cus
	adsimíliter		exkérpsit		refé:cit

Templates

Prosodic hierarchy

- Ilokano reduplication (McCarthy & Prince 1986, 1991, Hayes & Abad 1989)

kaldíŋ	"goat"	kal-kaldíŋ	"goats"
púsa	"cat"	pus-púsa	"cats"
kláse	"class"	klas-kláse	"classes"
jyánitor	"janitor"	jyan-jyánitor	"janitors"
ró?ot	"litter"	ro:-ró?ot	"litter" (pl.)
trák	"truck"	tra:-trák	"trucks"

- The reduplicant morpheme corresponds to a heavy syllable (either CVC or CV:).

Templates

Prosodic hierarchy

- Classical Arabic plurals and diminutives (McCarthy & Prince 1986, 1990)
- A LH iamb is imposed on the plural and diminutive forms.
- C# is extraprosodic.

	SG	PL	DIM	Gloss
CVCC	nafs	nu.fuːs	nu.faj.s	'souls'
	kalb	ki.laːb	ku.laj.b	'dogs'
CVCVC	raʒul	ri.ʒaːl	ru.ʒaj.l	'men'
	ʔasad	ʔu.suːd	ʔu.saj.d	'lion'
CVCCVC	ʒundub	ʒa.naːdib	ʒu.naj.dib	'locust'
CVCCV:C	sˤultˤaːn	sˤa.laːtˤiːn	sˤu.laj.tˤiːn	'sultan'

Templates

Prosodic hierarchy

- Tashlhiyt Impf (Jebbour 1999)

- A prosodic pattern imposed on the output

		Verb	Geminatio n	σ structure	Template
a.	frs	ffrs	ffrs	C̩.OC̩C	LL
	fsr	fssr	fssr	OC̩.OC̩	LL
	gru	grru	grru	OC̩.OV	LL
b.	mun	*mmun	m.mun	C̩.OVC	*LH
	amr	*ammr	am.mr	VC.OC̩	*HL
	aru	*arru	ar.ru	VC.OV	*HL

Templates

Prosodic hierarchy

- Tash. impf
- Impf is formed by means of gemination, tt-infixation, and vowel insertion.
- Vowel insertion may cooccur with gemination and perfix-tt
- Only a s subset of verbs undergo gemination

	base	**impf**	
a.	frn	ffrn	sort
	krz	kkrz	plow
b.	lkm	lkkm	arrive
	rgl	rggl	close
c.	mun	tt-muna	accompany
	gawr	tt-gawar	sit down
d.	skr	skar	do
	sdr	sdar	cover

Templates

Prosodic hierarchy

- Tashlhiyt Impf (Jebbour 1999)
- LL imposed on the output of impf gemination (Jebbour's analysis)
- CC̣C is light / CVC is heavy.

		Verb	Geminatio n	σ structure	Template
a.	frs	ffrs	ffrs	C̣.OC̣C	LL
	fsr	fssr	fssr	OC̣.OC̣	LL
	gru	grru	grru	OC̣.OV	LL
b.	mun	*mmun	m.mun	C̣.OVC	*LH
	amr	*ammr	am.mr	VC.OC̣	*HL
	aru	*arru	ar.ru	VC.OV	*HL

Templates

Prosodic hierarchy

- Mora infixation (Bensoukas 2001, 2025): floating mora affixation (a type of **Generalized Mora Affixation** (Trommer & Zimmermann 2015) and **Generalized Nonlinear Affixation** (Bermúdez-Otero 2012)).
- GMA => any morphological operation that involves a change in the segments' quantity (lengthening, gemination, shortening, and subtraction) is an instance of mora affixation.
- The impf morpheme is a featureless (empty) **floating mora (μ)** that docks onto a syllable position in the stem.
-

Templates

Prosodic hierarchy

/lkm/+μ	**MAX-μ (realize morpheme)**	***FLOAT (no unlinked mora)**	**DEP-C (no epenthetic**	**IDENT-Weight**
a. **lkm** (mora deleted)	****!**			
b. **lkim** (epenthetic V hosts μ)			***!**	
☞ c. **lkkm** (μ docks on C2, C2 geminates)				*****

Templates

Prosodic hierarchy

- **Choctaw** y-grade (intensive): prosodic circumscription+μ affixation (Lombardi & McCarthy 1991)

- A consonant between the penult and antepenult syllable is always geminated.
- If the antepenult is missing (e.g., in disyllabic like *pisa*), a default *y* is inserted, and the penult vowel spreads to fill the template.
- The antepenult and penult syllables form an iambic foot (e.g., (**talak)**či).

base	**y-grade**	
talakči	tállakči	'to be tied'
binili	bínni:li	to sit'
pisa	píyyiisa	to tie'
ona	óyyoona	to arrive there'

- A μ is prefixed to the iambic base, then filled by spreading from an adjacent consonant.
- Edge-in association allows geminating the medial consonant (μ+(talak)^{LH}či => [tállakči]

Templates

Association conventions

- **Universal Association conventions** (Goldsmith 1976)

  - Autosegments (tones, segments, features) are associated to their skeletal slots one-to-one in some direction.

  - Left-to-right direction for tones (Goldsmith 1976, Clements & ford 1979, Pulleyblank 1986) and Semitic-like root consonants (McCarthy 1979, 1981).

  - Right-to-left and left-to-right directions in affix reduplication: right-to-left in prefixed reduplication vs. left-to-right in suffixed reduplication Marantz 1982, McCarthy & Prince 1986).

  - Edge-in direction (Yip 1988).

