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THE MORPHOSYNTAX OF THE ARABIC VERB:

TOWARD A UNIFIED SYNTAX-PROSODY*

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This paper proposes a unified model of the morphosyntax and morphophonology of the Modern Standard Arabic verbal system which attempts to preserve the empirical and analytical observations from recent Optimality-Theoretic approaches to templates in Semitic phonology (Ussishkin 1999, 2000, 2005) as well as the observations from Distributed Morphology concerning argument structure and morphemic composition (Arad 2003, 2005). In doing so, a clausal syntax for Arabic is proposed which does not crucially rely on an Agr(eement) Projection as a landing site for subject movement. This is done using arguments from VP-adverb placement, negative clitic placement, and word order in perfective periphrastic verbal constructions in order to motivate the syntactic structure. This structure is then shown to pose a problem for modern theories of morphological linearization (Pak 2008; Embick 2010). Finally, the linearization problem is resolved by appealing to prosody as the mechanism for linearization, following a recent proposals in morphophonology (Kramer 2007; Tucker 2011b). This move is motivated by data from Arabic Hollow Verbs which confirm the predictions the model makes with respect to allomorphic sensitivity of morphemes to each other over nonconcatenative (and therefore nonadjacent) distances. Finally, the implications of these findings for morphological and syntactic theory are discussed.

Keywords: Arabic, root-and-pattern morphology, inflectional morphology

1 Introduction

Modern Standard Arabic and its regional dialectal variants are well known for being a prototypical example of the phenomenon of NONCONCATENATING TEMPLATIC MORPHOLOGY (NTM), also sometimes known as ROOT-AND-PATTERN MORPHOLOGY (RP). In such a morphological system, vocalic infixes are discontinuously inserted between members of a two to four-consonantal root. The latter contains the lexical content of the word and appears in many different derivationally related forms. The example given ubiquitously in the literature involves the root \sqrt{ktb} meaning roughly ‘writing’ and is shown in Table 1.¹

As Table 1 shows, the root \sqrt{ktb} can appear in quite a few different patterns. In all, the Hans Wehr Dictionary of Modern Standard Arabic gives 32 distinct derivational forms from the root \sqrt{ktb} , 30 of which have semantics which implicate a meaning of ‘writing, letters, or books.’² These forms vary across all lexical categories (noun, verb, adjective) and include a variety of prefixes and prosodic/vocalic templates. Moreover, this strategy of word-formation is the rule rather than the exception in the language, and it is the primary expression of derivational morphological relationships (Ryding 2005).

NTMs in general, and the Arabic verbal system in particular, have been the object of many studies in the generative literature. The morphophonology of Arabic and Hebrew was first examined by Chomsky (1955) and McCarthy (1979, 1981), and much subsequent work has focused on understanding the metrical

*This paper is the result of several years of thinking about the Arabic verb, and parts of it will appear in Tucker 2011b. This previous work has had several audiences, and owes thanks to Ryan Bennett, Jessica Coon, Dilworth Parkinson, David Embick, Vera Gribanova, Jorge Hankamer, Boris Harizanov, Laura Kalin, Ruth Kramer, Alec Marantz, Andrew Nevins, Jim McCloskey, Mohammad Mohammad, Lauren Winans, Luis Vicente, John Whitman, and audiences at the UC Santa Cruz Morphology Reading Group, Morphology Proseminar, 28th West Coast Conference on Formal Linguistics, 25th Arabic Linguistics Symposium, and Linguistics at Santa Cruz conference. This work was sponsored by a generous grant from the Tanya Honig fund for Linguistics Graduate Students at UCSC to CRISP. Finally, special thanks to Tariq El-Gabalawy, Mina Mansy, Sarah Ouguayda, and Munther Younes for their patience in gathering the Arabic data. Despite all this help, any errors which remain are solely my responsibility.

¹These data are from Wehr 1976.

²The two remaining forms, *katiiba*, ‘squadron, amulet,’ and *kataa?ibii*, ‘pertaining to the Lebanese Phalange Party,’ are related to an Arabicization of the Greek loan *phalanx* and thus are not indicative of the (morpho-)semantics of native word formation.

<i>Root</i>	<i>Meaning</i>	<i>Template</i>
kataba	he wrote	CaCaCa
kattaba	he made someone write	CaCCaCa
nkataba	he subscribed	nCaCaCa
ktataba	he copied	CtaCaCa
kitaab	book	CiCaaC
kuttaab	Koranic school	CuCCaaC
kitaabii	written, in writing	CiCaaCii
kutayyib	booklet	CuCayyiC
maktaba	library, bookstore	maCCaCa
mukaatib	correspondent, reporter	muCaaCiC

Table 1: Derived forms from the Root \sqrt{ktb}

and segmental properties associated with NTM systems. Within this body of literature most of the effort has been directed at revealing the relevance and contribution of the root and template to word formation, as well as the metrical/prosodic constraints active in the formation of words in NTMs.³ The conclusions of this literature are varied, but one dominant idea has been that regardless of whether roots are needed for a formal description of NTMs, templates are unnecessary and can be derived by general principles of prosody in such languages.

The argument here has gone as follows: There are properties of the morphophonology of (some) complex words in Hebrew and Arabic (*i.e.*, retention of non-optimal consonant clusters in denominal verbs from their nominal base; see Ussishkin 1999) which require reference to output words as the base of affixation. Therefore, on parsimony grounds an explanatory analysis of Semitic morphophonology should have only one kind of word formation (*i.e.*, word-based), instead of two (*i.e.*, root-plus-template and word-based). Furthermore, theories which posit a verbal template usually struggle to explanatorily ground the template inventory.⁴ If one instead eschews templates in favor of general prosodic principles, there is no longer any issue pertaining to stipulative template inventories. In contrast to the morphosyntactic works discussed in the next paragraph, not much attention is paid in these phonological studies to the semantics of the resulting complex words.

On the morphosyntactic side, examinations of NTMs have focused on the relevance of the root to the syntactic determination of argument structure and the implications of NTMs for theories of the morphology-syntax interface.⁵ In these works, the focus is on where and how the parts of the verb are distributed and realized across morphosyntactic space. The conclusions here are similarly varied, but one influential strand of thought holds that the parts of the verb in NTM languages are distributed across different parts of syntactic space; for instance, Marantz (1997) and Arad (2003, 2005) focus on the lexical-semantic contribution of each of the identifiable morphemic constituents of the Semitic verb and conclude that these pieces are distributed across syntactic space in at least three places: The root, which hosts the CCC root material; the vocalism, which sits in the syntactic position associated with voice; and the template, which sits in the syntactic

³While the discussion of these two questions almost always proceeds in tandem, see Ussishkin 1999, 2000; Davis and Zawaydeh 2001; Buckley 2003; Ussishkin 2005; Kramer 2007; Tucker 2011b; *i.a.*, for discussion of the root versus whole-word debate and McCarthy 1979, 1981; McCarthy and Prince 1990; McCarthy 1993; Watson 2002; Dell and Elmedlaoui 2002; *i.a.*, for the examination of metrical constraints and the role of prosody.

⁴This is precisely the criticism leveled at the proposals of McCarthy (1979, 1981) by researchers working in the later Fixed-Prosodic literature (*e.g.*, Bat-El 1994; Ussishkin 1999, 2000, 2005).

⁵For discussions about the morphosemantics of NTMs, see Doron 1996, 2003; Younes 2000; Arad 2003, 2005, *i.a.* For examination of the implications of NTMs for morphological theory and morphosyntax, see Marantz 1997; Prunet, Béland, and Idrissi 2000; Idrissi, Prunet, and Béland 2008, *i.a.*

position associated with verbal argument structure (v^0 (see §3.2.1). In contrast to the morphophonological works, little emphasis is placed on the relevance of prosody and metrical structure.

What both of these strands of literature fail to address is how one might go about unifying the prosodic and syntactic generalizations into a coherent picture of the derivation of an NTM verb. The present paper aims to fill this gap, using data from the dialect of Arabic read in and around Cairo by educated speakers, called here “Modern Standard Arabic” (MSA, henceforth).⁶ I propose that, once the clausal structure of Arabic is properly understood, the morphosyntax of NTM can be understood in the framework of Distributed Morphology (Halle and Marantz 1993, 1994, *et seq.*). Once we are within such a morphosyntactic framework, it remains to be understood how to incorporate the prosodic generalizations. To account for the heavy influence of prosody in Arabic word-formation, I propose that the output of Distributed Morphology is fed into an output-optimizing parallel morphophonological component (Prince and Smolensky 1993/2004; Trommer 2005; Gribanova 2010; Tucker and Henderson 2010). The emergent picture is one in which the exceptional behavior of NTM languages is the result of the interaction of independently needed principles in two different components of the grammar (the syntax and phonology).

This paper is organized as follows: In §2 I provide an overview of the verbal system in Modern Standard Arabic and discuss the parts of the MSA verb which will be relevant to the analysis in this work. In §3 I discuss the clausal syntax of MSA and how the relevant parts of the verbal system must be distributed across syntactic space. Along the way, I outline how the syntactic picture of the distribution of verbal components poses a problem for recent theories of linearization of morphological constituents within Distributed Morphology (Embick 2003; Pak 2008). §4 then argues that a proper resolution of this problem can be found if one takes seriously the prosodic generalizations discussed in the morphophonological literature. Linearization is argued to be conducted under prosodic auspices and a tentative sketch of how this is to be accomplished is given as a revision of the model of the PF branch first outlined in Embick and Noyer 2001 which accounts for both the syntactic and prosodic generalizations. Finally, §5 concludes.

2 The Arabic Verb

This section introduces the Arabic verb and discusses the morphemic analysis assumed in this work. In doing so, I focus on the verbal system of Arabic, using data collected from primary sources and discussions with native speakers. Descriptively, verbs in MSA are formed by placing a two to four consonantal root in one of several verbal patterns. For trilateral (three-consonant) roots, there are ten verbal forms, of which seven (all except IV, VII, and IX) are in common use in the dialectal variants of MSA. For quadrilateral (four-consonant) roots, there are two common patterns.⁷ These patterns are exemplified in the perfective tense/aspect and active voice for the dummy root $\sqrt{fʕl}$, ‘doing, action’ in Table 2. For quadrilateral roots, Table 2 shows forms exemplified with the nonce root $\sqrt{fʕll}$, following the practice in the traditional Arabic literature. Note that the /ll/ in this nonce root is not a geminate but rather two distinct consonants.⁸

In each of these forms, the consonants of the root are linearized in patterns known as templates. These templates are given in the final column of Table 2 and locate the positioning of vowels and affixal consonants in the linear structure. All of this morphology is potentially nonconcatenative—vowels appear between a discontinuous root and affixal consonants may appear at the edge (as in forms V or X, for instance), or infixes between roots and vowels (as in form VIII). It is important to keep in mind that at this

⁶It is important to clarify that the speech is of educated Cairene readers since the Arabic language is at best a diglossic collection of closely related dialects. For this work, the data are judgments on Modern Standard Arabic by three native speakers of Cairene Arabic living in California.

⁷Most modern grammars (*i.e.*, Ryding 2005) give two more forms. They are suitably rare enough to be of little importance here.

⁸In giving these forms, I abstract away from the fact that forms VII, VIII, and X are usually realized in isolation with a prothetic /ʔ-/ (*hazatu l-wasli* in the traditional literature). This is done following arguments in McCarthy and Prince 1990 and Watson 2002 that this prothesis is conditioned upon position in higher-level prosodic structure, and thus not crucial in an understanding of the morphosyntax/morphophonology of the verbal stem.

