

Your Roots Are Showing: On Root-Sensitive Allomorphy in Arabic*

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1 Introduction

Big Picture: When are roots visible for {conditioning, undergoing} allomorphy relative to other syntactic elements?

Three common hypotheses:

- (1) The **INSIDE-OUT HYPOTHESIS**:
Allomorphy is determined starting with the most deeply-embedded node and with {no, principally restricted} access to information from outer elements.¹
- (2) The **ADJACENCY HYPOTHESIS**:
Allomorphy is only possible with elements that are directly {adjacent, concatenated}.²
- (3) The **ACTIVITY HYPOTHESIS**:
Elements in the syntax are not visible for computation of allomorphy after certain points in the derivation.³

Today, two cases of allomorphy {involving, conditioned by} roots in Arabic which show that there can be only one cyclic head between the root and T.

- Important given the proposal (Embick, 2010) that allomorphic visibility can skip one, but not two, cyclic heads.⁴
- Two more cases like Embick's (2010:ch.2) treatment of English past tense.
- Important given recent claims that *voi* and *v* are distinctly present in the syntax — should they both be cyclic?⁵
- In order to preserve (3), we need to admit that *x*'s are not cyclic.
- *Secondarily*: can we model stem allomorphy with root lexical insertion?

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1. See Carstairs (1987); Bobaljik (2000); and Embick (2010) for modern instantiations, but this idea is quite old.

2. This is an idea that has risen to prominence since the work of Embick (2003; 2010).

3. See Marantz (1997); Arad (2003; 2005); Embick & Marantz (2008); Embick (2010); and Deal & Wolf (2013), among others.

4. Under the right circumstances, which are tantamount to linear adjacency with no non-null intervening material. See Embick (2010:ch.2).

5. See, for instance, Harley (2007; 2010; 2012); Merchant (2013); Legate (2014); and Kastner (2015a;b); among many others. The only explicit discussion I know about the cyclic status of these heads is in Embick (2010:§3.2.2.1), where it is assumed by hypothesis that *v* is cyclic and *voi* is not.

Road Map:

1. Outline of assumed morphosyntax (§2)
2. Case Study #1: Weak Roots (§3)
3. Case Study #2: Deverbal Nominalizations (§4)
4. Architecture & Theory (§5)
5. Conclusions, *etc.* (§6)

2 Clausal Structure

Presumed Arabic clausal structure in Figure 1.⁶

- Here: following Tucker (2011b); Wallace (2013); and Kastner (2015a;b).

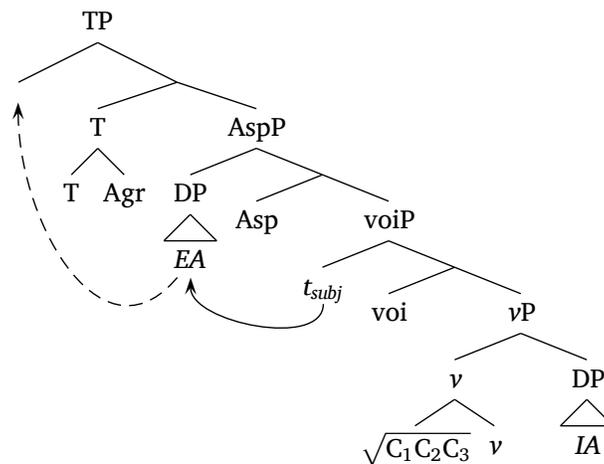


Figure 1: Clausal Architecture for Arabic

Some important assumptions (mostly from Tucker, 2011b):

- Verb/root always moves at least to T via syntactic head movement.
- External argument originates in [Spec,voiP] and always raises at least to [Spec,AspP].
- Optional [EPP] moves EA to [Spec,TP] and derives SVO from VSO word order (both possible).
- Head movement creates suffixation (for simplicity).
- v and voi are the only possible cyclic heads in this structure.⁷

(4) Post-syntax for Figure 1:

a. Output of Syntax:

$[_T [_{Asp} [_{voi} [v \sqrt{C_1 C_2 C_3} v] voi] Asp] T]$

b. Adjacency Relations: $[[[[\sqrt{C_1 C_2 C_3} * v] * voi] * Asp] * T]$

6. In this handout I use the following abbreviations of note: 1/2/3 = 1/2/3 person, SG/PL = singular/plural number, M/F = masculine/feminine gender, NOM/ACC/DAT/GEN = nominative/accusative/dative/genitive case, AP = active participle, PP = passive participle, VN = verbal noun, PASS = passive voice, PERF = perfective aspect, IMPF = imperfective aspect, VOC = vocative particle., EA = external argument, and IA = internal argument.

7. For my purposes today it doesn't matter whether all voice heads are cyclic or only those which introduce an external argument (Legate, 2003 versus Chomsky, 2000; 2001b). It can be shown that there are transitive verbs that whose roots participate in the allomorphic alternations under discussion here. For simplicity of exposition, I will assume all voi heads are possibly cyclic.

Question: Where does the nonconcatenative templatic morphology come from?