Templates

Association conventions

- **Universal Association conventions** (Goldsmith 1976)

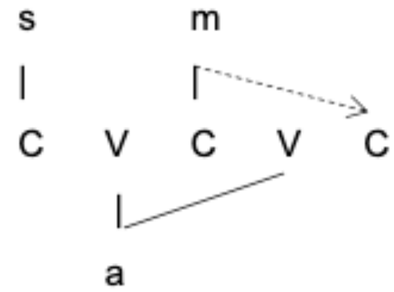
  - One to one, left-to-right accounts for tone spreading, contour tones in Mende (Leben 1973), floating tones in Ewe (Clements & Ford 1981), root mapping onto the template in Classical Arabic (McCarthy 1979, 1981).

1. **Tone and segment spreading**

Mende: stem-final tone spreads to the toneless suffix /ma/ 'on'.

'money'	nàvó	nàvó-má
'war'	kɔ́	kɔ́-má
'house'	pɛ́lɛ́	pɛ́lɛ́-má

Arabic: C2 spreads to the following empty C



samam "to poison"

Templates

Association conventions

- **Direction of association: counterexamples**

  - HHL tone pattern found in Mende (Dwyer 1978) and Shona (Odden 1988) fails to undergo the left-to-right direction of association.

  - In Hausa, the tone pattern of some PL-marking suffixes overrides that of the stem (Newman (2000 :431).

–a:Ce:)^{HLH}	dámóo báamíi kúrfóo	dámàamée báamàayée kúràafée	« ground monitor » « beginner» « whip»

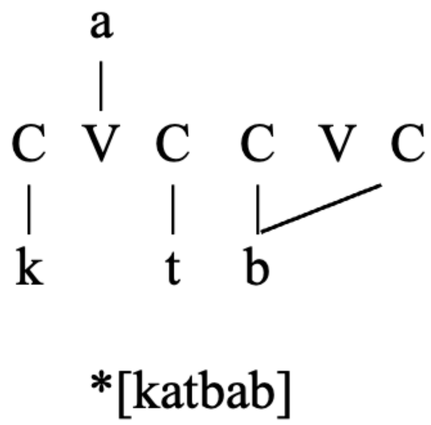
Templates

Association conventions

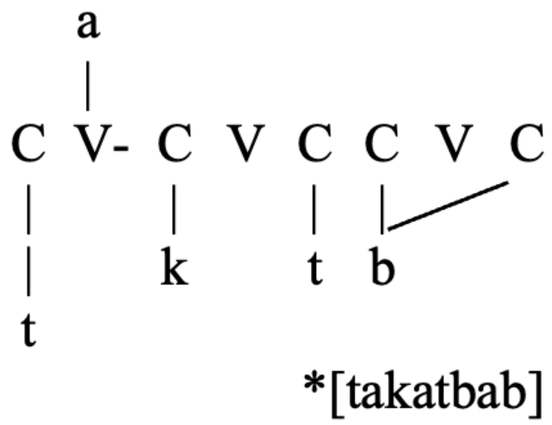
- **Direction of association: counterexamples**

  - In Classical Arabic, medial consonant gemination in form II **kattab** is derivable neither by left-to-right direction of association nor by right-to-left.

  - Given the number of C slots in the Form 2 template (CVCCVC), it is the stem final consonant that spreads to the empty C slot instead of the medial consonant, leading to ***katbab** (the same holds for form V **takattab** that should be realized as *takatbab).



*[katbab]



*[takatbab]

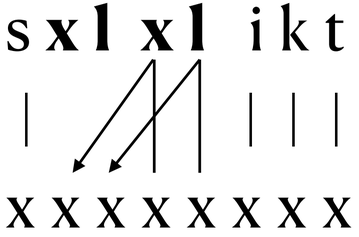
Templates

Association conventions

No crossing condition: Association lines may not cross one another.

- In Semitic, multitiered representations prevent association lines from crossing (consonants and vowels sit on different tiers).
- Reduplication may incur crossing lines unless the reduplicant morphemes is represented on a different tier (not easy to achieve in some cases):

Bella Coola (Bagemihl 1991): reduplicate the leftmost Obs-Son sequence in the base.

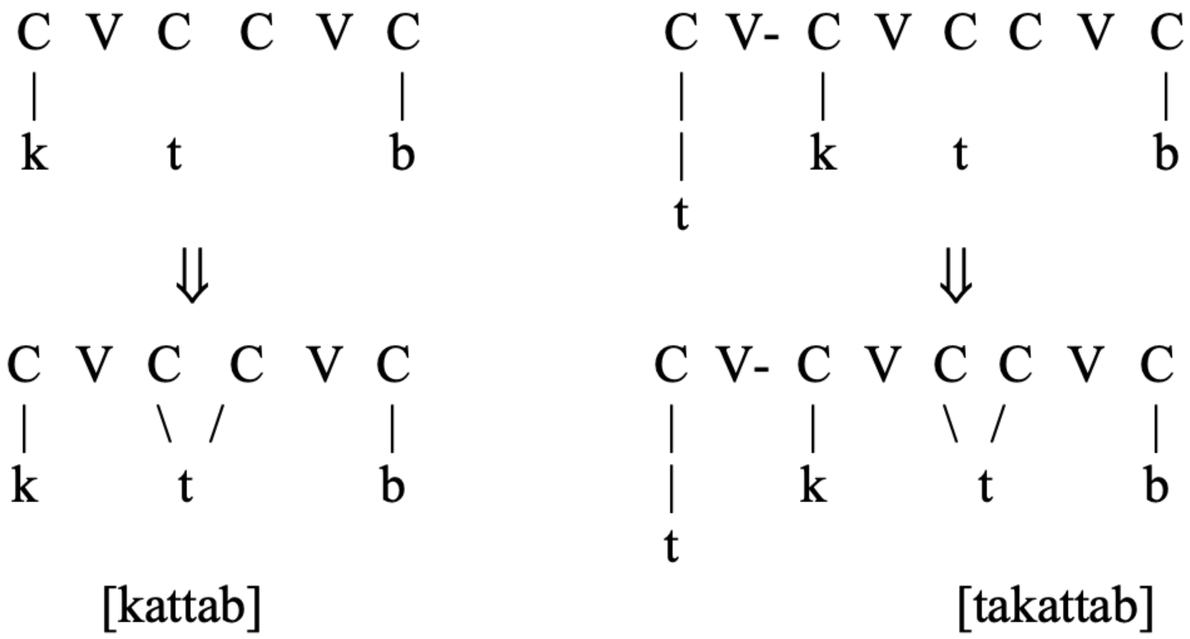


tlk'ʷ	**tl**tlk'ʷ	swallow
sxlikt	sxlxlikt	be angry
t'lksn	t'lksnsn	shoot with a bow

