

The Nanosyntax of Arabic Agreement:

Rethinking Noyer's Hierarchy as Functional Sequence

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Abstract

Modern Standard Arabic verbal agreement shows two properties that I argue to have important implications for the theory of interpretative/post-syntactic morphology. Firstly, it shows affixes whose distribution cannot be described as natural classes in the SPE-style subset principle of Distributed Morphology (Halle and Marantz 1993) without recourse to impoverishment rules that violate otherwise established markedness constraints (Noyer 1992, Nevins 2011). Secondly, certain affixes occur either as prefixes or as suffixes on the verb, depending on the Tense/Aspect configuration. This is unexpected from the perspective of any theory that argues that prefixhood and suffixhood are part of the vocabulary item/rule itself (Halle and Marantz 1993, Noyer 1992, Halle 2000). I argue that the hierarchy Noyer (1992) described actually captures properties of the f-seq, and that spellout operating on spans, regulated by a superset principle (Starke 2009) can capture the distribution of these affixes, and that a movement-based antisymmetry approach to linear order can derive the positional effects at PF (Kayne 1994, 2017, Koopman 2017b, 2018, Julien 2002, Blix under review) in a way that unifies their paradigmatic distribution with their linear one.

1 Introduction

Narrowly, this paper discusses the linear and paradigmatic distribution of the Classical/Modern Standard Arabic (MSA) agreement affix *t'*. Paradigmatically, the suffix's distribution is of interest, because its distribution has to be described disjunctively under a subset approach to the post-syntactic matching of a vocabulary item to a morpho-syntactic context. Linearly, it is of interest, because it can occupy three distinct morphological positions, as a prefix, or in two different suffixal positions.

Broadly, the approach proposed here argues that the hierarchy Noyer (1992) describes as governing various morphological effects in Afro-Asiatic languages, such as Discontinuous Bleeding, the order of spellout, or Impoverishment, really describes the functional sequence of Tense and Agreement, and that a bottom-up, span-based spellout can derive these effects in MSA without recourse to a template, an independently existing hierarchy, or Impoverishment. I argue that the span-based approach to the spellout of agreement advocated in Blix (under review) can derive effects that cannot be stated in a non-contradictory or arbitrary fashion in a subset principle approach to matching a vocabulary item to its contexts, and link the paradigmatic distribution to the linear one in a systematic way.

The first aspect, i.e., the paradigmatic distribution of *t'* bears on the nature of natural classes that morphemes are sensitive to, i.e., potentially able to spell out at PF. It is standardly assumed within Distributed Morphology (DM) that natural classes are characterized by an SPE-style

subset principle: A set/structure of features [A,B] defines the classes [A], [B], and [A,B], and – possibly – [], i.e., there is a structural symmetry to (certain) features that is resolved by other means, such as an Elsewhere Principle based competition, or markedness. The distribution of ‘*t*’, and the contrasts it shows with ‘*y*’, however, cannot be captured in such a system. To see this, consider the data in Table 1: First consider the subjunctive contrast between *y-aktub-a* (3MS) and *t-aktub-a* (3FS): In a subset-based approach, minimally, ‘*t*’ spells out feminine gender, or ‘*y*’ spells out masculine gender, given that these verb forms form a minimal pair for gender.

PERSON, NUMBER	SUBJUNCTIVE	
	FEMININE	MASCULINE
3SG	<i>t-aktub-a</i>	<i>y-aktub-a</i>
3PL	<i>y-aktub-na</i>	<i>y-aktub-uu</i>
2PL	<i>t-aktub-na</i>	<i>t-aktub-uu</i>

Table 1: Classical Arabic ‘*t*’ and ‘*y*’ with *k-t-b* ‘to write’