- Output of linearization undergoes Vocabulary Insertion in the usual way (see below).
- VI delivers unpronounceable structures consisting of nonsense such as /a:kʔb/.
- Prosodic concerns force this nonsense to be re-linearized by your favorite prosodic theory.⁸

Morphophonological Exponence: the Arabic verb is usually thought of as having four parts:

1. The CONSONANTAL ROOT
2. The VOCALISM — here, *all* the vowels (Kastner, 2015a)
3. The CV-TEMPLATE — complete list of verbal templates for verbs in Table 2 in the appendix.⁹
4. The AGREEMENT {suffixes, circumfixes}

Here, these four components come from four distinct places in the morphosyntax:

1. The syntactic $\sqrt{\text{ROOT}}$ gives $C_1C_2(C_3(C_4))$
2. The vowels are a function of *voi*, conditioned by T/Asp & $v/\sqrt{\text{ROOT}}$
3. The combination of *voi* + $v + \sqrt{\text{ROOT}}$ yields the CV-template, which is not a morpheme *sui generis*.¹⁰
4. The agreement affixes are an expression of a DISSOCIATED Agr morpheme inserted at VI.¹¹
5. Asp is null in everything to be considered today, so I will ignore it.¹²

Motivating vowels in *voi*: Arabic has a /u...X/ passive:¹³

(5) Vocalic Passives in MSA:¹⁴

- a. **fataħ**-tu l-ba:b-a.
opened-1.SG.M the-door-ACC

“I opened the door”

(Ryding, 2005:658)

- b. **futiħ**-a l-ba:b-u bi-ha:ða: l-mifta:h-i.
opened.PASS-3.SG.M the-door-NOM with-this the-key-GEN

“The door was opened by/with this key.”

(Ryding, 2005:659)

3 Case #1: Weak Roots

First test case: WEAK ROOTS in Arabic: roots with a glide in one of the three consonantal positions.

3.1 Classificational Considerations

Broadly: Weak roots fall into three classes based upon where the glide appears in the root, with different realizations of the glide conditioned in part by the position of the glide in the root:

(6) ASSIMILATED Roots: $C_1 = \{j, w\}$

- a. $\sqrt{ws^f l}$: *was^fal*, “he arrives”; *ittas^fal*, “he joins” (cf. *ettis^falat*, “telecom”); *s^fila*, “junction”
- b. \sqrt{jsr} : *jasar*, “he became easy”; *masara*, “left side”; *jusir*, “he had it easy”

8. See Tucker (2011c;a); and Tucker (2011b) for specific proposals about Iraqi and Modern Standard Arabic; Wallace (2013) for more Arabic and Akkadian; and Kastner (2015a) for Hebrew.

9. I will refer to the CV-pattern by the Western numbering system (I–X), where reference to a particular template is necessary.

10. This is an idea *contra* early approaches like that in McCarthy (1979; 1981), inspired by Ussishkin (2000; 2005). See Tucker (2011b;c); Wallace (2013); and Kastner (2015a) for instantiations with the particular morpheme inventory espoused here.

11. For the terminology and idea here, see Embick (1997).

12. Asp is arguably not null in some of the spoken varieties of Arabic and is relevant for hosting verb raising in the syntax, so it is present, just not particularly interesting for allomorphy. See Tucker (2011b).

13. The relevance of this for placing the vowels in *voi* is discussed in Tucker (2011b); cf. also the discussion of Hebrew *pu'al* in Kastner (2015a).

14. Today I will confine myself to Modern Standard Arabic (MSA), drawing mainly from Ryding (2005), supplemented by judgments of Arabs with training in either linguistics or MSA directly. I believe these conclusions can be replicated in various dialects, and that project is underway for Palestinian at present.

(7) HOLLOW Roots: $C_2 = \{j, w\}$

- a. \sqrt{qwl} : *qal*, “he said”; *qul-tu*, “I said”; *maqul*, “(a) saying”; *taqawwal*, “rumor”
- b. $\sqrt{\text{ʕj}}$: *ʕaf*, “he lived”; *ja-ʕif*, “he lives”; *muʕajafa*, “coexistence”; *ʕajjaʕ*, “bread seller (archaic)”

(8) DEFECTIVE Roots: Roots: $C_3 = \{j, w\}$

- a. \sqrt{bdw} : *bada*, “he appeared”; *ja-bdu*, “he appears”; *badawi*, “Bedouin (adj.)”
- b. \sqrt{nsj} : *nasij(-a)*, “he forgot”; *ja-nsa*, “he forgets”; *nasij*, “forgetful”

Some important extras:

- Often times, there are more roots with /w/ than /j/; ask me about this.
- There are correlates of many of these roots in all the spoken varieties of Arabic.
- **These roots are not an insignificant minority of the lexicon.**
 - 1400 roots contain /w/, 1369 contain /j/, 139 have both.
 - 9551 roots in total; overall weak root prevalence is ~27.5% of the lexicon.¹⁵

3.2 A Few Easy Pieces

The Beauty of Kastner (2015a): A lot of these cases fall into sharp focus.

Hollow Roots have alternations where the glide comes and goes based on the CV-template:

- In Form I, the glide surfaces as a long vowel whose identity (a:/i:/u:) is determined by the root.
- In some the other patterns, the “underlying” glide surfaces instead (9).
- Some of the “derivational” patterns also have a long vowel — /a:/ or /i:/ (10).