Templates

Association conventions

- Yip (1988) claimed that Classical Arabic verbal forms, including forms II and V, are better analysed with an “Edge-in” direction of association.



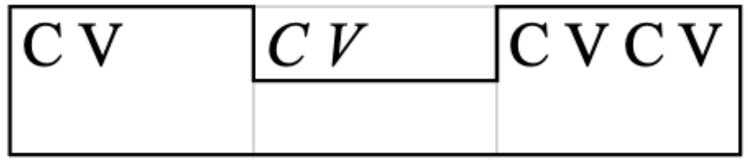
Templates

Strict CV

- In Strict CV, Guerssel & Lowenstamm (1990), Lowentamm (2003) and Lahrouchi (2008) addressed the problem of directionality of associations by positing that the template:
  - is no more a flat structure, a string of C and V slots.
  - Rather, it is a morphologically complex object, internally structured so that the standard association conventions do not apply to the entire CV slots simultaneously.

Templates

Strict CV



- The template consists of strictly alternating C and V positions, referring to the Strict CV approach to syllable structure (Lowenstamm 1996, Scheer 2004).
- The template is made of two components: a derivational site that functions as the morphological head of the form, and the boxed syllables that are the complement of the head.
- The components are filled one after the other by means of two operations:

  (1) root formation

  (2) verb derivation

Templates

Strict CV

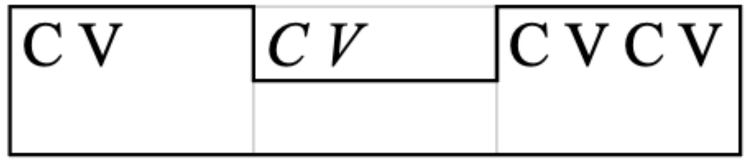
"Certain obvious regularities appear in (13) which the grammar ought to take account of. First, the stems of all binyanim invariably end in closed syllables (CVC). Second, there is no binyan with a sequence of two light syllables like CVCVCVC. Third, no binyan contains a light syllable after a heavy syllable like CVCCVCVC. Fourth, no binyan which begins with a consonant cluster is three or more syllables long overall." (McCarthy 1981: 386)

(14) a. $[(\left\{\begin{matrix}C\\CV\end{matrix}\right\})\ CV([+seg])CVC]$

b. $V \rightarrow \phi\ /\ [CVC \qquad CVC]$

Templates

Strict CV

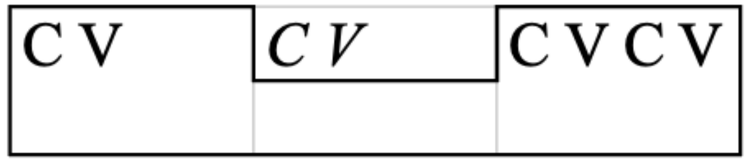


(1) *root formation* involves the association of root consonants to the complement

(2) *verb derivation* involves the identification of the head –the empty derivational site- by means of consonant or vowel spreading

Templates

Strict CV

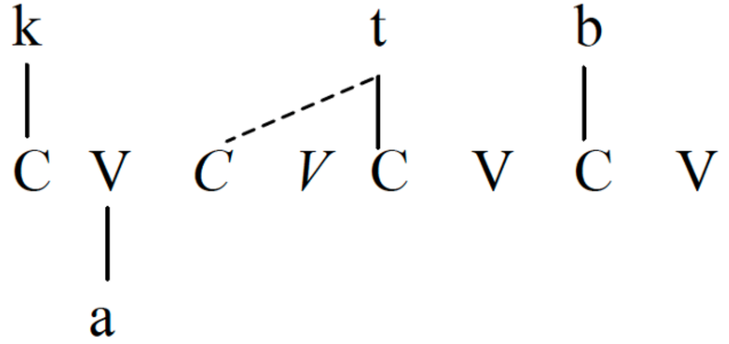


- Such an internally structured template allows reducing the number of templates originally proposed by McCarthy (1979), especially since it all root internal morphological operations are located between the first and second consonants.

Templates

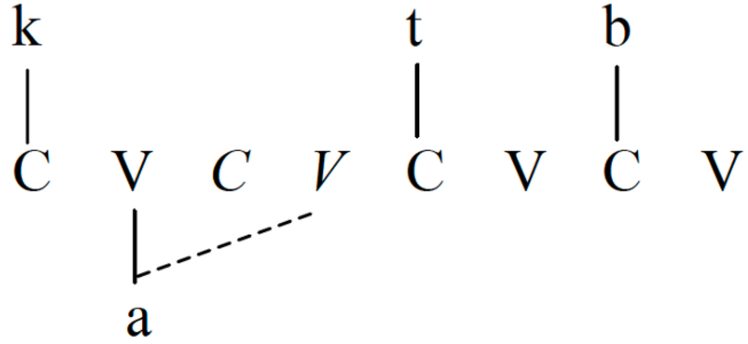
Strict CV

a. *Form II*



[kattaba]