<i>Number</i>	<i>Verb</i>	<i>Template</i>
I	faʕal	C ₁ aC ₂ aC ₃
II	faʕʕal	C ₁ aC ₂ C ₂ aC ₃
III	faaʕal	C ₁ aaC ₂ aC ₃
IV	?aʕʕal	?aC ₁ C ₂ aC ₃
V	tafaʕʕal	taC ₁ aC ₂ C ₂ aC ₃
VI	tafaaʕal	taC ₁ aaC ₂ aC ₃
VII	nfaʕal	nC ₁ aC ₂ aC ₃
VIII	ftaʕal	C ₁ taC ₂ aC ₃
IX	fʕall	C ₁ C ₂ aC ₃ C ₃
X	stafʕal	staC ₁ C ₂ aC ₃
Q1	faʕalal	C ₁ aC ₂ aC ₃ aC ₄
Q2	tafaʕlal	taC ₁ aC ₂ C ₃ aC ₄

Table 2: Perfective Active of *fʕl*, ‘doing, action’

point the terms ‘root’ and ‘template’ are descriptive generalizations only. Later I shall justify the use of the root as a theoretical construct and argue against templatic statements such as those in Table 2 (§3.2.3).

The examples given in Table 2 all have the vocalism /a...a/ though not all words in Arabic have these same two vowels. In MSA, the vocalic portions of words convey information concerning the tense, aspect, and voice of the verb (as in other dialects and Classical Arabic; see McCarthy 1979 and Ryding 2005). This is most clearly seen in the perfective passives of the verbs in Table 2, shown in Table 3. Comparing the *Template* column of Table 2 with the *Template* column of Table 3 reveals that the only difference in the two templates of any verbal form are the vocalisms. For the active they are /a...a/ and for the passive they are /u...i/.

<i>Number</i>	<i>Verb</i>	<i>Template</i>
I	fuʕil	C ₁ uC ₂ iC ₃
II	fuʕʕil	C ₁ uC ₂ C ₂ iC ₃
III	fuuʕil	C ₁ uuC ₂ iC ₃
IV	?uʕʕil	?uC ₁ C ₂ iC ₃
V	tufuʕʕil	tuC ₁ uC ₂ C ₂ iC ₃
VI	tufuuʕil	tuC ₁ uuC ₂ iC ₃
VII		n/a
VIII	ftiʕil	C ₁ tiC ₂ iC ₃
IX		n/a
X	stufʕil	stuC ₁ C ₂ iC ₃

Table 3: Perfective Passives of *fʕl*, ‘doing, action’

Beyond the passive, Arabic marks one other distinction with vowel quality alternations, and that is the tense/aspect distinction. Arabic has two tenses/aspects, called in traditional grammars the perfect(ive) and the imperfect(ive) (Ryding 2005). The imperfective in both voices has distinct vocalisms, as (1-2) show for the first two verbal forms, I and II:⁹

⁹These forms are in the 3rd masculine singular form, the usual citation form found in Arabic grammars.

- (1) Imperfective Active:
 - a. yaffʕal (I)
 - b. yufaʕʕil (II)
- (2) Imperfective Passive:
 - a. yuffʕal (I)
 - b. yufaʕʕal (II)

In this paper, I will treat the derivational morphology of only the perfective tense/aspect for reasons of space and complexity. However, the data in (1–2) serve to reinforce the claim that the vocalic quality in the stem expresses three distinct morphosyntactic features at once, namely those of tense, aspect, and voice. If we make the preliminary assumption that these features are all expressed on the same (morpho)syntactic head,¹⁰ we can even go so far as to write vocabulary entries for the two vocalisms we have seen thus far:

- (3) [PERF, PASS] ↔ /u . . i/
- (4) [PERF] ↔ /a . . a/

With these vocabulary entries, the Subset Principle as discussed in Halle and Marantz 1993 will provide for the correct vocabulary insertion. Within the perfective aspect/tense, which vocalism the verb receives depends upon whether or not the feature [PASS] is present on the head which carries tense, aspect, and voice. If the feature [PASS] is present, then the vocabulary entry for /u . . i/ has the most matching features, and it will be inserted.¹¹ If [PASS] is not present, however, then the passive vocalism has a feature which the terminal node does not, and the Subset Principle ensures that /u . . i/ is not inserted. In that case, /a . . a/ emerges as the realization of perfective aspect.

MSA also inflects verbs for agreement with the subject along the usual φ -featural dimensions of person, number, and gender. This is shown in Table 4 for the perfective active of form I verbs, but the endings are identical across all verbal patterns and both voices (in the perfective).¹²

		<i>Number</i>	
		<i>Singular</i>	<i>Plural</i>
<i>1st</i>		faʕal-tu	faʕal-naa
	<i>2nd masc</i>	faʕal-ta	faʕal-tum
<i>2nd fem</i>	<i>fem</i>	faʕal-ti	faʕal-tunna
	<i>3rd masc</i>	faʕal-a	faʕal-uu
<i>3rd fem</i>	<i>fem</i>	faʕal-at	faʕal-na

Table 4: Inflection of Perfective Verbs Exemplified in Form I

In Table 4 we can see that φ -featural agreement is expressed by additional affixation over and above the nonconcatenative linearization which integrates the lexical root with tense, aspect, and voice as seen in the tables above. However, the affixes in Table 4 are not the only exponents of φ -featural agreement. There

¹⁰I will offer no real justification for this assumption here, beyond noting that I am aware of no verbal pattern or verb in which the vowels do not carry some or all of these kinds of information.

¹¹Voice need not be marked explicitly on a feature such as [PASS], and could instead be a lexical property of individual instantiations of v^0/voi^0 (as in, say, Embick and Halle 2005), as long as this property is visible at Vocabulary Insertion (Halle and Marantz 1993).

¹²Modern Standard Arabic has a dual number which is robustly instantiated in the verbal system, though it has not been carried over to nearly any of the modern regional dialects of spoken Arabic (Ryding 2005). For that reason, I do not consider the dual here.

is a separate inflectional paradigm for imperfective aspect, and these circumfixes are shown in Table 5. These forms, in addition showing a different inflectional paradigm, show us two things: (i) That inflection is allomorphically sensitive to the choice of aspect and (ii) that inflectional morphology in MSA is always realized as circumfixes around the NTM base.¹³

<i>Person</i>	<i>Number</i>		
	<i>Singular</i>	<i>Plural</i>	
<i>1st</i>	ʔa-fʃul-u	na-fʃul-u	
<i>2nd</i>	<i>masc</i>	ta-fʃul-u	ta-fʃul-uuna
	<i>fem</i>	ta-fʃul-iina	ta-fʃul-na
<i>3rd</i>	<i>masc</i>	ya-fʃul-u	ya-fʃul-uuna
	<i>fem</i>	ta-fʃul-u	ya-fʃul-na

Table 5: Inflection of Imperfective Verbs Exemplified in Form I

If we follow Embick (1997) in assuming that verbal agreement morphology is the realization of an Agr(reement)⁰ head which is inserted after the syntactic computation is completed, then the observation that agreement morphology is allomorphically sensitive to the choice of aspect provides evidence for the structural location of the dissociated Agr⁰ node, though explicit discussion of this is postponed until §4 when a more complete clausal structure for MSA is at our disposal. In the meantime, the more immediate need is a featural analysis of the forms in Tables 4–5.

Fortunately, there is already work on a similar inflectional paradigm in Distributed Morphology which ports quite easily to the analysis of Arabic. Noyer (1997), in examining the inflectional paradigm of Tamazight Berber, proposes that paradigms where individual φ -features are represented by exponents across multiple cells in the paradigm, the Agr⁰ node inserted postsyntactically undergoes FISSION.¹⁴ This operation separates the φ -features of the Agr⁰ node so that multiple Vocabulary Items can be inserted as agreement markers. The net result of this operation is a morphology in which exponents *discharge* the features for which they are specified, and Vocabulary Insertion proceeds until all features are discharged or until there are no more licit insertions.

This process of Fission allows us to account for the repeated occurrence of /-t/ marking 2nd person and feminine gender, /ya-/ for 3rd person, and /-uu/ and /-na/ for plurality. The proposal is this: Agr⁰ undergoes Fission in MSA, and the Vocabulary Items that realize agreement features are as in (5–6):¹⁵

- (5) VIs for Perfective Aspect:
- [3, MASC, PL] ↔ /-uu/
 - [1ST] ↔ /-tu/
 - [2ND] ↔ /-t/
 - [FEM] ([2ND]) ↔ /-i/
 - [MASC, PL] ([2ND]) ↔ /-tum/
 - [MASC, PL] ([2ND]) ↔ /-tunna/

¹³This is not surface true in the imperfective paradigm because of prosodically-driven truncation of one of the stem vowels in some forms (Brame 1974). I do not analyze this phenomenon here, but see McCarthy 2005 for one proposal.

¹⁴Space considerations make impossible a complete summary of this proposal. See Harley and Noyer 1999 for one particularly concise summary.

¹⁵In the representations in (5–6), the parentheses around features are meant to be read as “only insert if this feature has been discharged.” For more discussion, see Noyer 1997 and Harley and Noyer 1999. There is also a question here of how to order the VIs in (5–6), though I set this aside for now. See Noyer 1997 and Harley and Ritter 2002 for discussion on this point.

- g. [FEM,PL] ↔ /-na/
- h. [FEM, SG] ↔ /-at/
- i. [PL] ↔ /-uu/
- j. Elsewhere ↔ /-a/

(6) VIs for Imperfective Aspect:

- a. [1, PL] ↔ /-na/
- b. [1] ↔ /ʔa-/
- c. [2] ↔ /ta-/
- d. [FEM] ([2]) ↔ /-iina/
- e. [PL] ([2]) ↔ /-na/
- f. [MASC] ([PL]) ↔ /-uu/
- g. [3] ↔ /ya-/
- h. [PL] ([3]) ↔ /-na/
- i. Elsewhere ↔ /-u/

To see how these Vocabulary Items and the process of Fission works, consider the derivation of the verb *faʕal-ti*, the 2nd person feminine singular perfective of *faʕal*. As the derivation exits the syntax, the verb bears φ -features, but no phonological material. Agr^0 is inserted and receives the features of the subject/verb agreement relationship (Embick 1997); Agr^0 then undergoes Fission (Noyer 1997). The result is a structure in which VI can insert separate entries for each of person, number, and gender. The realization of 2nd person requires the insertion of /-t/, which discharges the [2ND] feature. This creates the contextual domain for the insertion of /-i/ to discharge the feminine feature, resulting in *faʕal-ti*. In contrast, with a verb such as *faʕal-it* (3rd person feminine singular perfective), the absence of [2ND] means /-t/ cannot be inserted. Thus, the domain for insertion of /-i/ is never met, and /-at/ is inserted instead, resulting in *faʕal-at*.

In this section we have motivated and given vocabulary entries for two sets of morphological exponence over and above the consonantal root: (i) Tense/aspect/voice, expressed as vowels in the verbal stem and (ii) φ -featural agreement morphology expressed as two sets of verbal suffixes. The next section turns to asking what the syntactic distribution of these morphemes is and how they might all come to be expressed within the same word.

3 The Morphosyntax of the Arabic Verb

In this section I consider the question of how the Arabic verb is built in the clausal syntax. For concreteness, the discussion in this section takes as its starting point the Minimalist Program version of syntactic theory as outlined in Chomsky 1995, 2000, 2001b, 2008, *et seq.* This is done for two reasons: (i) The purpose of this paper is to provide an understanding of the *morphology* of the Arabic verb in its syntactic context, not to decide between competing syntactic theories, and (ii) the Minimalist Program version of syntax is what is assumed by most of the researchers working in Distributed Morphology (see Harley and Noyer 1999; Embick and Noyer 2001, 2007; Embick 2010; *i.a.*). The morphological conclusions reached in this work could thus be recast in any syntactic theory compatible with Distributed Morphology, if the reader so desires. This section is organized into two parts. In the first, I sketch a basic clausal syntax for Arabic using data from adverb placement and negation (§3.1). With this clausal syntax in hand, I then turn to fitting the morphological generalizations from the previous section into the syntactic picture, paying close attention to the implications of nonconcatenative morphology on syntactic linearization (§3.2).