(9) Disappearing-Reappearing Glides

- a. $\sqrt{\text{ʕj}}$: *ʕaf*, “he lived” (I) → *ʕajjaʕ*, “he kept (s.o.) alive” (II)
- b. \sqrt{qwl} : *qal*, “he said” (I) → *qarwal*, “he negotiated” (III)
- c. $\sqrt{t^f w f}$: *t^f a f*, “he obeyed” (I) → *tat^f awwaʕ*, “he volunteered” (V)
- d. $\sqrt{\text{ʕj}}$: *ʕaf*, “he lived” (I) → *taʕajjaʕ*, “he coexisted” (VI)

(10) Long Vowels for Glides

- a. \sqrt{dwr} : *dar*, “he turned (i.)” (I) → *ʔadar*, “he managed” (IV); cf. *dawwar*, “he turned (tr.)”
- b. \sqrt{hwr} : *har*, “he destroyed” (I) → *ʔmhar*, “he collapsed” (VII); cf. *tahawwur*, “recklessness”
- c. \sqrt{hwdz} : *ʔahwadz*, “he needed” (IV) → *ʔihtadz*, “he needed” (VIII)
- d. $\sqrt{t^f w f}$: *t^f a f*, “he obeyed” (I) → *ʔistat^f a f*, “he was able” (X); cf. (9c)

Moreover, root specificity is present; certain roots do not participate in (10), though they “should”:¹⁶

(11) Exceptional Roots vis-à-vis (10)

- a. \sqrt{zwdz} : *ʔzdwadz*, “he doubled, paired” (**ʔzda:dz*)
- b. \sqrt{hwj} : *ʔhtawa*, “he contained” (**ʔhta:/ʔhta:j*)

⇒ This is the interaction of the root and v — glides disappear in the context of particular v 's.

Tense/Aspect matters, too: in form I, the glide surfaces invariably as /a:/ in the perfective:

(12) Glide and Vowel Alternation Leveling in Perfective Hollow Verbs:

- a. $\sqrt{\text{ʕj}}$: *ʕaf* (**ʕif*), “he lived” → *ja-ʕif*, “he lives”
- b. \sqrt{qwl} : *qal* (**qu:l*), “he said” → *ja-qu:l*, “he says”

15. These counts were generated with `grep` from the MSA corpus constructed for Habash & Rambow (2006) without removal of duplicate roots, so this count is likely on the high end. Thanks to Nizar Habash for generously making this list available to me.

16. See also Ryding (2005:569).

However, the quality of this long vowel in Form I shows root specificity:

- Roots with /w/ typically show /u:/ and roots with /j/ typically show /i:/.
- However, some roots atypically take /a:/, even when they have a glide underlyingly.¹⁷

(13) Hollow Root-specific Vowel Quality:

- $\sqrt{\text{zwr}}$: *zar*, “he visited” → *ja-zur*, “he visits” (**ja-zir*, **ja-zar*)
- $\sqrt{\text{bjf}}$: *baʔ*, “he sold” → *ja-biʔ*, “he sells” (**ja-burʔ*, **ja-baʔ*)
- $\sqrt{\text{nwm}}$: *nam*, “he slept” → *ja-nam*, “he sleeps” (**ja-num*, **ja-nim*)
- $\sqrt{\text{njl}}$: *naʔ*, “he obtained” → *ja-naʔ*, “he obtains” (**ja-niʔ*, **ja-nuʔ*)

⇒ voi’s form mediated by the root: members of the hollow root class trifurcate into inflectional classes.

The Agr component of Tense also matters in determining the stem vowel. Table 1 shows a typical paradigm in the perfect.

- The *length* of the vowel *could* be prosodic: a short vowel appears with C-initial inflectional suffixes.
- *However*, the *quality* of the vowel is only predictable from the root.
- There is, e.g., no general process that reduces /a:/ → /u/ / _ +C.
- The language-wide epenthetic is /i/ or /ɪ/; the morphological default (if any exists) is /a/.¹⁸
- Moreover, there are roots that take /i/: *biʔ-tu*, “I sold” ($\sqrt{\text{bf}}$).

PERS/GEN	NUMBER		
	Singular	Dual	Plural
1	<i>zur-tu</i>	<i>zur-na:</i>	<i>zur-na:</i>
2.Masc	<i>zur-ta</i>	<i>zur-tuma</i>	<i>zur-tum</i>
2.Fem	<i>zur-ti</i>	<i>zur-tuma</i>	<i>zur-tunna</i>
3.Masc	<i>zar-a</i>	<i>zar-a:</i>	<i>zar-u</i>
3.Fem	<i>zar-at</i>	<i>zur-na</i>	<i>zar-u</i>

Table 1: Inflection of *zar*, “he visited” in the perfect.

⇒ This is the interaction of T and voi — stem vowels level to /a:/ in the context of perfective T.

Question: why does this work?

- Placing the vowels in voi splits them across cyclic domains by a combination of adjacency relations.
- voi is *adjacent* to the $v/\sqrt{\text{ROOT}}$ complex since it is in a lower domain.
- But voi is *also adjacent* to T/Agr because of the latter’s selection of voiP.
- voi is an *intermediary* for relations between T and the root at a distance by the placement of stem-internal vowels in voi.

3.3 A Few More Interesting Pieces

Defective Verbs have disappearing/reappearing glides based on CV-pattern, too:

(14) Defective Glides Modulated by CV-pattern:

- $\sqrt{\text{ynj}}$: *yanij-at*, “she was rich” (I) → *yann-at*, “she sung” (II)
- $\sqrt{\text{fnj}}$: *fanij-at*, “she meant” (I) → *fan-at*, “she endured” (III)
- $\sqrt{\text{nsj}}$: *nasij-at*, “she forgot” (I) → *?ans-at*, “she caused (s.o.) to forget” (IV)

17. Interestingly, many of these syncretize with the more well-behaved hollow roots in many of the dialects. Thus one will find *ji-num* for (13). This does not affect the main point here, however.