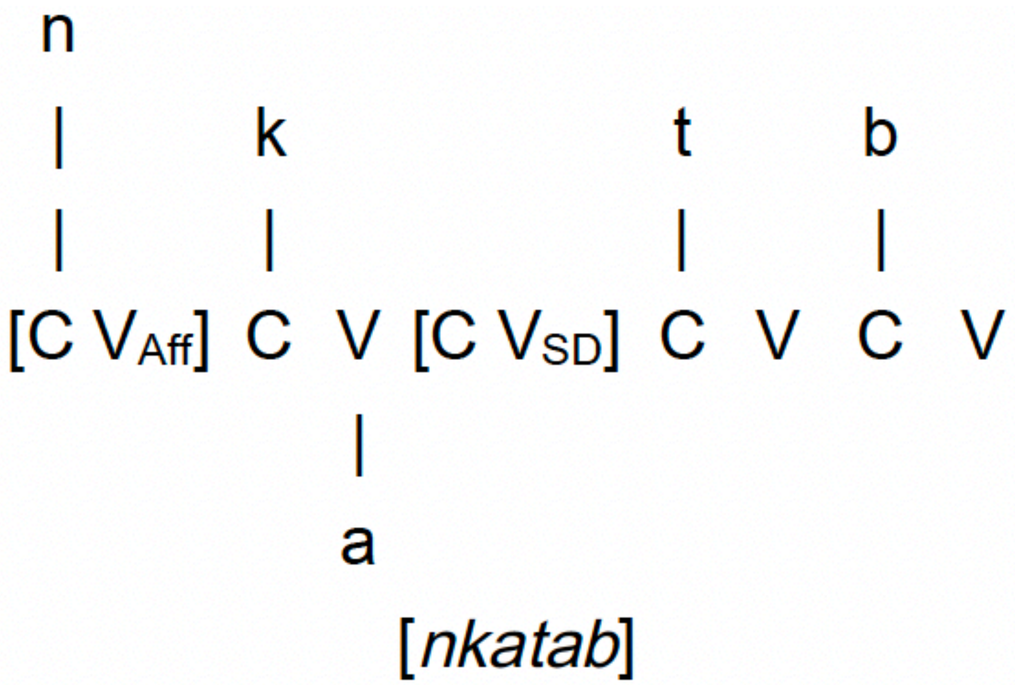
b. *Form III*



[kaataba]

Templates

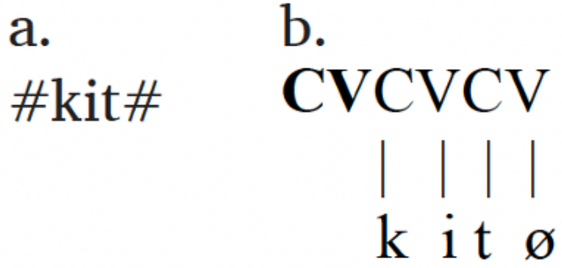
Strict CV



Templates

initial CV

- In an attempt to rationalize the asymmetry between languages with only sonority-rising clusters at the beginning of the word and languages where initial clusters are made sonority-free, Lowenstamm (1999) argues that each word of a major category is preceded by an empty CV site.