3.1 Arabic Clausal Syntax

Modern Standard Arabic is predominantly VSO in its major constituent order, though SVO is a possible alternative word order:¹⁶

(7) Modern Standard Arabic {S, V}O Constituent Order:

- a. qaabal zayd ʔamr.
 met.3.SG.MASC Zayd Amr
 ‘Zayd met Amr.’
- b. zayd qaabal ʔamr.
 Zayd met.3.SG.MASC Amr

In this section, I propose and defend the idea that the major clausal structure in Arabic is as in (8–9):

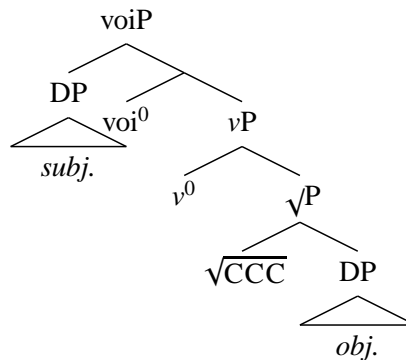
(8) VS(O) Order: [TP T⁰ [AspP *Subj.* [Asp⁰ [voiP voi⁰ [vP v⁰ √C₁C₂C₃]]]]]

(9) SV(O) Order: [TP *Subj.* [T⁰ [AspP Asp⁰ [voiP voi⁰ [vP v⁰ √C₁C₂C₃]]]]]

The structure of the argument I will pursue is as follows. Starting from the version of the VP-Internal Subject Hypothesis argued for by Kratzer (1994, 1996), I show that (i) the subject cannot be in its vP internal θ -position at the end of the derivation in VS word orders and (ii) there is evidence for two functional projections above vP in the inflectional layer. Then, I identify these two projections as T(ense)P and Asp(ect)P using evidence from periphrastic verbal constructions.

To begin the syntactic analysis, let us first start with the VP-Internal Subject Hypothesis (Kitagawa 1986; Fukui and Speas 1986; Kuroda 1988; Diesing 1990; Koopman and Sportiche 1991; *i.a.*). This proposal takes all clauses to have a verb phrase constituent at their core which contains all the arguments θ -marked by the verb, including the subject. There are many ways to implement this proposal, but for concreteness I assume the voi(ce)P proposal outlined in Kratzer 1994, 1996. For simple transitives, this amounts to the following structure:^{17,18}

(10) Simple Transitives with VP-Internal Subjects:



¹⁶It is worth noting that these two word orders are truth-conditionally equivalent; *e.g.*, there is no focus meaning for SVO word orders. See Fehri 1988; Ouhalla 1994; and Mohammad 1999 for discussion of this point in other dialects and Modern Standard Arabic

¹⁷I assume in this paper that MERGE is restricted to two elements at a time (Chomsky 1995, *et seq.*), yielding the binary-branching hypothesis first proposed in Kayne 1981. Furthermore, I also assume that internal arguments of the root are contained inside a \sqrt{P} instead of in a small clause projected by v^0 as in Embick (2004) or as a specifier of v^0 . Nothing crucial hinges on either of these moves.

¹⁸I also attempt to rectify in this tree a labeling disaster which occurs in the literature on Distributed Morphology: I use voi^0 for the head that projects an external argument, following Kratzer (1994, 1996). This is potentially the same head that Chomsky (2000, *et seq.*) refers to as v^0 . This head is distinct, however, from the categorizing v^0 argued for in Marantz 1997, *et seq.* In this work, I reserve the label v^0 for only the latter head. The place where this is nomenclatural distinction has the most impact is in the data from adverbs, which go from being called “VP-adverbs” to more properly being called “voiP-adverbs.” Hopefully this will help keep things clear.

Within this basic clausal structure, a possible analysis of the SVO/VSO clausal order contrast in (7) becomes available. Following Emonds (1981) and Sproat (1985), we might say that (at least some) VSO constituent-order languages can be surface-derived by movement of the main verb to some higher projection, call it FP. For researchers such as Emonds or Sproat, F⁰ was assumed to be C⁰, for later researchers assuming the voiP-Internal Subject Hypothesis, this could be assumed to be Infl⁰ or T⁰.¹⁹ In these analyses, the subject of the Arabic clause remained *in situ* in its base-generated, θ -marked position, while the verb moved around the subject to derive VSO constituent order. In order to refer to them later, I call these analyses “Simple V-Raising” Analyses (SVR).

The problem with these analyses is that there are arguments against leaving the subject *in situ* at the end of derivation. Consider first the distribution of adverbs which modify the semantics of the voiP layer of the clause. Much like English, as first discussed in Pollock 1989, one can use the placement of voiP adverbs in Arabic to indirectly discern the location of the Arabic subject at the point where the derivation is sent to be linearized (utilizing somewhat outmoded terminology, call this “S-Structure”). The data in (11–12) are indicative of voiP adverb placement.²⁰

(11) voiP Adverbs in VSO Clauses:

- | | | |
|----|---|------------|
| a. | yid ^ʕ rub al-walid al-kalab ?ahyaanan . | |
| | hits the-boy the-dog often | |
| | ‘The boy hits the dog often.’ | V-S-O-ADV |
| b. | ?ahyaanan yid ^ʕ rub al-walid al-kalab. | ADV-V-S-O |
| c. | * yid ^ʕ rub [?ahyaanan al-walid al-kalab]. | *V-ADV-S-O |
| d. | (?) yid ^ʕ rub al-walid [?ahyaanan al-kalab]. | ?V-S-ADV-O |

(12) voiP Adverbs in SVO Clauses:

- | | | |
|----|---|------------|
| a. | al-walid yid ^ʕ rub al-kalab ?ahyaanan . | |
| | the-boy hits the-dog often | |
| | ‘The boy hits the dog often.’ | S-V-O-ADV |
| b. | ?ahyaanan al-walid yid ^ʕ rub al-kalab. | ADV-S-V-O |
| c. | * al-walid [?ahyaanan yid ^ʕ rub al-kalab]. | *S-ADV-V-O |
| d. | (?) al-walid yid ^ʕ rub [?ahyaanan al-kalab]. | ?S-V-ADV-O |

The data in (11–12) show that the most comfortable position for manner adverbs in Arabic is crucially to the immediate right of the VSO subject.²¹ This accords with McCloskey’s (1996) similar observation for Irish, where he concludes that the subject cannot remain *in situ* in VSO constituent order. If the

¹⁹See especially Fehri 1988; Ouhalla 1994; and Mohammad 1999 for proposals along these lines.

²⁰One should not buy this argument without independent proof that these adverbs actually adjoin to the projection which hosts the external argument (see Johnson 1991 for discussion of the availability of multiple voiP-internal adjunction hosts). I will give none here, but note that this investigation is ongoing in fieldwork. Also note that in Egyptian pronunciation of MSA, prefixal /a/ is often realized as /i/, its corresponding vowel in Colloquial Egyptian.

²¹While the pattern in (11–12) extends to *all* voiP adverbs (*i.e.*, locative, temporal, aspectual, or agent-oriented adverbs) in MSA, it does happen to be the case that MSA (and Arabic more generally) lacks many adverbs. Most voiP modification is done with adjunct PPs, all of which have to be extraposed to the left or clause-final:

(i) voiP Modifiers in VSO Clauses:

- | | | |
|----|--|-----------|
| a. | d ^ʕ arab al-walid al-kalab bi-suraʕa . | |
| | hit the-boy the-dog with-haste | |
| | ‘The boy hit the dog quickly.’ | V-S-O-PP |
| b. | bi-suraʕa d ^ʕ arab al-walid al-kalab. | PP-V-S-O |
| c. | * d ^ʕ arab [bi-suraʕa al-walid al-kalab]. | *V-PP-S-O |
| d. | * d ^ʕ arab al-walid [bi-suraʕa al-kalab]. | *V-S-PP-O |

All of my MSA consultants agree on the adverb data for all of the adverbs I have been able to test ($N = 7$), and have varying judgments for the adjunct PPs in (21), so I set these aside for future closer scrutiny.

subject were in the [Spec, voi⁰] position, one would expect the adverb to be able to appear in the position shown in the (c) example, between the verb in T⁰ and the subject contained within the voiP layer. Since this is not the case, and because this data is so robust with Arabic adverbs, it appears as though the traditional SVR analysis as proposed by Emonds (1981) and Sproat (1985), *inter alia*, is too simplistic to be maintained. We reach a similar conclusion concerning the acceptability of the (d) example in (12), where, since it maintains that SVO order results from base-generation, the SVR analysis would expect the adverb to be able to intervene in linear order between the subject and verb, contrary to fact.

Another piece of data which cannot be accounted for in the SVR analysis is the distribution of negation in copular clauses, as noted by Benmamoun (1992). Benmamoun provides an explicit argument that, for Arabic, sentential negation can be used to help further identify the left edge of the voiP layer. This is because, as shown by Ouhalla (1994), the NegP which hosts sentential negation in Arabic must be situated between the TP and voiP projections. Normally, in sentential negation contexts, the verb must successive-cyclically raise through this projection to T⁰, picking up the negative circumfix *ma...fi* in the process.²² However, Arabic is like many languages in lacking a present-tense copular form. In present tense equative/copular sentences, then, the negative particle *ma* should remain in its base position within NegP, since no successive cyclic raising of the verb occurs. In these contexts, the position of subjects can be discerned by their position vis-à-vis negation.

It is in this spirit that Shlonsky (1997) and Aoun, Benmamoun, and Sportiche (1999) note that the position of dialectal Arabic subjects with respect to negation in copular clauses is not what is expected given the SVR analysis with *in situ* subjects. These data are shown in (13) for Modern Standard Arabic. The first pair gives an example of standard sentential negation with an overt predicate, while the second pair shows the same sentential negation in a present-tense copular frame:²³

(13) Negation in Present Tense Copular Clauses:

- a. omar **ma-ʒa-f**.
Omar NEG-come.3.SG.MASC.PAST-NEG
'Omar didn't come.'
- b. * **ma-ʒa-f** [_{voiP} omar].
- c. omar [_{NegP} **ma-fi** [_{voiP} fi-beit]].
Omar NEG at/in-the.home
'Omar is not at home.' S-NEG-PRED
- d. * [_{NegP} **ma-fi** [_{voiP} omar fi-beit]]. *NEG-S-PRED

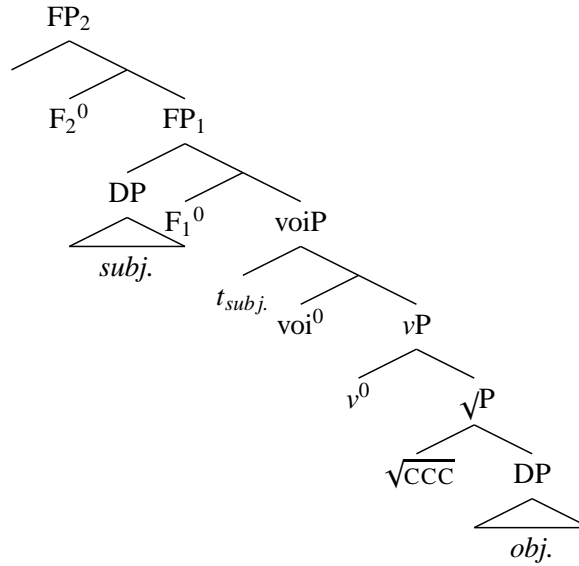
If some form of the SVR analysis were correct, we would expect (13d) to be grammatical, contrary to fact.

Given the data in (11–13), it is clear that any version of the SVR analysis cannot be correct for Arabic. Notice, too, that even just one movement of the subject will solve all the problems posed for the SVR analysis with respect to (11–13). However, in order to derive both VSO and SVO word orders with the subject obligatorily moving out of voiP, this one subject movement must entail two head positions above voiP to which the verb moves—one whose specifier hosts the subject in its movement out of voiP and another above that which hosts the verb. Thus, what we need is something like the following, where FP stands for a yet-to-be identified functional projection:

²²Informally, when /ma-/ attaches to verbs, the verbal host appears with a negative doubling /-f(i)/ suffix the (the optionality of -i will not be discussed here).

²³That this is sentential negation can be seen in fn. 6 of Aoun et al. 1999, where it is shown that it licenses NPI's, which constituent negation cannot do in this dialect.

(14) Schematic Structure Thus Far:



If the preceding structure is adopted, then we can explain the data in (11–13). The subject’s θ -position is [Spec, voi^0], following Kratzer (1994, 1996). The movement of the subject to [Spec, F_1^0] then accounts for the conclusion above that the subject is not *in situ* at the end of the derivation.