18. For the epenthetic /i/ or /ɪ/, see any work on Arabic prosodic phonology (e.g., Watson, 2002), but a core observation is that the initial /ʔi/ in forms VII, VIII, IX, and X disappears with an overt prefix; treatments of this initial /ʔi/ as epenthetic go back as far as McCarthy (1979; 1981). For the possibly disputable claim that a morphological default exists and is distinct from the prosodic epenthetic vowel, see Ussishkin (2000; 2005).

- d. $\sqrt{qd^fij}$: *qad^fij-at*, “she concluded” (I) → *?mqad^f-at*, “she expired” (VII)
 e. \sqrt{lqj} : *laqij-a*, “he met/encountered” (I) → *iltaqa:*, “he met/encountered” (VIII)
 f. $\sqrt{\theta nj}$: *\theta anij-a*, “he draped” (I) → *?ista\theta na:*, “he excluded” (X)

Moreover, the appearance of the glide is (morpho-)phonologically related to the agreement affix involved:

- In the perfective, the glide surfaces...
- ...but is only retained when the following suffix is V-initial (VG+C → V:+C).
- In the imperfective, this glide is universally lost in favor of a long vowel (usually /a:/ or /i:/).

(15) Defective Glides Mediated by T/Agr/Asp

- a. \sqrt{nsj} : *nasij-a*, “he forgot” (PERF) → *ja-nsa:* (IMPF)
 b. \sqrt{wlj} : *walij-a*, “he followed” (PERF) → *ja-li:* (IMPF)

However: this process is root-conditioned; *not all defective verbs do this:*

(16) Defective Verbs with No Glides:

- a. $\sqrt{s\ddot{f}j}$: *sa\ddot{f}a:*, “he strived” (**sa\ddot{f}aj-a*, **sa\ddot{f}ij-a*)
 b. \sqrt{bnj} : *ba\ddot{n}a:*, “he built” (**ba\ddot{n}aj-a*, **ba\ddot{n}ij-a*)
 c. \sqrt{kfj} : *kafa:*, “he was sufficient” (**kafaj-a*, **kafij-a*)
 d. \sqrt{mj} : *ma\ddot{f}a:*, “he walked” (**ma\ddot{f}aj-a*, **ma\ddot{f}ij-a*)

Assimilated Verbs also do this, but on the other end of the root.

- Again, the presence/absence of the glide is mediated by *v/voi* (17):

(17) Assimilated Glides Appearing by CV-Pattern:

- a. $\sqrt{wq\ddot{f}}$: *ja-qa\ddot{f}a*, “he drops” (I) → *ju-waq\ddot{f}i\ddot{f}*, “he endorses” (II)
 b. $\sqrt{w\ddot{f}q}$: *ja-^fi\ddot{f}q*, “he is in accordance with” (I) → *ju-wa\ddot{f}i\ddot{f}q*, “he agrees (w/)” (III)
 c. $\sqrt{jqt^f}$: *ja-qat^f*, “he is watchful” (I) → *ja-stajqit^f*, “he wakes up” (X)

(18) Assimilated Glides Missing by CV-Pattern:¹⁹

- a. $\sqrt{wd^f\ddot{h}}$: *ja-d^f\ddot{h}*, “he becomes clear” (I) → *ju-d^f\ddot{h}*, “he explains” (IV)
 b. $\sqrt{wh\ddot{d}}$: *ja-hid*, “he is unique” (I) → *ja-tti\ddot{h}ad*, “he is unified” (VIII)²⁰

And here, too, this process is root specific (for form I)

- Ryding (2005:460) even claims /j/ never assimilates in this fashion.

(19) Exceptional Non-Assimilating Assimilated Roots:

- a. $\sqrt{wd\ddot{z}f}$: *ja-wd\ddot{z}a\ddot{f}*, “he hurts” (**ja-d\ddot{z}a\ddot{f}a*)
 b. \sqrt{wd} : *ja-wadd*, “he likes” (**ja-wadd*)
 c. $\sqrt{ws\ddot{f}}$: *ja-wsu\ddot{f}*, “he is wide” (**ja-su\ddot{f}*)
 d. \sqrt{jsr} : *ja-jsir*, “he is easy” (**ja-sir*)
 e. $\sqrt{jqt^f}$: *ja-jqat^f*, “he wakes up” (cf. (17c))

Roots which do lose the glide also differentially lose it *based upon tense/aspect:*

- This entails direct interaction between T and the $\sqrt{\text{ROOT}}$.

(20) Tense-Conditioned Glide Assimilation:

- a. $\sqrt{ws^f\ddot{l}}$: *was^f\ddot{a}l*, “he arrived” (PERF) → *ja-s^f\ddot{i}l* (IMPF)
 b. \sqrt{wzn} : *wazan*, “he weighed” (PERF) → *ja-zin* (IMPF)
 c. $\sqrt{wd^f\ddot{a}f}$: *wad^f\ddot{a}f*, “he put” (PERF) → *ja-d^f\ddot{a}f* (IMPF)
 d. $\sqrt{wd\ddot{z}b}$: *wad\ddot{z}ab*, “he was necessary” (PERF) → *ja-d\ddot{z}ib* (IMPF)
 e. $\sqrt{wq\ddot{f}}$: *waqa\ddot{f}*, “he fell” (PERF) → *ja-qa\ddot{f}* (IMPF)

19. As far as I am aware, there are no glide-initial roots in Form VII; I am unsure whether this is meaningful or a lexical accident.