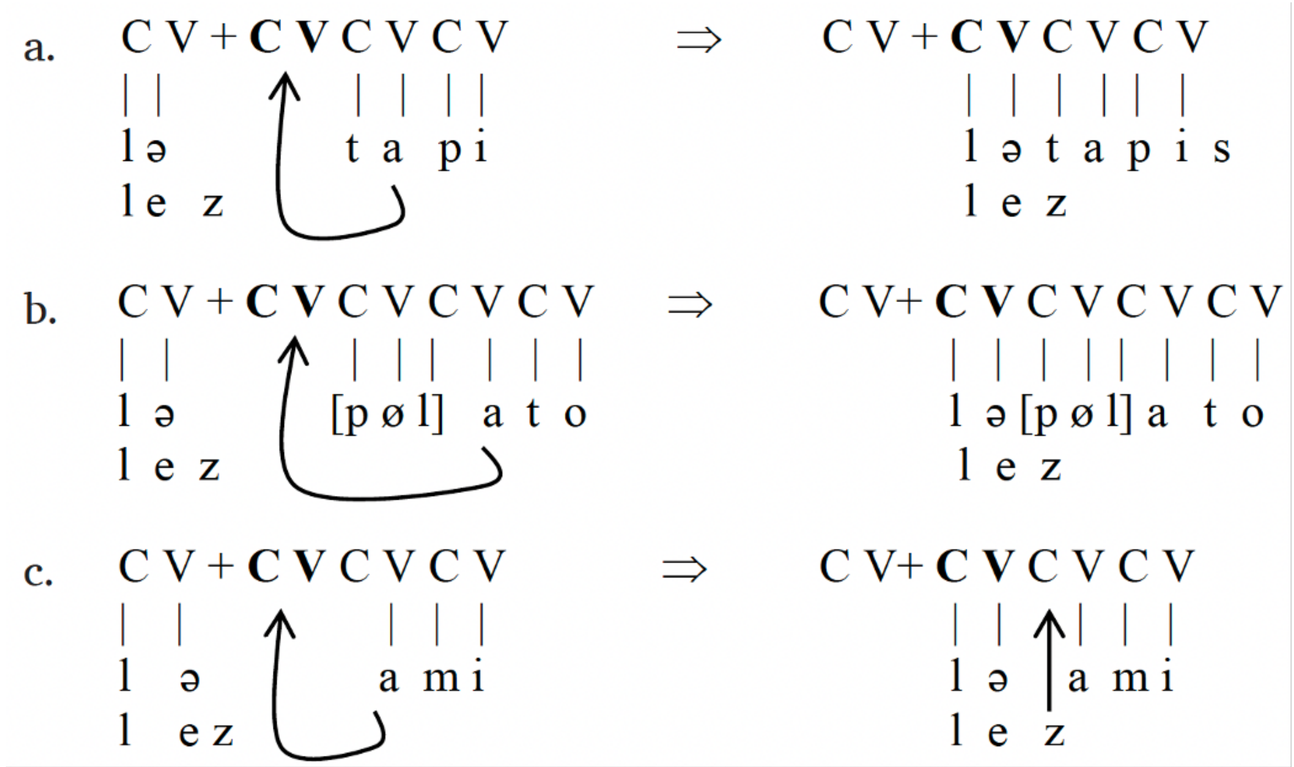


- The site is filled by means of phonological and morphological operations involving licensing condition. Two types languages:
  - Type I languages such as English and French where the initial site is always licensed by the following vowel.
  - Type II languages such as Maghrebi Arabic and Hebrew where it is not always licensed.

Templates

initial CV

- In French, the initial site **<u>is always licensed</u>** => it hosts proclitics

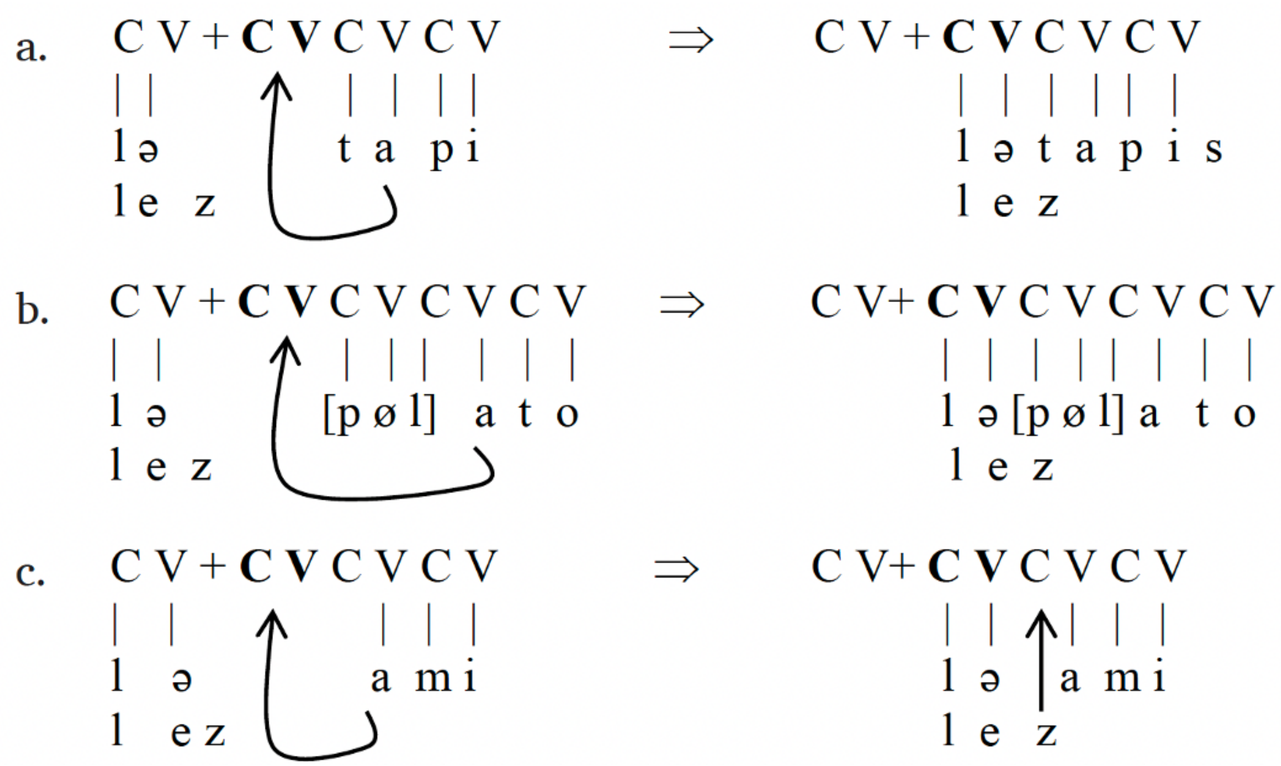


- Following the proposal put forth in Scheer (1996), Lowenstamm assumes that in French a word-initial sequence consisting of an obstruent followed by a liquid constitutes a closed domain that the following vowel straddles to license the initial site (see also Scheer 2004: 101–102).

Templates

initial CV

- In French, the initial site **<u>is always licensed</u>** => it hosts proclitics



- Scheer (2004: 111) and Seigneur-Froli (2001: 62–69; 2003: 354; 2006: 278) take a different view of the problem. Relying on similar facts in Czech and Greek, they suggest that the dichotomy that opposes languages with clusters of rising sonority at the beginning of the word to languages where such clusters are made sonority-free is a matter of presence vs. absence of the initial site, rather than a difference in the licensing status.
- They claim that languages like English and French with sonority-rising clusters have an initial site, whereas languages with sonority-free clusters do not.