However, what about the verb and the VSO/SVO constituent order options? In order to derive the VSO word order with the subject in [Spec, F_1^0], then the verb must minimally raise to F_2^0 . At this point, there are two possible derivations of the SVO word order alternative:

1. *Verb-Stopping*: In SVO clauses the verb fails to raise to F_2^0 . SVO order results at F_1P .
2. *Subject Raising*: In SVO clauses the subject *also* raises to F_2^0 . SVO order results at F_2P .

To decide between these two alternatives, it is helpful to first address the question of the identity of the heads F_1^0 and F_2^0 . Data which helps decide this question comes from periphrastic past imperfective constructions (e.g., *Xander was hunting for ducks in the marsh.*) in Arabic. As noted by Diesing and Jelinek (1995) and Ouhalla (1994), imperfective aspect in the past tense is realized with periphrasis in Arabic, as (15) demonstrates for MSA:

(15) Past Imperfective Periphrasis:

- | | | | | |
|----|--------------------------------------|--------------------------------------|---------------------------------------|----------|
| a. | kaan-uu | $t^{\text{f}}-t^{\text{f}}$ aalibaat | bi-yi-ʔkul-uu. | |
| | be.PAST-3.PL.FEM | the-students.FEM | bi-3-eat-FEM.PL | |
| | | ‘The students were eating.’ | | AUX-S-V |
| b. | $t^{\text{f}}-t^{\text{f}}$ aalibaat | kaan-uu | bi-yi-ʔkul-uu. | |
| | the-students.FEM | be.PAST-3.FEM.PL | bi-3-eat-FEM.PL | |
| | | ‘The students were eating.’ | | S-AUX-V |
| c. | * kaan-uu | bi-yi-ʔkul-uu | $t^{\text{f}}-t^{\text{f}}$ aalibaat. | |
| | be.PAST-3.FEM.PL | bi-3-eat-FEM.PL | the-students.FEM | |
| | | ‘The students were eating.’ | | *AUX-V-S |

In such constructions, there are only two licit word orders, SAuxVO and AuxSVO. Crucially, AuxVSO is not a possible order, as (15c) demonstrates.²⁴ This provides yet another argument against the SVR analysis, which predicts that AuxVSO order should be the default periphrastic order, yet (15c) shows this order is impossible. Note, too, that the tentative structural assumptions made in (14) can account for these facts, since the obligatory subject movement will take the subject minimally past F_1^0 .

Beyond being able to explain the data in (15), there is another set of facts that the preliminary structure in (14) can explain. If (14) is on the right track, then we expect that the voiP adverbs discussed above such as *?ahiænan* should only be licit clause-internally when they appear between the verb and object in periphrastic constructions, regardless of word order. This is because the structure in (14) would take the auxiliary to be in F_2^0 and the main verb in F_1^0 , with the subject at least as high as [Spec, F_1^0]. The left edge of the voiP constituent to which *?ahiænan* attaches should therefore be between the verb and the object regardless of the linear position of the subject. As (16–17) show, this prediction is confirmed in MSA:

- (16) kaan (***?ahyaanan**) al-walid (***?ahyaanan**) bryid^ʕrub (**?ahyaanan**) al-kaləb.
 was (**often**) the-boy (**often**) hitting (**often**) the-dog
 ‘The boy hit the dog often.’ AUX-S-V-O
- (17) al-walid (***?ahyaanan**) kaan (***?ahyaanan**) bryid^ʕrub (**?ahyaanan**) al-kaləb.
 the-boy (**often**) was (**often**) hitting (**often**) the-dog
 ‘The boy hit the dog often.’ S-AUX-V-O

Therefore, it is reasonable to conclude that the subject movement that is motivated above is in fact movement to the specifier of the projection hosting the main verb in constructions such as (15). We thus have reason to accept (14), but what are the identities of the F_x^0 's?

The answer to this question, I suggest, lies in the identity of the morpheme glossed until now as *bi-*. This morpheme has cognates in other dialects, such as /da-/ in Iraqi Arabic (Erwin 2004:338–9), /b-/ in Syrian Arabic (Cowell 2005:320), and /ka-/ in Moroccan Arabic (Harrell 2004:176–8). Across all these dialects, the common meaning to these cognate particles is habitual or durative aspect. Crucially for our purposes, this makes /bi-/ in Egyptian a plausible exponent of Asp^0 , a conclusion also reached by Diesing and Jelinek (1995) when examining the same particle.

Moreover, the /bi-/ particle can only appear on the main verb, not the auxiliary, we can see in (18):

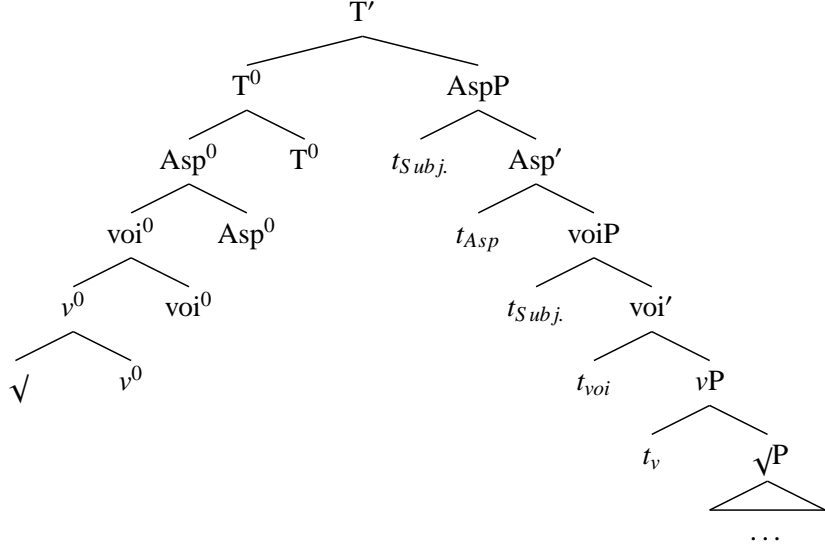
- (18) * bi-kaan-uu / bi-yi-kuun-uu yi-ʕkul-uu t^ʕ-t^ʕaalibaat.
 bi-was / bi-is eating the-students.FEM
 ‘The students were eating.’

The inability of the auxiliary to bear the aspectual marker /bi-/ lends itself to the conclusion that in past imperfective periphrastic constructions, the auxiliary bears tense morphology, whereas the main verb is marked for aspect. Since verbs in these positions in (15) bear only aspectual morphology, this analysis follows Diesing and Jelinek (1995) in assuming that the main verb is in Asp(ect)P in these constructions. The auxiliary which bears tense morphology, on the other hand, is assumed to be located in T(ense), where it is base-generated. In non-perfective constructions, the verb raises all the way to T^0 , in an instance of what Pereltsvaig (2006) calls “snowballing head movement,” as in the following:

- (19) Snowballing Head Movement in Arabic:

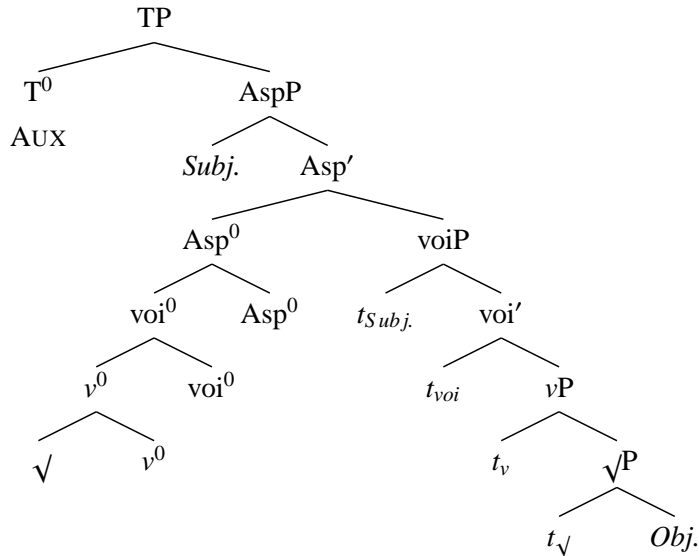
²⁴The word order found in (15c) is grammatical, but only under a contrastive focus reading of the entire verbal complex—it cannot have the discourse-neutral interpretation that (15a–15b) can have. I thank Sarah Owayda (p.c.) for help picking through the delicate judgments here.

The Morphosyntax of the Arabic Verb



In periphrastic perfective constructions, however, this last movement of the verbal complex, from Asp⁰ is blocked by the presence of the overt auxiliary, which is base-generated in T⁰. Note that in these structures, the verb still raises to Asp⁰, as shown in the following:

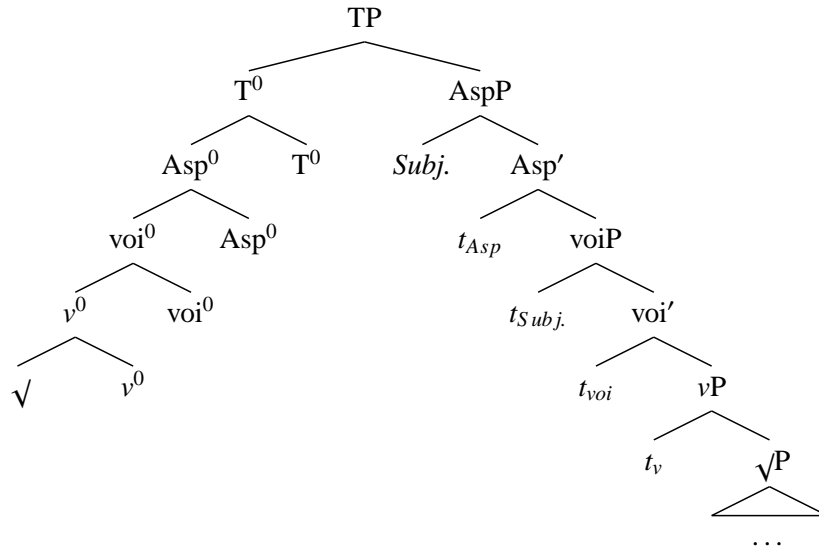
(20) Overt Aux Blocks V-Raising:



Returning to the skeleton provided in terms of functional projections, we can determine that $F_2^0 = T^0$ and $F_1^0 = Asp^0$. Now it is possible to adjudicate between the *Verb-Stopping* and *Subject-Raising* analyses outlined above. The example (15b) above requires that it be possible for the subject to move to [Spec, T^0], as the subject can precede the copular auxiliary in T^0 . If such a movement is necessary in structures with auxiliaries, then there is no reason to suspect it does not occur in clauses without auxiliaries. Assuming the *Verb-Stopping* analysis would require positing an extra movement (to [Spec, T^0] or some other position above AspP) which only occurs in auxiliary-containing clauses. The *Subject-Raising* hypothesis, on the other hand, requires no such added mechanism.²⁵

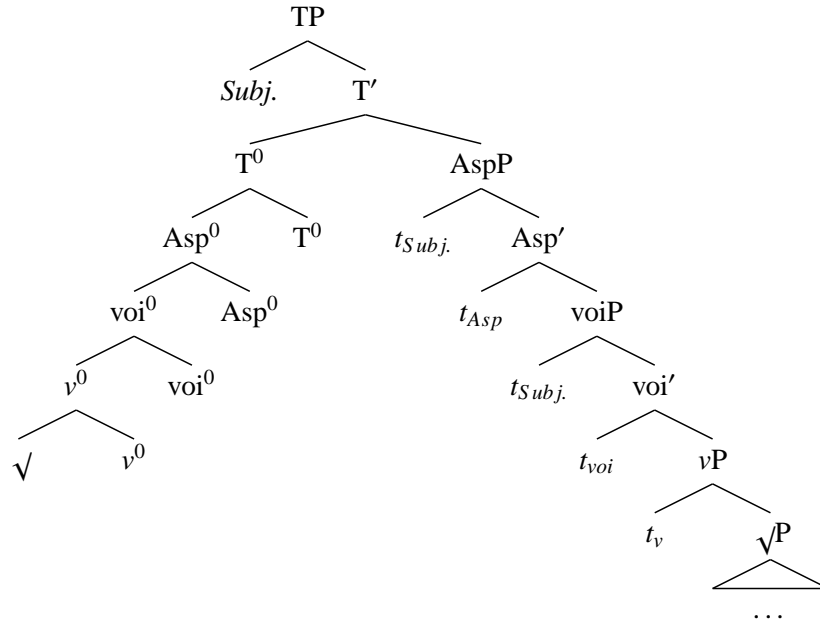
Summing up the proposals in this section, then, we have arrived at the structures in (21–22) for the simple declarative clause in Arabic.