20. For the fans of Manchester City FC, cf. *al-etti\ddot{h}ad*.

Some important details:

- This isn't pure phonology; the exact phonemic sequences are licit — *cf.* (14–15) and (19).²¹
- There are psycholinguistic reasons to include the glide in the root:
 - Forms with the glide prime forms without and *vice-versa* (Frost *et al.*, 2000; Boudelaa & Marslen-Wilson, 2004 and Almeida, Idrissi, Schluter, and Tucker, *in prep.*).
 - Prunet, B eland, & Idrissi's (2000; 2008) aphasic can reconstruct them under metathesis.
- The glide alternations *all occur in the same pattern/voice*.
 - \implies T/Asp is controlling a root *consonant* alternation.
 - Unlike hollow verbs, this is about more than just vowels, but consonants *qua* root members.

Secondarily: Add to a growing body of literature supporting root vocabulary insertion.²²

- We treat weak roots as root allomorphy — this is already the treatment of Semitic inflectional classes in Kastner (2015a).
- An open question: is there a hard line between root allomorphy and root suppletion?

Weak roots involve visibility of T at the root (over *voi* and *v*).

4 Case #2: Nominalizations

Second Test Case: DEVERBAL NOMINALIZATIONS in Arabic

- Definitionally, nominals with enough verbal syntax to be the product of verbal syntax (*e.g.*, *voiP*).
- Simplest option assumed in Figure 2.

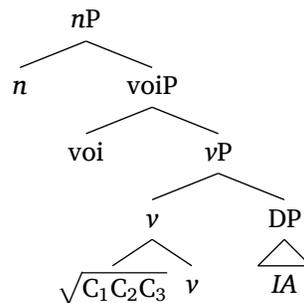


Figure 2: Nominalization Syntax for Arabic Deverbal Nominalizations

(21) Post-syntax for Figure 2

a. Output of Syntax:

$[_{nP} [_{voiP} [_{v} \sqrt{C_1 C_2 C_3} v] voi] n]$

b. Adjacency Relations:

$[[[\sqrt{C_1 C_2 C_3} * v] * voi] * n]$

4.1 Which Nominalizations?

Descriptive Arabic grammar groups nominalizations by CV-pattern.

- Three categories: ACTIVE PARTICIPLES (AP), PASSIVE PARTICIPLES (PP), and VERBAL NOUNS (VN).
- These classes cross-cut whether the nominals in question have verbal syntax or not.
- Complete list in Table 3 in the appendix.

21. This is also important because it is unclear if this is still true of many of the spoken varieties, where these verbs have been reanalyzed as vowel-final or vowel-initial (Watson, 2002:6.5).

22. See Haugen & Siddiqi (2013); Harley (2014); and references therein/replies thereto.

Interest here is not in these classes *per se*, but in members of these morphological classes which are deverbal nominalizations.

- They have regular form and meaning relationships to underlying verbs.²³
- Additionally:

They can assign accusative case (22):²⁴

(22) Nominal Assignment of Accusative Case:

xila:la **stiqla:l-i-hi** ?amsi **wafd-an** min ?a:ha:li: l-mafqu:d-i:na ...
 during **meeting-GEN-his** yesterday **delegation-ACC** of families the-missing-GEN

“During his meeting yesterday of a delegation of families of the missing...” (Ryding, 2005:82)

They can appear *in lieu* of infinitives/gerunds (23).

(23) Nominal “Infinitives” in MSA:

ħa:wal-at sufa:d **kasr-a** l-taqli:d-i.
 tried-3.F.SG Souad **breaking-ACC** the-tradition-GEN

“Souad tried breaking/to break tradition.”

Where a verb imposes C-selection on a prepositional complement, the VN does too (24).

(24) C-Selection by Underlying Verbs:

- a. li-l-fawz **bi-l-ri?a:sat** / fa:z-a **bi-X**
 in.order.to-the-win **in-the-presidency** / win-3.M.SG **in-X**
 “In order to win the presidency / he won X.”

- b. taħwi:l l-hulm **?ila: haqi:qat** / ħawwal-a **X ?ila: Y**
 transforming the-dream **into** reality / transform-3.M.SG **X into Y**
 “Transforming the dream into reality / he transformed X”

They can be modified by adverbials (*cf.* also (22)).

(25) Adverbial Modification of Nominalizations:

taħaddaθ-a ?ana **dara:sat-i-hi** li-luya-t al-ʕarabijja **ju:mijan.**
 speak-3.M.SG.PERF about **study-GEN-his** DAT-language-GEN the-arabic **daily**

“He spoke about his daily study of Arabic.”

They are commonly used as verbs, esp. in the dialects (26)

(26) Participles as Main Verbs in Dialectal Arabic:

- a. ?ana: **labsa** mala:bis ʕaskarijja.
 I **wear** clothing military
 “I am wearing military clothing.”
- b. ja:-ʕa:li:, **lazim** ti-ʕtara: ʕalima emira:ti!
 VOC-Ali, **need** 2.M.SG-buy flag Emirati
 “Ali, you need to buy an Emirati flag!”

23. This is amply documented in any grammar of Arabic. For the variety under discussion today, see Ryding (2005). For clear generative discussion inside Semitic, the work of Arad (2003; 2005) and Doron (1999; 2003) is indispensable.