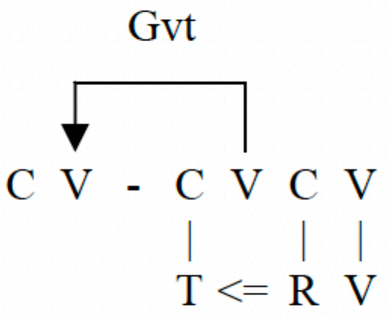
Templates

initial CV

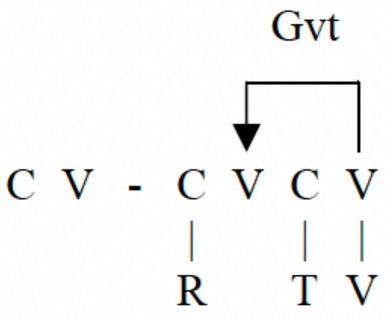
- Ò

restrictions on initial clusters in CVCV languages that possess the initial CV

a. #TR well-formed

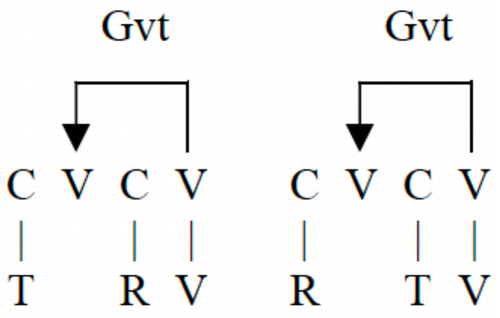


b. #RT ill-formed: two empty nuclei in a row



languages that lack the initial CV

c. #TR and #RT well-formed



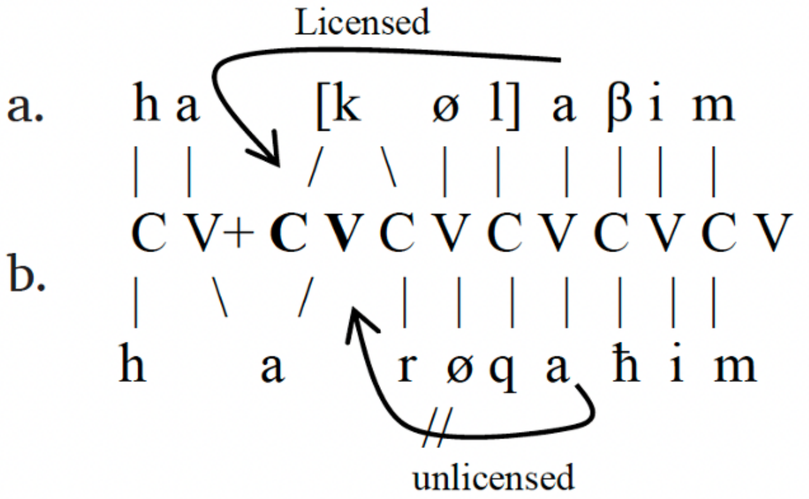
Greek (Seigneur-Froli 2001)	
ftero	wing
ktupos	noise
dzeo	boil
vðomas	week
Czech	
k**r**k	'neck'
v**l**k	wolf

Templates

initial CV

• In Hebrew, the initial site **is not always licensed,** but a **uniformity convention** allows the initial CV to remain unlicensed throughout the language, even in words beginning with sonority-rising clusters.

[hakklaβim] ‘the dogs’
[haːrqahim] ‘the spices’



Templates

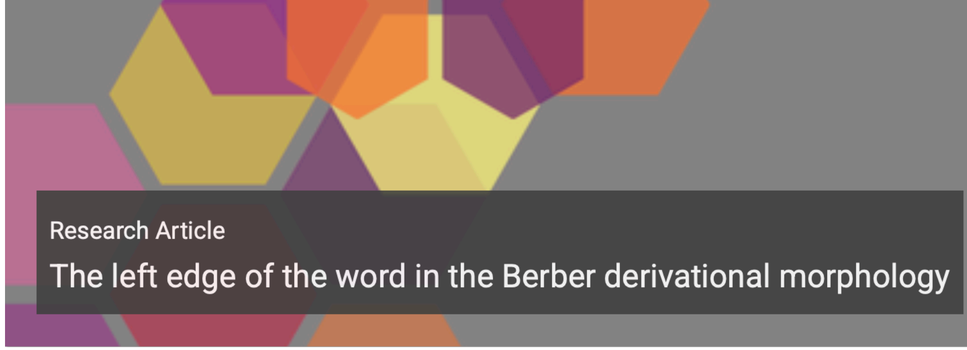
initial CV

In Tashlhiyt, the domain of the verb consists of the stem template, preceded by an initial empty CV.

(Lahrouchi 2001, 203, 2013, 2018)

Templates

initial CV



- In Berber, the initial site hosts prefixes. The licensing status of the site determines the phonological shape of the prefixes (Lahrouchi 2018)