(21) The Modern Standard Arabic Clausal Structure for Simple VSO Declaratives:



²⁵Of course, the *Subject-Raising* analysis does have the added burden of justifying the movement of the subject (for reasons other than simply to achieve the correct word order). I have nothing insightful to say about this here, except to note that there is evidence in other VSO languages for the presence of an [EPP] feature (McCloskey 2009). Thus, while it would still be necessary to explain the [EPP], at least the problem in Arabic would be reducible to a well-known general problem.

(22) The Modern Standard Arabic Clausal Structure for Simple SVO Declaratives:



Looking at the structures in (21–22) side by side, one final point about the analysis is also clear: The only difference between VSO and SVO structures in Arabic is an (optional) instance of the [EPP]. Localizing the difference between VSO and SVO clauses to this optional feature helps make sense of the truth-conditional equivalence of the two word orders. This section has motivated the existence of two functional projections above a *voiP* thematic shell in Arabic: *AspP* and *TP*. These two constructions host verbs which have raised out of the *voiP* shell, and the difference between SVO and VSO order boils down to how high the subject raises. The first movement of the subject occurs in all clauses to [Spec, *Asp*⁰]. In the absence of [EPP] on *T*⁰, the subject stops there, where VSO order results. If [EPP] is present, the subject moves again and SVO order results.

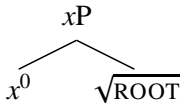
3.2 Distributing the Parts

With a clear picture of the clausal syntax of Arabic in hand from §3.1, we can now turn to the question of how the morphemes identified in the composition of the Arabic verb from §2 are distributed throughout the clausal structure. To begin this discussion, it is helpful to start from the concrete proposals for the morphosyntactic makeup of the Semitic verb, specifically those presented by Arad (2003, 2005). These are based upon work by Marantz (1997). The framework proposed in those works is based on the model of Distributed Morphology assumed in this paper and is one of the most well-worked out theories of Semitic verbal morphosyntax. This section proceeds by first laying out the major portions of the framework developed by Arad (2003, 2005) as well as motivating the use of the framework for Arabic (§3.2.1). I then show two reasons to prefer revisions to this system based on two problems: (i) The issue of nonconcatenative linearization (§3.2.2) and (ii) the putative existence of templates *qua* vocabulary items (§3.2.3). The picture that emerges from this discussion is that, with minor revisions, the morphosyntactic picture presented by Arad (2003, 2005) is adequate for Arabic. The morphophonological picture, however, is not, and requires major rethinking (which is the topic of §4).

3.2.1 Aradian Preliminaries

In two related works, Arad (2003, 2005) proposes to extend the ideas in Marantz 1997 about the syntactic composition of words to account for the morphosyntax of Hebrew. The basic idea imported from Marantz 1997 is that *all* words, whether morphologically simple or complex, are syntactically phrasal idioms of the following form:

(23) Marantz’s (1997) Phrasal Idiom Theory of Words:

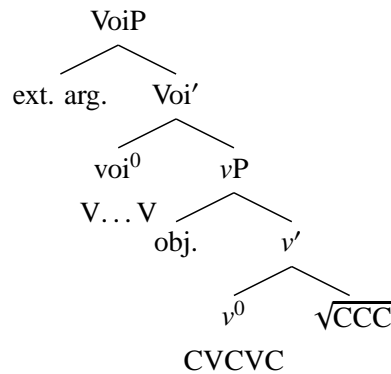
- a. 
- b. Where $x^0 \in \{n^0, a^0, v^0, \dots\}$, a set of *categorizing* heads.

In these syntactic phrasal idioms, an acategorial root appears as sister to a selecting head which categorizes it and hosts basic syntactic category information. As Marantz himself notes, “Semitic languages would seem to wear their root and little x structure on their sleeves” (Marantz 1997:17). One of the arguments for this comes from the ability of one root in Arabic to appear in multiple templates across many different syntactic categories, as shown in Table 1 on Page 178

As Table 1 shows, when a root like \sqrt{ktb} appears in many different words, one can find derived nouns (*kuttaab*), verbs (*kataba*), and adjectives (*kitaabii*). Saying that roots are categorized only in syntactic context captures this polycategoriality of roots in a straightforward way: Roots do not have syntactic category in and of themselves, but rather gain category when selected for by the appropriate x^0 . Moreover, the semantic regularities evident across Table 1 are predicted because the same morpheme (\sqrt{ktb}) appears in each of the derived forms.

Arad (2003, 2005) picks up on this suggestion and develops it further. In particular, she proposes the following structure for the morphosyntax of Hebrew verbs:

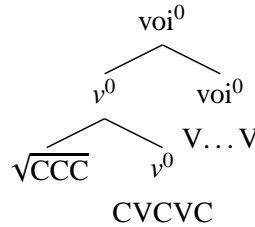
(24) Arad’s Structure of the Hebrew Verb:



This structure assumes the phrasal idiom approach to words, but is more explicit about the positioning of DP arguments and morphemes. In this proposal the root is simply that—the consonantal root. This morpheme is selected for by a categorizing head, in this case v^0 since it is verbs which are under consideration. This categorizing head hosts the phonological instantiation of the template, which Arad (2003, 2005) assumes to be a CV-timing tier following proposals in McCarthy 1979, 1981, *et seq.* (see §3.2.3). This selection projects a vP , the projection hosting the internal arguments of the verb (see Arad 2005 for arguments supporting this treatment of internal arguments based upon facts from lexical semantics). This vP is selected for by voi^0 , following Kratzer (1994, 1996), and this head in turn hosts the vocalic melody.

Successive-cyclic head movement of the verb up through this structure yields the following head structure at Spell-Out:

(25) Verbal Head Structure at Spell-Out:



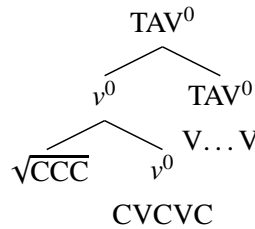
In Hebrew, the vocalic melody expresses voice *only* (Arad 2005:190–1), and in this way Hebrew and Arabic are different. Recall from §2 that in Arabic the features of tense, aspect, and voice are all realized simultaneously in the vocalic melody. To account for this fact, let us simply assume a postsyntactic FUSION rule applies in the early stage of the PF branch of the grammar in Arabic:²⁶

(26) PF-Fusion Rule for Arabic:

$$[T^0 T^0 [_{\text{Asp}^0} \text{Asp}^0 [_{\text{voi}^0} \text{voi}^0 [\dots]]]] \rightarrow [_{\text{TAV}^0} \text{TAV}^0 [\dots]]$$

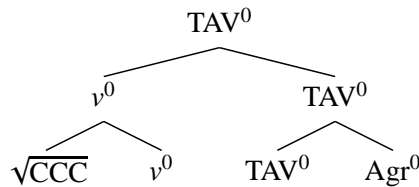
This rule takes the three heads T^0 , Asp^0 , and voi^0 and fuses them into one composite head, T(ense)-A(spect)-V(oice)⁰ which can then be realized with a single morpheme. With this amendment, we can straightforwardly adopt Arad’s (2003, 2005) proposals for Arabic. All that is different in our working hypothesis is the addition of the above rule to the postsyntactic component, yielding the following head adjunction structure at vocabulary insertion in Arabic:

(27) TAV-Version of (25):



A structure such as (27) also provides the final piece necessary to understand the postsyntactic insertion site of the dissociated Agr^0 morpheme inserted to host subject-verb agreement (see §2). Since the ultimate phonological realization of the Agr^0 node is dependent upon the featural content of the TAV^0 head, the Agr^0 node must be linearly adjacent to the TAV^0 node when Vocabulary Insertion occurs (Embick 2010). Thus, Agr^0 adjoins to TAV^0 when it is inserted, as in (28):

(28) Agr^0 Adjunction Structure for Arabic:



²⁶There are many other ways to achieve the result that one morpheme realizes tense, aspect, and voice in Arabic. I choose fusion for expository purposes only, and nothing crucial hinges upon the choice of fusion over head movement plus contextual allomorphy under c-command, for instance.

This structure and series of operations immediately accounts for several facts we have noted so far. In addition to the acategoriality of the root and the single exponence of TAV, this approach can also successfully account for the distribution of roots among the possible verbal patterns. In the structures immediately above, the root and v^0 are in a selectional relationship. This predicts that whether or not v^0 and the root appear together is dependent upon the identity of the root and v^0 in question. If we assume that there is a v^0 for each verbal pattern (which Arad (2003, 2005) does), then we expect the fact that not all roots appear in all patterns. Thus the root $\sqrt{tʃsr}$, ‘breaking’ appears only in patterns I, II, V, and VII, but not in patterns III, IV, VI, VIII, IX or X (Wehr 1976), and similar facts are reported for Hebrew by Arad (2003, 2005):

- (29) Patterns Acceptable with root $\sqrt{tʃsr}$:
- a. $tʃasar$, ‘he broke’ (I)
 - b. $tʃassar$, ‘he broke into pieces’ (II)
 - c. $tatʃassar$, ‘he was broken into pieces’ (V)
 - d. $intʃasar$, ‘he was broken’ (VII)
- (30) Patterns Unacceptable with root $\sqrt{tʃsr}$:
- a. * $tʃaasar$ (III)
 - b. * $?atʃsar$ (IV)
 - c. * $tatʃaasar$ (VI)
 - d. * $itʃtasar$ (VIII)
 - e. * $itʃsarr$ (IX)
 - f. * $istatʃsar$ (X)

Since we must capture the fact that roots select for the patterns they appear in, the move to make them both heads in a selectional relationship is a natural one. In this approach, v^0 's for particular patterns come specified for the roots they appear with, and the idiosyncratic pairing of root and template becomes a selectional restriction between syntactic heads.²⁷

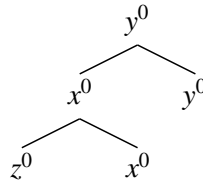
However, the working hypothesis faces two problems which are not so easily fixed by simple changes, which the next two subsections turn to describing.

3.2.2 The Linearization Problem

The first of these problems has to do with how to get from the head complex motivated in the previous section as (27) to the nonconcatenative linearization of these heads as $C-V-C-V-C$ with the correct TAV vowels and root consonants placed in the correct linear positions. There are numerous proposals in the Distributed Morphology literature for linearizing elements of a morphosyntactic representation (Embick 2007, 2010; Pak 2008, *i.a.*) but all of them involve the same problem with respect to the head structure given above: Linearization is assumed to produce binary ordering statements among terminal elements in the hierarchical representation (for particular discussion of this point, see Embick 2007). For instance, consider a complex word formed in the syntax:

²⁷Alternatively, we might place the idiosyncrasy with the root and say that roots come specified for particular v^0 's which they are licensed *under*. I know of no data which decides between these two understandings of root/ x selection, however, and so I adopt the one in the text to move forward. See Kramer 2009 for comparative discussion of these two approaches.