24. But *cf.*, Siloni (1997) and Baker & Vinokurova (2009).

4.2 Morphological Considerations

Vowels in derived nominalizations are different from those in the underlying verbs:

- See Table 3, where the second stem vowel in active participles is often /i/ regardless of the underlying verb's second vowel.
- (27) gives examples of this vowel change in VNs...

(27) Nominal Vowel Change — VNs:

- $\sqrt{\text{brk}}$: *ja-bruk*, “he praises” → *baraka*, “blessing” (I-VN)
- $\sqrt{\text{sbh}}$: *ja-sbaħ*, “he swims” → *sibaħa*, “swimming” (I-VN)
- $\sqrt{\text{swj}}$: *ju-sawwi*, “he is equal” → *taswiya*, “equalization” (II-VN)
- $\sqrt{\text{dff}}$: *ju-daʔfi*, “he defends” → *difaʔ*, “defense” (III-VN)
- $\sqrt{\text{s}^{\text{dr}}}$: *ju-fʔil*, “he sends out” → *ʔisʔdar*, “exportation” (IV-VN)
- $\sqrt{\text{ʔxr}}$: *ja-taʔaxxar*, “he is late” → *taʔaxxur*, “delay” (V-VN)
- $\sqrt{\text{nfs}}$: *ja-tanaʔfas*, “he rivals” → *tanaʔfus*, “rivalry” (VI-VN)

Descriptively, the pattern situation in the Form I VN is a complete mess.

- CV-template is idiosyncratic and root-specific.
- Wright (1889:110-112) lists 44 CV-templates (though for him vowels are distinct).
- These CV-changes can delete or augment vowels (28).

(28) Varying Forms in Nominalizations:

- $\sqrt{\text{d}^{\text{sm}}}$: *daʔam*, “he supported” → *daʔm*, “support” (C₁VC₂C₃)
- $\sqrt{\text{fkr}}$: *fakar*, “he reflected” → *fikr*, “thinking” (C₁VC₂C₃)
- $\sqrt{\text{hd}^{\text{r}}}$: *ħadar*, “he was present” → *ħudʔur*, “attendance” (C₁VC₂V:C₃)
- $\sqrt{\text{df}^{\text{r}}}$: *daffaʔ*, “he heated” → *tadfiʔa*, “heating” (tVC₁C₂VC₃V)
- $\sqrt{\text{yjr}}$: *yajjar*, “he changed” → *tayjir*, “change” (tVC₁C₂V:C₃)

Tying things together: What is the interaction of weak roots and nominalizations?

- Here, too, root specificity is at play.
- Defective roots take a phonologically inexplicable /n/ in certain active participles.

(29) Inexplicable Nunation on Defective APs:

- $\sqrt{\text{mj}}$: *maʔim*, “walking” (**maʔi*; I-AP)
- $\sqrt{\text{bj}}$: *baʔin*, “remaining” (**baʔi*; I-AP)
- $\sqrt{\text{s}^{\text{lj}}}$: *musʔallin*, “praying” (**musʔalli*; II-AP)
- $\sqrt{\text{ʔt}^{\text{lj}}}$: *muʔtʔin*, “giving” (**muʔtʔi*; IV-AP)
- $\sqrt{\text{mnj}}$: *tamannin*, “wishing” (**tamanni*; V-AP)
- $\sqrt{\text{hwj}}$: *muħtawin*, “containing” (**muħtawi*; VII-AP)

Nominalizations involve visibility of the root at *n* (over *voi* and *v*).

5 Theoretical Considerations

5.1 It's Not Readjustment

It's formally straightforward to do both of these cases with READJUSTMENT RULES.²⁵

- Weak roots involve readjustment to delete /j/ or /w/ triggered by particular values of T, *v*, etc.
- Nominalizations involve readjustment to reshape {CV-template, vowelings}.

25. See Halle & Marantz (1993; 1994); and Embick (2010) for some discussion of readjustment. For critical discussion, see especially Haugen & Siddiqi (2013) and Merchant (2015).

But: For nominalizations, this becomes a free-for-all:

(30) Potential Nominalization Readjustment Rules - I-VN:

- a. $C_1VC_2VC_3 \rightarrow C_1uC_2C_3 / \{\sqrt{b\bar{\iota}d}, \sqrt{\bar{\iota}mr}, \dots\} \dots \sim n$
- b. $C_1VC_2VC_3 \rightarrow C_1iC_2C_3a / \{\sqrt{xbr}, \sqrt{hkm}, \dots\} \dots \sim n$
- c. $C_1VC_2VC_3 \rightarrow C_1uC_2u:C_3 / \{\sqrt{hd^r}, \sqrt{\bar{\iota}r}, \dots\} \dots \sim n$
- d. $C_1VC_2VC_3 \rightarrow C_1uC_2u:C_3a / \{\sqrt{bt^l}, \sqrt{mrm}, \dots\} \dots \sim n$
- e. $C_1VC_2VC_3 \rightarrow C_1uC_2C_3a:n / \{\sqrt{yfr}, \sqrt{fqd}, \dots\} \dots \sim n$
- f. $C_1VC_2VC_3 \rightarrow naC_1C_2iC_3 / \{\sqrt{nt^q}, \sqrt{\bar{\iota}rf}, \dots\} \dots \sim n$

It also *doesn't even solve the problem* if one assumes something like (31):²⁶

(31) READJUSTMENT ACTIVITY HYPOTHESIS:

A Readjustment Rule triggered by morpheme X can effect a Root- or morpheme-specific change only when X and the Root/functional head are in the same PF cycle.