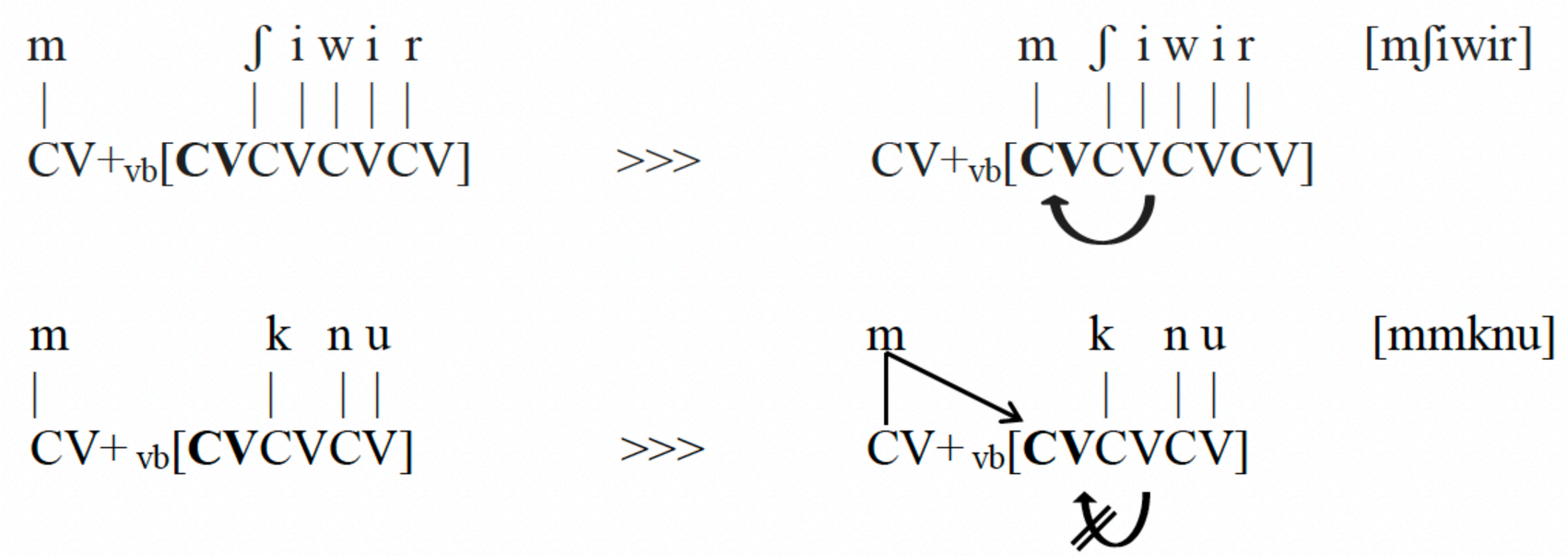
	Verb	Causative	
a.	mun	smun	'accompany'
	gawr	sgawr	'sit down'
	gngr	sgngr	'dislocate’
b.	nkr	ssnkr	'wake up'
	lkm	sslkm	'arrive'
	knu	ssknu	'lean'
	awz	zziwz	'disturb'

	Verb	Reciprocal	
a.	ʕawn	mʕiwin	'help'
	ħada	mħidi	'be alongside'
	gabl	ngibil	'watch over'
b.	knu	mmknu	'lean'
	zri	mmzri	'pass'
	ddu	mmuddu	'go'
	ns	mmnsu	'spend the night'

Templates

initial CV

- The variation in the shape of the **reciprocal** prefix results from the use of the initial site through two distinct operations: *spreading* and *movement*



Templates

initial CV

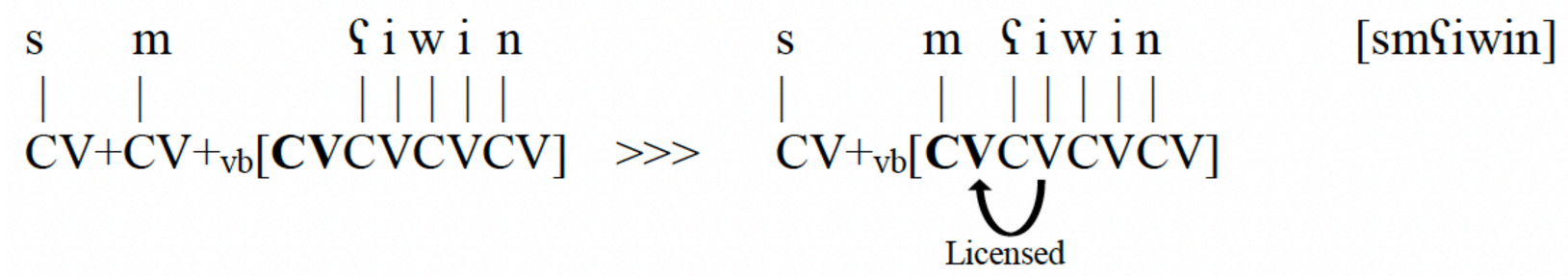
- Complex combinations of prefixes:

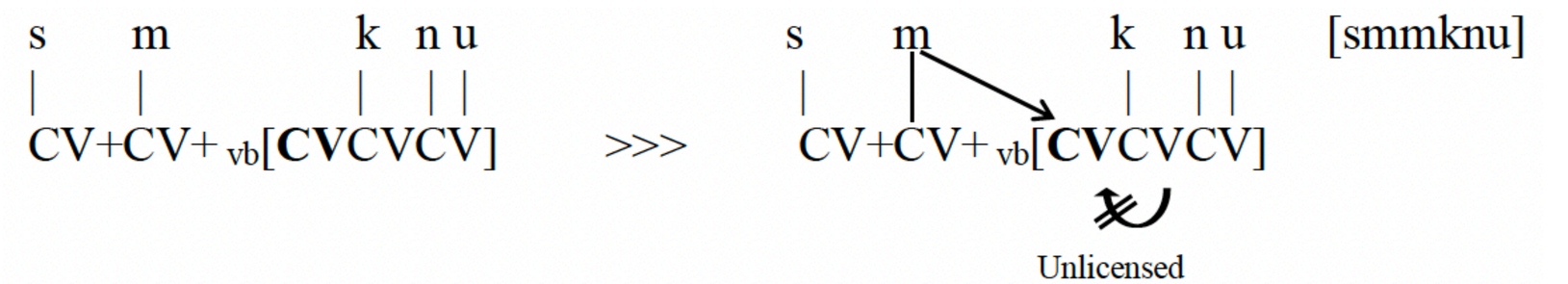
	Verb	*Reciprocal*	*Causative + Reciprocal*	
a.	knu	mmknu	smmknu	‘make (them) lean mutually’
	rwi	mmrwi	smmrwi	‘make soil each other’
	dru	mmdru	smmdru	‘make each other share meal’
	kʷti	mmkʷti	smmkʷti	‘make each other recall’
b.	ʕawn	mʕiwin	smʕiwin	‘make help mutually’
	ħada	mħidi	smħidi	‘make close to each other’
	gabl	ngibil	sngibil	‘make each other face’
	fhm	nfihim	snfihim	‘make each other understand’

Templates

initial CV

- Complex combinations of prefixes: only the inner prefix varies in length.
    - why? because it has access (locally adjacent) to the initial CV





Templates

initial CV

- Jebbour 1999

Type of base	Number of μ	Selected prefix		Examples
O**V**	1	ss-	*nu*	*ss-nu*
O**C**	1	ss-	*ɣr*	*ss-ɣr*
O**V**C	2	s-	*mun*	*s-mun*
O**V**.O**V**	2	s-	*ħidi*	*s-ħidi*
O**V**C.O**V**	3	s-	*gusmu*	*s-gusmu*

etc.