(31) Schematic Verb:



If the ultimate output of the linearization operation is a concatenation statement (call it \star) which orders the heads x^0 , y^0 , and z^0 in linear sequence, then we have the following possible outputs for the hypothetical structure above:

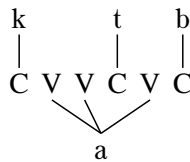
(32) Possible linearizations:²⁸

- a. $z^0 \star x^0 \star y^0$
- b. $z^0 \star y^0 \star x^0$
- c. $x^0 \star z^0 \star y^0$
- d. $x^0 \star y^0 \star z^0$
- e. $y^0 \star x^0 \star z^0$
- f. $y^0 \star z^0 \star x^0$

Of course, none of the linearizations in (32) are what is needed to derive the nonconcatenative linearization of TAV⁰, v⁰, and $\sqrt{\text{CCC}}$ found in Arabic. Moreover, the outputs of such linearization procedures on the syntactic structure argued for by Arad (2003, 2005) are nonsensical statements like $\sqrt{\text{CCC}} \star \text{CVCVC} \star \text{VV}$. Thus, simple concatenation statements involving terminal nodes in the morphosyntactic representation is not a sufficient linearization algorithm for deriving the forms of verbs in Arabic.

What is needed is a specific algorithm for doing nonconcatenative linearization, and this is the purpose of the template in the morphosyntactic representations above. The template is, following McCarthy (1979, 1981), *et seq.*, a CV-skeletal timing unit responsible for linearizing consonantal and vocalic morphemes in a nonconcatenative manner. In linking phonemic material to the CV skeleton, explicit (possibly nonconcatenative) ordering is established among phonemes which make up a morpheme. The process of linking is assumed to be governed by the principles of Autosegmental Phonology (see McCarthy 1979, 1981) and produces autosegmental outputs such as the following:

(33) Autosegmental Outputs for Arabic:



In this representation the consonantal root has been associated from left to right with consonant slots and the vocalic /a/ has been associated from left to right with vowel slots. The nonconcatenative output is given by the CV alternations in the template, and we can understand why the nonsensical statements resulted from the DM approach above: That approach attempted to linearize as if all the Vocabulary Items were on the same autosegmental tier. This appears to be exactly the kind of system we need—the familiar principles on autosegmental representations govern the linearization of the root and vowels, and the template provides nonconcatenative ordering. However, as the next section turns to discussing, there is reason to doubt the existence of templates and with them this possible explanation of nonconcatenative linearization in Distributed Morphology.

²⁸It is worth noting that (b) and (d) are only available after something like *m*-MERGER (Marantz 1984), PROSODIC INVERSION (Halpern 1995) LOCAL DISLOCATION (Embick and Noyer 2001). I include these orderings here, though, for concreteness.

3.2.3 Templates and Semitic Morphosyntax

Up until now, we have assumed the existence of a unit called the template which (by giving the order of consonants and vowels) provides the pattern in which the consonantal root and vowels are realized non-concatenatively. However, no arguments have been given for the formal need to reference the template *qua* morphological entity. To put it another way, we have not yet asked the question: Is there evidence for a morpheme called the template?²⁹

If the template does have morphemic status, then one would expect to find some morphosyntactic property which is tracked by the template as a realization of v^0 . In the Distributed Morphology literature on x^0 heads, two properties which are argued to be dependent upon the x^0 head are:

1. argument structure (*i.e.*, Embick 2004)
2. interpretation of the root (*i.e.*, Marantz 1997)

However, neither of these properties reliably correlates with template selection in Semitic. Arad (2005) provides several arguments against the idea that templates can be reliably correlated with the interpretation of the root, ultimately settling on the idea that interpretation of the x^0 and root in concert must be idiomatic (following Marantz (1995)). Since that work is concerned with the interpretation of roots in various contexts and lays out a considerable amount of evidence against taking (2) seriously, these arguments will not be reviewed here.

But what about argument structure? It certainly could be the case that particular templates are associated with reliable alternations in argument structure. This is the analysis implied by traditional grammars and studies in lexical semantics in Semitic which often produce grammatical function alternations among the various templates such as in Younes's (2000) discussion of the semantics of templates in Palestinian Arabic, shown in Table 6.

<i>Number</i>	<i>Form</i>	<i>Grammatical Function</i>
(I)	faʕal	basic
(II)	faʕʕal	causative of I
(III)	faaʕal	reciprocal, causative basic form
(IV)	?afʕal	causative of I/denominal
(V)	tafaʕʕal	passive/reflexive of II
(VI)	tfaaʕal	passive/reflexive of III
(VII)	nfaʕal	passive/reflexive of I
(VIII)	ftaʕal	passive/reflexive of I
(IX)	fʕall	denominal
(X)	stafʕal	denominal
(Q1)	faʕlal	basic quadriliteral
(Q2)	tafaʕlal	passive/reflexive of Q1

Table 6: Grammatical Function-Changing Relations Among Templates

However, such derivational relationships among patterns do not hold up to close scrutiny, as it is quite easy to find examples of verbs which have the same meaning in multiple forms, as Table 7 does for various form I and II verbs. In this case, the form II verb is not the causative of the form I verb or even

²⁹Note that this question is logically distinct from the question: Is there evidence for a prosodic constituent called the template? This latter question is the topic of much of the phonological work, and so I do not review it here. See Ussishkin 2000 for discussion.

plausibly a causative interpretation of the same root. Similar examples can be adduced for any of the other verbal patterns.

	<i>Root</i>	<i>I Verb</i>	<i>II Verb</i>	<i>Meaning</i>
a.	kds	kadas	kaddas	to pile up
b.	kfr	kafar	kaffar	to cover/hide
c.	rwd ^ʕ	rad ^ʕ a	rawwad ^ʕ	to tame/domesticate
d.	sdl	sadal	saddal	to let fall down/hang
e.	ħff	ħaff	ħaffaf	to surround
f.	ħt ^ʕ m	ħat ^ʕ am	ħat ^ʕ t ^ʕ am	to shatter

Table 7: Verbs with Identical Form I and II Meanings

Moreover, the same template can be associated with several different argument structures, many of which vary in transitivity or θ -role assigned to the external argument, and so must have different v^0 's in their syntactic representation. This is exemplified in Table 8 with verbs in the form II/*faʕʕal* pattern; again, examples can be adduced from any of the templates in MSA.

	<i>Root</i>	<i>Verb</i>	<i>Meaning</i>	<i>Argument Structure</i>
a.	bst ^ʕ	bassat ^ʕ	to spread out	<AGENT, THEME>
b.	ʕnb	ʕannab	to keep away from	<AGENT, GOAL> (<THEME>)
c.	s ^ʕ wt	s ^ʕ awwat	to vote	<AGENT>
d.	mlk	mallak	to cause to own	<CAUSER, AGENT, THEME>
e.	ʕd ^ʕ	ʕad ^ʕ d ^ʕ ad	to help each other	<AGENT, REFL>
f.	yjm	yajjam	to become cloudy	<THEME>

Table 8: Argument Structure Variation Across a Single Template

At this point, the only morphological reason to posit the existence of a template left to us is to ensure correct linearization of the root and vocalic material. If it were the case that an independently-needed mechanism elsewhere in the grammar could derive the correct linearization, then there would be a redundancy argument against including the template as a vocabulary item inserted in the morphological representation.

In this section I have argued for a particular syntactic representation of the Arabic clause which includes the functional hierarchy $T^0 > Asp^0 > voi^0 > v^0$ and subject raising as high as [Spec, T^0] using data from adverb placement, word order in negative sentences and ordering among verbal auxiliaries. While well motivated for syntactic reasons, this clausal structure was shown to pose some particular problems for the morphological composition of verbs which hinged on the inclusion of a template *qua* morpheme as a realization of v^0 . In the next section I will do away with the template in favor of output constraints on prosodic form independently needed in the language, and we will then be in a position to fit the syntactic pieces together in a principled way to derive the various Arabic verbal patterns.

4 Putting it All Together with Prosodic Glue

This section shows that there is already a sufficient linearization algorithm for nonconcatenative templatic morphology in another module of the grammar—the one responsible for prosodic structure-building. This demonstration begins from the results in morphophonological work on Arabic discussed in §1 which has attempted to derive the templatic form of NTM languages from independently-needed markedness constraints

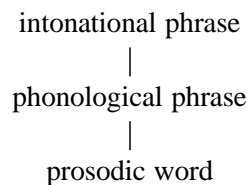
on prosodic form. This work began with Ussishkin 2000, 2005; and Buckley 2003, where it is shown that constraint interaction between prosodic markedness constraints in Optimality Theory (Prince and Smolensky 1993/2004) are sufficient for deriving template form. However, in these works, the root is assumed not to exist, a claim which does not fit with the present investigation. Later work, however, by Kramer (2007) and Tucker (2011a,b) has shown that it is possible to derive templatic form from markedness constraint interaction over root-based inputs.

Before adopting these approaches for Arabic, we should first be sure that prosody has relevance for allomorphy in general in Arabic. There are many such arguments dating back to McCarthy 1979, but one particularly salient example which argues for the independently needed status of prosodic structure comes from the so-called “pausal forms”—allomorphs of words in Arabic seen only at the edges of phonological and intonational phrases. These forms are discussed in nearly every Arabic grammar (see Erwin 2004; Harrell 2004; Cowell 2005; Ryding 2005; among many others), and come in a variety of different patterns, as discussed in McCarthy To Appear. A sample of these alternations from various patterns appear in (34–38):

- (34) Absence of suffix vowel:
 - a. ʔalkitaabu ~ ʔalkitaab, ‘the book (NOM)’
- (35) Epenthesis of h after stem:
 - a. ʔiqṭadi ~ ʔiqṭadih, ‘imitate!’
- (36) Metathesis of suffix vowel:
 - a. ʔalbakru ~ ʔalbakur, ‘the young camel (NOM)’
- (37) Absence of suffixal n:
 - a. kitaab-un ~ kitaab, ‘a book (NOM)’
 - b. kitaab-an ~ kitaab-aa, ‘a book (ACC)’
- (38) Substitution of suffix -ah for suffix -at:
 - a. kaatib-at-un ~ kaatib-ah, ‘a writer (F.NOM)’

While space prohibits a formal discussion of these facts (though see McCarthy To Appear for one proposal), the import of these examples is that the truncated forms on the right of ~ in (34–38) only appear at the edges of phonological and intonational phrases. In order to explain these allomorphic alternations, a descriptively adequate theory will have to make reference to prosodic structure.

We have thus seen evidence in this section that reference to prosodic structure is needed in order to account for the size and morphemic shape of the MSA verb. Specifically, we have seen evidence for at least three levels of prosody:



The next section turns to showing that the same constraints which derive the shapes of prosodic words in Arabic, along with independently needed restrictions on syllable and foot shape, are sufficient to linearize discontinuous morphemes in an NTM fashion.

4.1 Linearization under Prosodic Auspice

In this section I summarize the discussion in Tucker 2011b, where it is shown that independently needed constraints on prosodic word form are sufficient to derive the linearization of the Arabic verb in the framework of Optimality Theory (Prince and Smolensky 1993/2004). In this framework, possible output candidates are subjected to an evaluative component consisting of an ordered series of constraints, and the input which does the best on the highest-ranked constraints surfaces as the output form. Furthermore, constraints in Optimality Theory come in two flavors: MARKEDNESS constraints, which require outputs to satisfy a well-formedness restriction and FAITHFULNESS constraints, which require inputs to map to outputs in constrained ways.

Within this framework, Tucker (2011b) proposes a Root-and-Prosody theory of NTMs (the RP approach, henceforth) which relies on two assumptions:

(39) Basic Assumptions of the RP Approach:

- a. ROOTS AND VOWELS ARE MORPHEMES: The input to NTM forms consists of the consonantal root and a vowel affix (e.g., /a/ for perfective aspect).
- b. TEMPLATES ARE GIVEN BY PROSODY: Templates are emergent properties of words in NTM languages which surface from the necessary satisfaction of high-ranking prosodic markedness constraints (an extreme version of “templates are made up of the authentic units of prosody”; McCarthy and Prince 1993:1).

In the present context, these two assumptions are fitting—in §3.2.3 we saw evidence for the second claim that templates are not morphemic units and in §2 we saw evidence for treating the roots and vowels as distinct morphemes. Within these assumptions, linearization can occur as an emergent by-product of the output-satisfaction of the following constraints (see Tucker 2011b for justification of their inclusion):

(40) FAITH: A cover constraint for:

- a. MAX:
No deletion.
- b. DEP:
No epenthesis.