Moreover: there is a bit of a *reductio* on what this would mean for readjustment in general:

- It's not clear that we want this kind of readjustment for $\frac{1}{4}$ of the Arabic lexicon.
- Part of a more general growing concern about the place of readjustment:

As Bobaljik (2012:140) refreshingly puts it, "In theory, there is a sharp division of labor between rules of exponence and readjustment rules. ...Of course, there is a difficult grey area for the analyst in establishing just where the boundary lies; alternations like many – mo-re could be treated formally as suppletion ...or as the output of a very powerful readjustment rule, rewriting the syllable rime." (Bobaljik himself eschews readjustment rules entirely in his analyses of comparatives. See also Haugen and Siddiqi 2013a for a critical discussion of the explanatory power of readjustment rules, and compare the unmincing condemnation in Bermúdez-Otero 2013:83: "DM [Distributed Morphology] routinely ...resort[s] to devices, like the unconstrained use of readjustment rules, that blur the line between allomorphy and phonology, and destroy the empirical content of the theory.") Without a criterion for deciding when a morphophonological readjustment rule is involved, and when simple allomorphy, the appeal to unspecified readjustment rules threatens to be no better than Justice Stewart's famous criterion for recognizing pornography ("I know it when I see it") and becomes subject to Stainton's (2006:107) criticism (of elliptical repair effects): it becomes a "get-out-of-counterexample-free card." (Merchant, 2015:282)

5.2 Cyclic Considerations

Instead: assume that one of {voi, v} is not cyclic for allomorphy:

- This will make the two relevant heads for allomorphy C and whichever of {voi, v} is cyclic.
- Reasons for voi as cyclic:
 - Original Chomsky (2000; 2001b; 2001a; 2008) argumentation
 - Reconstruction effects (Fox, 1999; 2000; Legate, 2003)
 - Austronesian pivot/extraction effects (Rackowski & Richards, 2005; Legate, 2014)
 - QR in ACD (Legate, 2003)
 - Parasitic gaps (Nissenbaum, 1998; Legate, 2003)
 - Den Dikken's (2006) predicate inversion
- Reasons for v as cyclic:
 - ...by hypothesis in Marantz (1997); Embick (2010) and earlier work.²⁷

Moreover: voi is the last head for which the exponence in Arabic is nonconcatenative:

- Before voi: the consonantal root, vowels, v (responsible for templatic shape)
- After voi: agreement circumfixes, aspectual particles, tense clitics, *etc.*²⁸

26. From Embick (2010:73).

27. The positive argument for x's as cyclic heads from Arad (2003; 2005), I take to be falsified by several of the papers presented at the USC Roots and subsequent work. See also Kramer (2009:322–323e) for discussion of how nP internal agreement relations might require n to not be cyclic.

28. One important addendum here is the treatment of the productive passive *ta-* seen in forms V-VI. These prefixes have the same productivity discussed for Hebrew in Doron (2003). We might take this prefix to be the exponence of a head Pass(ive) that merges above voi; see Doron (2003); Alexiadou & Doron (2012); Bruening (2012); Spathas *et al.* (2015); and Kastner (2015a) for more on this idea.

Categorizing heads (*v, n, a, etc.*) are not cyclic for the purposes of allomorphy.

5.3 Deriving Weak Verbs

Once we admit the visibility of the root at the TP level, a more vanilla option is available for weak roots: LOCAL DISLOCATION.²⁹

- T can dislocate around AspP to appear adjacent to the root.
- There is no cyclic domain in the complement of *voi* → no spell-out when *voi* is merged.
- Merger of cyclic C triggers spell-out of *voi*P's domain, which can now see the adjacent T.

(32) Structural Derivation for Weak Roots:

a. Output of Syntax:

$$[{}_T [{}_{Asp} [{}_{voi} [{}_v \sqrt{C_1 C_2 C_3} v] voi] Asp] T]$$

b. Initial Adjacency Relations:

$$[{}_T [{}_{Asp} [{}_{voi} [{}_v \sqrt{C_1 C_2 C_3} * v] * voi] * Asp] * T]$$

c. After Local Dislocation:

$$[{}_T T * [{}_{Asp} [{}_{voi} [{}_v \sqrt{C_1 C_2 C_3} * v] * voi] * Asp]]$$

d. Dissociated Insertion of Agr:

$$[{}_T [{}_T Agr * T] * [{}_{Asp} [{}_{voi} [{}_v \sqrt{C_1 C_2 C_3} * v] * voi] * Asp]]$$

For a pair like \sqrt{nsj} : *nasij-a*, “he forgot” (PERF) ~ *ja-nsa*: (IMPF):

- *voi* is responsible for *all* vowels that change under features of {*voi*, T, Asp}.
- The glide disappearance is mediated by adjacency of root to T.