The obvious explanation then is given in (9):

The causative prefix is
i. geminated [ss-] if it is adjoined to a monomoraic base.
ii. simple [s-] if it is adjoined to a polymoraic base.

Templates

Hypocoristics

- The truncated form contains at most 2 syllables (1 foot).
- Feet are maximally binary at the syllabic or moraic level.
- Hypocoristics in French anchor left by default (right-anchor in Elisabeth > Zabeth).

a.	ʃaʁlɔt mikaɛl gabrijɛl	ʃaʃa mika gabi	Charlotte Michael Gabriel	2σ, 2μ
b.	viktwaʁ kχistjɑ̃ fχederik	vik kχis fχɛd	Victoire Christian Fréderique	1σ, 2μ
c.	florɑ̃s joana klod	flo dʒo klo	Florence Joanna Claude	1σ, 1μ

Templates

Hypocoristics

Nelson (1998), constraints:

a. ANCHOR LEFTBT: Anchor L(Trunc, Base). The left edge of the truncated form must correspond to the left edge of the base.

b. ANCHOR RIGHTBT: Anchor R(Trunc, Base). The right edge of the truncated form must correspond to the right edge of the base.

c. CONTIGUITY: The portion of the base standing in correspondence forms a contiguous string, as does the correspondent portion of the truncated form.! (McCarthy &Prince 1994)

d. ONSET: *σ[V (Itô 1989)

e. NO CODA: *...C] σ

f. MAX BT: Every segment of the base form must correspond to a member of the truncated form.

Ranking: CONTIGUITY » ONSET » ANCHOR LEFTBT » !ANCHOR RIGHTBT » NO CODA » MAXBT

Templates

Hypocoristics

Input: do.ro.te	Onset	Anchor Left	Anchor Right	NoCoda	MAXBT
a. ☞ doro			*		te
b. dorot			*	*!	e
c. rote		*!			do

Templates

Hypocoristics

Input: e.li.za.bet	Onset	Contig	Anchor Left	Anchor Right	No Coda	MAXBT
a. ☞ zabet			*		*	eli
b. zabe			*	*!		eli,t
c. liza			*	*!		e,bet
d. eli	*!			*		zabet
e. ebet	*!	*			*	liza

Templates

Hypocoristics

- **Weight-by-Position** (Hayes 1989: 258): "prevocalic consonants must be parsed as non-moraic onset elements and thus can never receive weight by position".
- Coda consonant may or not count in weight calculation, onsets never count (e.g. Lardil where a CVC syllable counts as light, Hayes 1989: 255, Hyman 1985: 8).

Counterexamples

- (initial) geminates can be moraic in languages such as Turkese and Pattani Malay (see Topinzi 2008, 2010, 2011).
- Complex onsets can affect weight in quantitative meter (Ryan 2014).
- French hypocoristics (Lahrouchi 2022).

Templates

Hypocoristics

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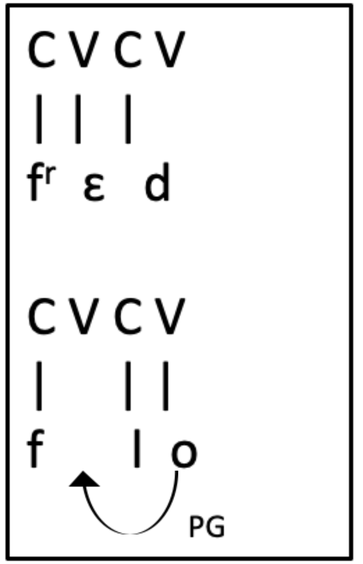
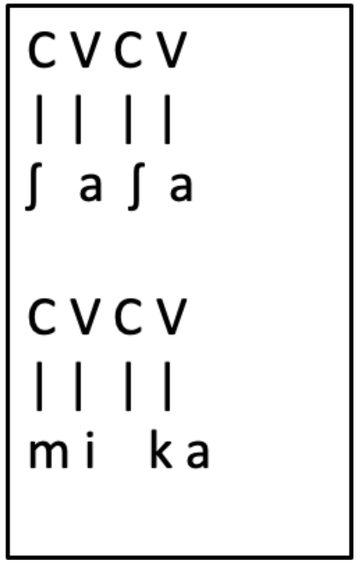
Templates

Hypocoristics

Lahrouchi (2022), Minimality, weight and melodic content: The view from French and Berber hypocoristics. *Radical: A Journal of Phonology* 3: 1-44.





- The minimum size template which French hypocoristics display consists of two CV units.
- **CVCV** is the minimal domain where Proper Government holds (Kaye et al. 1990, Lowenstamm 1996, Scheer 2004).

Templates

Hypocoristics

Tashlhiyt (Lahrouchi 2022)

- Any segment can be syllabic in Tashlhiyt Berber.
- Ungoverned V slots host syllabic consonants.

a.	brahim	bihi	2σ, 2μ
	ʕbdˤollah	ʕabd	
	fadˤna	fadˤn	
b.	muħmmad	muħ	1σ, 2μ
	ʕiʃa	ʕiʃ	
	lħusajn	ħus	
c.	blʕid	blʕ	1σ, 2μ
	ʕbdˤollah	ʕbl	
	blqasm	blq