(41) *COMP(LEX): A cover constraint for:

- a. *COMPLEX^{ons}:
No complex onsets.
- b. *COMPLEX^{cod}:
No complex codas.

(42) INT(EGRITY): A segment in the output has a single correspondent in the input.³⁰

(43) CONTIG(UITY) (McCarthy and Prince 1995):

The portion of the input and output strings standing in correspondence forms a continuous string.

Given the Vocabulary Entries discussed in §2, satisfaction of these constraints by the output results in NTM structure on the surface, as the Tableau in (44) shows for two and three-consonant roots.³¹

³⁰In this work I do not show or consider candidates which violate UNIFORMITY, the constraint which bans coalescence. For all practical purposes, uses of INTEGRITY in this work can be understood to mean both INTEGRITY and UNIFORMITY.

³¹For reasons of space, I am abstracting away from quite a bit here, such as the action of the constraint ALIGN-ROOT and the reason for the single input vowel in Tableau (44). Such details are irrelevant for the present purposes, which focus on borrowing only the idea that prosodic structure is sufficient for linearization in MSA. See Tucker 2011b for a thorough discussion of the morphophonology of Arabic.

(44) Verbs in Form I (parentheses = feet, brackets = prosodic word):

$/\sqrt{CC(C)}/, /a/$	FAITH-ROOT	*COMPLEX	INTEGRITY	CONTIGUITY
☞ a. [(‘faʃal)]			*	**
b. [(‘faʃl)]		*!		*
c. [(‘fʃal)]		*!		*
d. [‘ʃal]	*!			*
☞ e. [(‘marr)]				*
f. [(‘amr)]		*!		

In Tableau 44, we see that the action of nonconcatenative linearization is in the ranking *COMPLEX \gg CONTIGUITY. This ranking informally translates to the idea that simplex syllable margins are more highly valued in MSA than linearizing affixal material continuously. Since it was discussed above that prosodic structural effects occur in MSA, this valuation should be unsurprising. However, what is surprising is that we have now derived nonconcatenative linearization using only prosodic constraints—all that was required was to view continuous linearization as a violable constraint.

Aside from simply being able to derive nonconcatenative linearization, one other property of the way in which this model derives NTM behavior is attractive in the current context. This has to do with the input and structure of the derivation of NTM behavior. Specifically, no claims are made in the derivation in the tableau in (44) concerning the syntax or the linearization of syntactic terminals. Thus, if NTM behavior is a fact about prosody and not about syntax or linearization, the appearance of NTM languages no longer poses a problem for the typology of syntactic linearization—the linearization problem as stated in §3.2.2 simply does not arise and there is no longer any need to worry about the cross-linguistic validity of a nonconcatenative-templatic-specific linearization procedure.

The reason this latter concern does not arise is because of the particular nature of typological predictions in Optimality Theory. As discussed in Prince and Smolensky 1993/2004, OT relates languages to one another by re-ranking of the constraints in the evaluative component. Since the analysis in the RP approach assumes that NTM behavior arises via constraint ranking, NTM behavior is thus naturally predicted in the factorial typology of any constraint set which assumes the constraints shown above. Given this lack of a need for a specific linearization mechanism, finding a way to connect the analysis in this section with the syntactic picture given in §3 seems especially desirable.

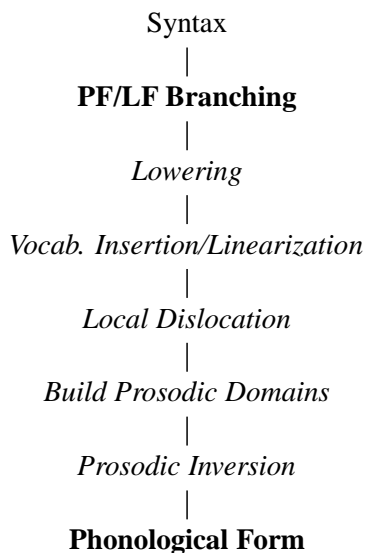
4.2 Conceptual Problems

The immediate problem with simply carrying over the analysis summarized in §4.1 is conceptual and two-fold: (i) The frameworks of Distributed Morphology and Optimality Theory are typically assumed to be incompatible in their assumptions (see Embick and Marantz 2006; Embick 2010 in particular) and (ii) there is a substantial timing inconsistency in the derivation of prosodic structure across the two theories. In this paper I do not consider (i) but do discuss (ii) here briefly.

The problem with simply claiming that the solution to NTM languages is to take prosodic structure and add it to the analysis in §3 is that the standard timing model of the PF branch assumes that prosodic structure is built too late to be of any use to linearization, as prosody is usually assumed to be built later (if it is built at all—see Pak 2008; Embick 2010) than linear structure is determined. This can be seen easily in

the explicit proposals made by Embick and Noyer (2001, 2007) for the sequence of events after Spell-Out along the PF branch:³²

(45) Embick and Noyer’s (2001) model of the PF Branch:

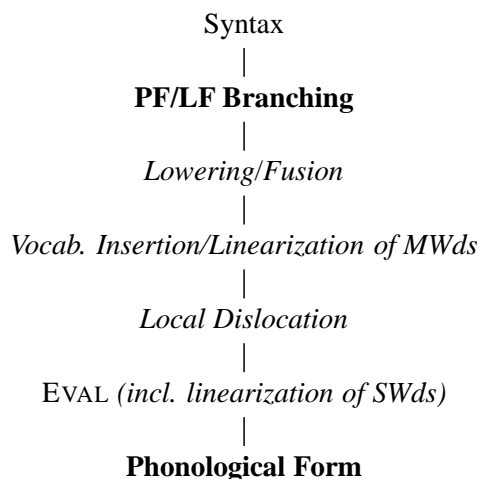


The problem here is that Vocabulary Insertion and linearization of syntactic terminals (the so-called “morphemes,” in DM) occurs before the building of prosodic domains, which occurs quite late. Thus, unless this order is altered, we cannot assume that prosodic structure can have an influence on linearization.

However, this assumption concerning the lateness of prosody in Distributed Morphology has recently been challenged (Trommer 2005; Gribanova 2010; Tucker and Henderson 2010). Specifically, evidence from direction marking, verbal affixes and argument structure, and the linear positioning of clitics has been argued to show that prosody must be built early and that Distributed Morphology as a model should countenance at least some of the constraint-based logic of Optimality Theory. The question, then, is how to properly integrate these two architectures in a way which helps to account for the facts in §§1–3 concerning the Arabic verbal system. The intuition is clear: Prosody must linearize the head adjunction structure from which the fully derived verb results, repeated here from §3:

³²I call this the “standard model” of the PF branch in DM because it has been adopted by much subsequent work. See Arregi and Nevins 2008; Pak 2008; Kramer 2009; among many others, for discussion of this model.

(50) A Model of the PF Branch:



In this model, the levels of “build prosodic structure” and “prosodic inversion” from Embick and Noyer 2001 have been replaced by the evaluative component of Optimality Theory, EVAL. This component takes as input to constraint evaluation the output of Local Dislocation, that is, a partially linearized string with subwords unlinearized with respect to one another. In such a model the linearization of phrasal elements and MWds will occur via general syntactic principles (heads before complements, specifiers before heads, etc.), whereas the linearization of the component SWds of Morphosyntactic Words are linearized by EVAL. If EVAL happens to value prosodic markedness constraints highly (as Ussishkin (2000) and Tucker (2011b) show must be the case for Arabic), then this linearization by EVAL will amount to linearization by prosodic principles, exactly as desired.

To see how this model works in action, let us consider the complete derivation of the Arabic form /faʕal pattern from lexicon to phonology. Following the discussion in §1 and the arguments against the template *qua* morpheme in §3.2.3, this derivation begins with the following numeration:³³

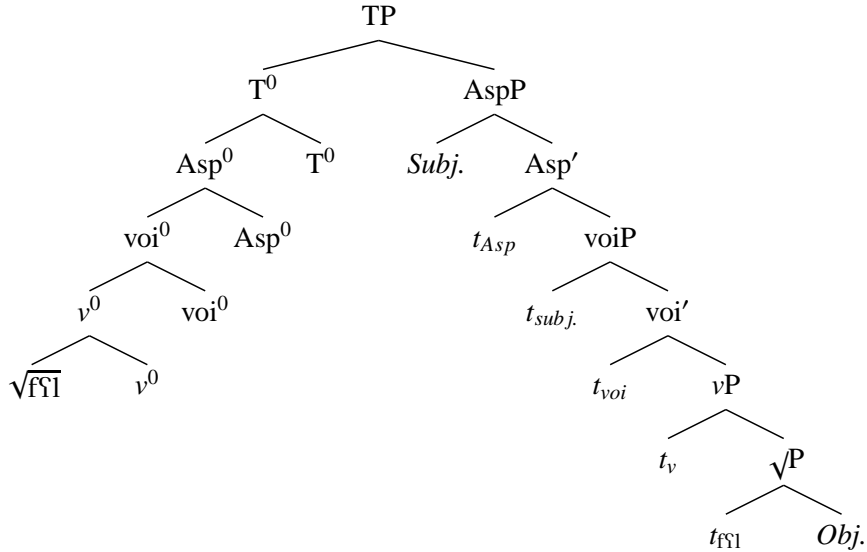
(51) NUMERATION for form /faʕal:
 $\{T^0, Asp^0_{perf}, voi^0, v_I^0, \sqrt{fʕl}\}$

Since the verb *faʕal*, ‘he did’ is perfective present aspect, the numeration selects T^0 without [PAST], voi^0 without [PASS], and Asp^0_{perf} . The selection of these three heads thus ensures the correct TAV information at LF, as well as the eventual correct vocabulary item insertion in the complex head formed by fusion. The selection of $\sqrt{fʕl}$, $DP_{subj.}$, and $DP_{obj.}$ is the selection of (what will come to be) the verbal predicative core and its (in this case, two) arguments, $DP_{subj.}$ and $DP_{obj.}$. However, the selection of v^0 is not quite so straightforward. In §3.2.3 I adduced several arguments for not treating the template as a morpheme—so what does the featural content of v^0 look like? Here I assume for concreteness that there is a separate Vocabulary Item for each verbal pattern containing any consonantal material which that pattern has over and above the root (e.g., *-t-* in form VIII) and a feature to index the verbal complex with a diacritic indicating the number of the form. In this case, v_I^0 is the v^0 which appears for form /faʕal forms, and will have a null exponence at Vocabulary Insertion, since there is no affixal material in form I once the template is dispensed with (see Table 2 in §1).

³³In the sample derivation which follows I abstract away from higher-level syntactic functional material above TP and the exact syntactic composition of phrasal arguments to the TAV⁰ complex. This allows the present discussion to focus on the derivation of the verb, the empirical topic at hand, while remaining agnostic enough to other syntactic decisions to be somewhat analysis-neutral with respect to other syntactic questions in MSA. Therefore, the numeration I give contains no numerated elements to construct DP arguments. I also abstract away from the mechanics of subject-verb agreement in MSA, since they are straightforward. None of these simplifications should affect the point at hand, however.