(33) VIs for \sqrt{nsj}

- a. $\sqrt{nsj} \leftrightarrow /ns/ / T_{[IMPF]} _$
- b. $\sqrt{nsj} \leftrightarrow /nsj/ / ELSEWHERE$

(34) VIs for Relevant Portion of Agreement:

- a. $Agr_{[3.M.SG]} \leftrightarrow /-a/ / _ T_{[PERF]}$
- b. $Agr_{[3.M.SG]} \leftrightarrow /j-...-a/ / _ T_{[IMPF]}$

(35) VIs for Relevant Subsets of *voi*:

- a. $voi + v \leftrightarrow /ai/ \leftrightarrow / \{ \sqrt{nsj}, \sqrt{wlj}, \dots \} _ Asp_{[IMPF]}$
- b. $voi + v \leftrightarrow /a:/ \leftrightarrow / \{ \sqrt{nsj}, \sqrt{wlj}, \dots \} _ Asp_{[PERF]}$

5.4 Deriving Nominalizations

Once we admit the visibility of the root at the *n*P level, then we can also apply LOWERING to derive various nominals:

- Lowering of *n* to *voi* places *n* in a position to influence both *v* and be influenced by the root.
- Lowering creates a complex head; call it *nv*.³⁰

29. For more on this operation, see Embick & Noyer (2001); Embick (2007); and Kramer (2010); among others.

30. This result could also plausibly be achieved with FUSION, as well; see, e.g., Chung (2007). Notice that in this case, Fusion can be uniformly applied in Arabic; there aren't root-specific or morpheme-specific cases where Fusion would not apply. We therefore would not run afoul of the concerns raised in recent work that Fusion involves look-ahead (Neeleman & Szendrői, 2007; Caha, 2009; Radkevich, 2010; Haugen & Siddiqi, 2013; Merchant, 2015).

(36) Relevant Post-syntax for Nominalizations:

- a. Output of Syntax:
 $[_{nP} [_{voiP} [_{\nu} \sqrt{C_1 C_2 C_3} \nu] voi] n]$
- b. After Fusion:
 $[_{voiP} [_{\nu} \sqrt{C_1 C_2 C_3} \nu] nv]$
- c. Adjacency Relations:
 $[[\sqrt{C_1 C_2 C_3} * \nu] * nv]$

Consider the derivation of \sqrt{mj} : *mafi:n*, “walking” (< *mafi*, “he walked”):

- The crucial VI collection is the expression of *nv* (37).
- This is visible to both ν and the root.
- Similarly, ν can see *nv*, meaning that the CV-template is now alterable by the presence of *n*.

(37) Selected VIs for Nominalizations:

- a. $nv \leftrightarrow /ai:n/ / \{ \sqrt{mj}, \sqrt{s^l j}, \dots \} _$
- b. $nv \leftrightarrow /ai/ / \text{ELSEWHERE}$

6 Conclusions, etc.

Conclusions for Locality:

- If visibility for allomorphy runs to the second cyclic head, then nominalizations and weak roots in Arabic are more evidence for one cyclic head inside *voiP*.
- Roots must be sufficiently local to elements in the inflectional field (T, Asp, etc.).
- *Corollary*: There can be only one cyclic head between the root and T.
- “Morphology-only” cyclic heads (*x*’s) do more harm than good here.

Looking Forward:

- Did we ever really have evidence for the cyclicity of *x*’s?
- How general is this as a solution to paradigmatic classes in inflection (and derivation)?
- What relationship — if any — exists between syntactic and morphological cyclicity?

Appendix: Complete MSA Paradigms

<i>Number</i>	<i>Verb</i>	<i>Template</i>
I	<i>faʕal</i>	$C_1aC_2aC_3$
II	<i>faʕʕal</i>	$C_1aC_2C_2aC_3$
III	<i>faʕʕal</i>	$C_1a:C_2aC_3$
IV	<i>ʕafʕal</i>	$?aC_1C_2aC_3$
V	<i>tafaʕʕal</i>	$taC_1aC_2C_2aC_3$
VI	<i>tafaʕʕal</i>	$taC_1a:C_2aC_3$
VII	<i>nfaʕal</i>	$nC_1aC_2aC_3$
VIII	<i>ftaʕal</i>	$C_1taC_2aC_3$
IX	<i>fʕall</i>	$C_1C_2aC_3C_3$
X	<i>stafʕal</i>	$staC_1C_2aC_3$

Table 2: Perfective Active Derivational Verbs.

FORM	VERB	NOMINALS		
		VERBAL NOUN	ACT. PART.	PASS. PART.
I	<i>faʕal</i>	Varies	<i>faʕʕil</i>	<i>mafʕuʕl</i>
II	<i>faʕʕal</i>	Varies	<i>mufaʕʕil</i>	<i>mufaʕʕal</i>
III	<i>faʕʕal</i>	Varies	<i>mufaʕʕil</i>	<i>mufaʕʕal</i>
IV	<i>?afʕal</i>	<i>?ifʕaʕl</i>	<i>mufʕil</i>	<i>mufʕal</i>
V	<i>tafaʕʕal</i>	<i>tafaʕʕul</i>	<i>mutafaʕʕil</i>	<i>mutafaʕʕal</i>
VI	<i>tafaʕʕal</i>	<i>tafaʕʕul</i>	<i>mutafaʕʕil</i>	<i>mutafaʕʕal</i>
VII	<i>?mfaʕal</i>	<i>?mfiʕaʕl</i>	<i>munfaʕʕil</i>	<i>munfaʕʕal</i>
VIII	<i>?iftaʕal</i>	<i>?iftiʕaʕl</i>	<i>mufʕaʕil</i>	<i>mufʕaʕal</i>
IX	<i>fʕall</i>	<i>?ifʕilaʕl</i>	<i>mufʕall</i>	<i>mufʕall</i>
X	<i>?stafʕal</i>	<i>?istifʕaʕl</i>	<i>mustafʕil</i>	<i>mustafʕal</i>

Table 3: Nominalizations of Sound Dummy $\sqrt{fʕl}$

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