These heads (and the two DP phrases) combine in the syntax via MERGE, MOVE, and AGREE as discussed in §3. Specifically, the root $\sqrt{\text{ffl}}$ head moves through v^0 , Asp^0 , and T^0 as discussed above, resulting in the following structure as the derivation exits the narrow syntax (for VSO clauses):

(52) Output of the Narrow Syntax:



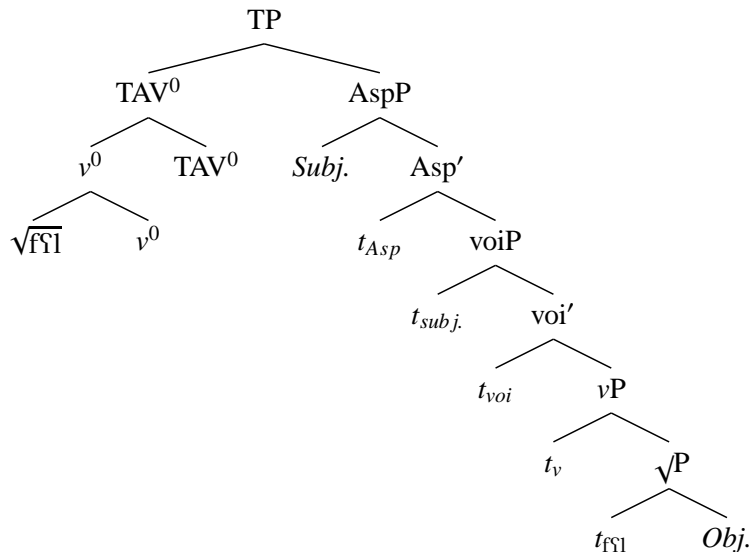
At this point, the syntactic computation has concluded (modulo movement of the Subject to [Spec, T^0] for EPP reasons, as discussed in §3). The syntactic representation is then handed off (via Spell-Out) to the PF (and LF) branch. Following the model proposed above, the first operations to apply are LOWER and FUSION. The former does not apply in MSA clauses, but the fusion rule discussed in §3.2.1, repeated below, applies:

(53) Fusion for Arabic, Repeated:

$$[T^0 T^0 [\text{Asp}^0 \text{Asp}^0 [\text{voi}^0 \text{voi}^0 [\dots]]]] \rightarrow [\text{TAV}^0 \text{TAV}^0 [\dots]]$$

The application of this rule fuses the three heads above v^0 into one complex head, resulting in the following morphosyntactic structure:

(54) Post-Fusion Clausal Syntax:



It is this structure to which linearization and vocabulary insertion apply. Since this work is not concerned with the linearization of MWds, let us assume that the linearization algorithm applies as discussed in Embick 2003 and Pak 2008 to yield Spec-Head-Complement orders. Applied to the tree immediately above, this yields the following linearization statements for the derivation of a simple VSO clause with a form I/ʃaʃal form:³⁴

(55) Linearization for simple VSO/ʃaʃal clauses:

- a. TAV⁰ ★ AspP
- b. *Subj.* ★ voiP
- c. voiP ★ vP
- d. vP ★ √P
- e. *Subj.* ★ *Obj.*

(56) Linearization After Chaining (Embick 2003):

TAV⁰ ∼ *Subj* ∼ *Obj.*

Notice that in (55–56), only the MWd TAV⁰ is linearized, not the SWd TAV⁰ segment or any of the other constituent parts of the TAV⁰ complex. The rest of the clause, however, is now linearized as it appears on the surface, as the linearization statement in (56) provides for a VSO word-order.³⁵ Following the discussion in Embick 2010, I assume that vocabulary insertion occurs on the output of linearization, with allomorphy sensitive to linear adjacency only. Thus, vocabulary insertion applies to the representation in (56).

There is a question at this point, however, as to how to do vocabulary insertion on a sequence of heads (like the ones which make up the complex head structure TAV⁰, above) which are not linearized. There are many ways to do this, but given time and space constraints, I will assume that Vocabulary Insertion inserts a set of exponents when the heads which make up an MWd are unordered. If we apply this mechanism to the representation in (56), this results in the following sequence of (semi-)ordered vocabulary entries:

(57) { √ʃʃl, aa } ∼ *Subj.* ∼ *Obj.*

From here, the derivation proceeds to the mechanism of LOCAL DISLOCATION. This operation has not been discussed at all in the present work, due to the fact that there is no evidence for its application in the derivation of Arabic verbs, and so I will continue to eschew discussion of it here.³⁶ After Local Dislocation has (not) applied, the derivation is handed off to the EVAL component familiar from Optimality-Theoretic architecture. I assume that this component is responsible for realizing/determining the phonology/PF representation of all of the elements in (57), but for our purposes here I only show the action at the level of the verbal head complex. Specifically, EVAL takes as input the (unordered) set { √ʃʃl, aa}. The derivation of *ʃaʃal* then proceeds according to Tableau 58:

³⁴Following Embick (2003), I do not show the linearization statements introduced by traces.

³⁵Of course, if we had moved the subject to [Spec, T⁰] in the narrow syntax, this would result in a chaining statement of *Subj* ∼ TAV⁰ ∼ *Obj.* and SVO order, instead.

³⁶Though see Kramer 2010 for a particularly detailed discussion of the need for Local Dislocation in the related Ethio-Semitic language Amharic.

(58) Derivation of *faʕal*:

$\sqrt{CC(C)}$, /a/	FAITH-ROOT	*COMPLEX	INTEGRITY	CONTIGUITY
a. [(ʕaʕal)]			*	**
b. [(ʕaʕl)]		*!		*
c. [(ʕʕal)]		*!		*
d. [(ʕal)]	*!			*

At this point, the derivation is complete, and we have seen an example of how MSA verbs may be derived successfully from lexicon to phonology. This system works by distributing the component pieces of the verb across syntactic space as argued for in §3 and allowing phonology to linearize these parts using prosodic markedness constraints as argued for in Tucker 2011b and discussed above. Derivations for the other verbal forms are omitted here for space reasons, but proceed along the same lines, *mutatis mutandis*.

Before closing this work, it is worth pointing out that this framework allows for stating an answer to a long-standing problem in the morpho-{syntax, phonology} of Arabic verbs. In the previous discussion, it was noted in passing that the theory of allomorphy in Embick 2010 assumes that linear adjacency is the only relevant locality condition on allomorphy. To unpack this claim, let us first begin with the exact formulation (Embick 2010:12):

(59) Contextual allomorphy is only possible with elements that are concatenated.

Within the present framework, (59)’s status is uncertain with respect to the complex head TAV^0 which remains unlinearized in the input to EVAL. However, notice that from the point of view of the morphosyntactic linearization of MWds, TAV^0 is one unit, its parts undifferentiated with respect to linearization. One could assume that contextual allomorphy is either (i) possible or (ii) not possible with such ordered sets. If we assume (ii), then the theory which results would predict that contextual allomorphy of, *i.e.*, $\sqrt{ʕl}$ triggered by v^0 is not possible. If we assume (i), on the other hand, such allomorphy is predicted to be possible.

It turns out that the contextual allomorphy predicted to exist with (i) but not with (ii) is found in MSA. Specifically, MSA has a special class of roots known in the Arabic literature as WEAK ROOTS (Ryding 2005). These roots have a semivowel in one of their three consonantal positions. Crucially, when this semivowel appears in the medial position, a particular allomorph of the entire verb appears in form I, VIII, and X (in the dialects). These roots are typically known as HOLLOW ROOTS, and there exist, to my knowledge, no proposals for their analysis in the generative literature. A sample of these hollow roots from the Iraqi dialect of Arabic are given in Table 9, using the nonce root \sqrt{fwl} .³⁷

When hollow roots appear in forms I, VIII, or X, the medial consonant disappears and the verbal form appears with either a long /aa/ in the perfective active or a long vowel corresponding to the root consonant: /uu/ for the semivowel /w/ and /ii/ for the semivowel /j/ (Ryding 2005). Which vowel appears on the surface is root-conditioned, and while in many of the dialects this vowel freely alternates as shown in Table 9 (see Erwin 2004), in MSA only one form is ever found per root, with the choice of vowel dictated idiosyncratically by the root in question.

In the present framework, this amounts to allomorphy of the root and TAV^0 head (the root and its vowels) conditioned by the selection of a form I, VIII, or X v^0 (its “pattern”). This is exactly the kind of allomorphy that is predicted if one assumes that unordered sets of vocabulary entries comprising one large MWd can influence the allomorphic selection of other such heads. Thus we have an argument against (ii) and in favor of (i) (*contra* Embick 2010). Similarly, Nevins (2005) notes that such hollow verbs are problematic

³⁷Note that like many of the dialects, MSA lacks some of the forms for verbs that MSA possesses in large quantities, as discussed in §1. This accounts for the missing numbers in Table 9.

Root	\sqrt{fwl}
I	faal/fuul
II	fawwal
III	faawal
V	tfawwal
VI	tfaawal
VIII	ftaal/ftuul
X	stafaal/stafuul

Table 9: Hollow Roots in Iraqi Arabic

for pure OT-based approaches to Semitic verbs such as the Fixed-Prosodic approaches of Ussishkin (2000, 2005).

How would such verbs be handled in the present approach? The key here is to allow allomorphic sensitivity of morphosyntactic subwords to other subwords inside a single morphological word structure. If we modify the proposal in (59) above to be the following:

- (60) Contextual allomorphy is only possible with elements that are concatenated or contained in the same MWd structure.

then the idiosyncratic allomorphy of hollow roots can proceed straightforwardly: For these particular roots, the list of vocabulary items provides for a more specific form I hollow form which wins in all derivations by the SUBSET PRINCIPLE. Thus, the model advanced here provides for a principled place to localize the idiosyncratic allomorphy of hollow verbs in MSA, a point in its favor given the recalcitrant nature of such forms.

5 Conclusion and Implications

In this work I have attempted to give a unified treatment to the Modern Arabic derivational verbal system, couched in three modern generative frameworks: Minimalist syntax (Chomsky 2000, 2001a,b, 2008); Distributed Morphology (Halle and Marantz 1993, 1994; Embick and Noyer 2001, 2007); and Optimality Theory (Prince and Smolensky 1993/2004). This was done by proposing a particular morphemic analysis for the Arabic verbal derivational and inflectional systems which breaks the verb into root, vowel, and verbal affixes (but crucially, not pattern) morphemic parts. These parts were then shown to be necessarily distributed across a large syntactic space, including the heads T^0 , Asp^0 , voi^0 , and v^0 , all of which were independently motivated using data from VP-adverbs and the order of constituents in past periphrastic clauses.

On the phonological side, the need for prosody was shown to be quite strong in MSA. Specifically, minimal and maximal word effects, together with prosodically conditioned allomorphy were shown to require reference to prosodic structure for descriptive adequacy. Once one makes this admission, however, linearization, which was quite problematic when considered in its syntactic context only, becomes possible using independently motivated constraints on prosodic structure, following Kramer (2007) and Tucker (2011b). Putting the pieces of these two modules together required revising slightly the concrete proposals for the PF branch given in Embick and Noyer 2001 and Embick 2010, allowing for the phonological/prosodic component to linearize morphosyntactic subwords, while the morphosyntax proper linearizes morphosyntactic words. Finally, this new model was shown to be superior to simple DM or OT-only models, given that it can account for the allomorphic alternations in MSA and dialectal hollow verbs.

Within this proposed model, several interesting avenues present themselves for future research in the form of open questions. The first of these has to do with cross-linguistic applicability; because this work has focused on the Semitic language family (and Arabic in particular), it was possible to countenance the strong claim that prosody is responsible for all subword linearization. Obviously this is not a tenable view from a crosslinguistic perspective, and the very claim itself is at odds with the very articulated system in Embick 2010. One question that remains for future research is how to delimit the possible space of language variation within this model: Do all languages linearize subwords in the phonology? Only some? If only some do, how does a language-learner make that choice? These questions have been untreated here and must be the topic of future work.

Along a similar vein of omission, little has been made in this work of patterns in verbal argument structure beyond surface-level generalizations about similarity in meaning across different patterns (*i.e.*, that there is none). This is somewhat surprising given the focused attention to argument structure which is common in the literature on Hebrew morphosyntax (*e.g.*, Doron 1996, 2003; Marantz 1997; Arad 2003, 2005). Future work is needed to hook this present model up to a cohesive theory of MSA morphosemantics, particularly in the domain of argument structure. Within this research program, it would be quite fruitful to ask how regularities in argument structure across verbal forms (to the extent that they exist as tendencies instead of hard-and-fast generalizations) can be captured and what their impact is on the morphosyntax and morphophonology.

Finally, it is always useful to ask the question: How generally applicable is the present model? It has been claimed here (albeit only rhetorically) that this model is applicable to *all* languages which display root-and-pattern morphology. However, evidence was only given from Arabic, and its Modern Standard dialect at that. Future work is needed to clarify exactly how the model extends to other Afroasiatic languages displaying NTM behavior (*i.e.*, Hebrew, Maltese, Amharic, etc.), as well as languages outside the Afroasiatic family which have similar phenomena. At present, this framework as outlined here serves as merely a starting point for such undoubtedly interesting future typological work.

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