Next, consider the same contrast in the third person plural of the subjunctive: Here we find *y-aktub-uu* (3MP) and *y-aktub-na* (3FP). Since ‘*y*’ occurs in both genders, it cannot be specified for gender, leading to the conclusion that it must be ‘*t*’ that is responsible for the first contrast, i.e., specified for feminine gender. In the second person, however, we are led to the opposite conclusion: In both the masculine *t-aktub-uu* (2MP), and the feminine *t-aktub-na* (2FP) we find ‘*t*’, rather than ‘*y*’, but with the same suffixes as in the third person plural. If the subset principle leads us to conclude that both ‘*t*’ and ‘*y*’ are unspecified for gender, however, there is no explanation for the initial contrast in the third person singular.¹ Instead, we arrive at a descriptive disjunction: From the contrast within the third person singular, we see that the *y/t* contrast encodes gender, but in the third/second person plural, we see the same *y/t* contrast encoding person.

The second aspect of interest with respect to the agreement morpheme ‘*t*’ pertains to its linear distribution: In addition to the prefixal paradigms, MSA also has a purely suffixal agreement paradigm called the Perfect. As shown in Table 2, some of the affixes that occurred as prefixes above, surface as suffixes in these paradigms. The first person plural form *n-aktub-a* has *katab-n-aa* is its Perfect counterpart, and every form that exhibits prefixal ‘*t*’ also shows a suffixal ‘*t*’ — with an additional occurrence of ‘*t*’ in the first person singular.

Curiously, however, ‘*t*’ can differ in its relative position as a suffix, as seen in the contrast between *katab-a-t* (3MS) and *katab-t-a* (3FS), both of which have *t-aktub-a* as their subjunctive counterpart. We thus find ‘*t*’ to be involved in the spellout of two paradigmatic contrasts, gender *or* person, as well as occurring in three distinct linear positions: In the non-perfect

¹Note that the point holds under any kind of standardly taken assumptions about feature structure, such as *i*) one gender is specified and the other is underspecified, *ii*) one is a subset of the other, or *iii*) both are specified (privatively or as opposite values of a binary feature), as long as there is a structural symmetry within the AGR node.

SUBJECT	SUBJUNCTIVE	PERFECT
1SG	ʔ- <i>aktub-a</i>	<i>katab-t-u</i>
1PL	n - <i>aktub-a</i>	<i>katab-n-aa</i>
2FS	t - <i>aktub-ii</i>	<i>katab-t-i</i>
2MS	t - <i>aktub-a</i>	<i>katab-t-a</i>
3FS	t - <i>aktub-a</i>	<i>katab-a-t</i>
3MS	<i>y</i> - <i>aktub-a</i>	<i>katab-a</i>

Table 2: Prefix/Suffix Alternations with *k-t-b* ‘to write’

paradigms, ‘*t*’ is always prefixal, but in the perfective, the gender contrast is encoded by ‘*t*’ at a suffixal position that is different from the position of first/second person ‘*t*’.

To my knowledge, there are two different perspectives in the DM literature that have been taken on the paradigmatic distribution of ‘*t*’ in the prefixal paradigms, and none that explicitly link it to the suffixal paradigms. Halle (2000) proposes that the prefixal ‘*t*’ is a pure elsewhere marker, devoid of features. It is inserted in the second person, because there are no competing prefixal vocabulary items. In the third person feminine singular, an Impoverishment rule deletes the third person feature [–participant], bleeding the insertion of the third person affix ‘*y*–’, and feeding the insertion of ‘*t*–’. The first issue with this account is the reliance on competition among prefixes only, which does not extend to the suffixal paradigms; the second issue is the reasoning that lead Noyer (1992) to argue for the other perspective in the literature, namely a homophony account: As Noyer shows in great detail, there appears to be a general hierarchy that governs Impoverishment in the Afro-Asiatic language family’s prefixal conjugations, as in (1). According to his account, a co-occurrence filter on two features can trigger Impoverishment of the feature that is lower on the hierarchy, but never vice versa — the exact opposite of the Impoverishment rule proposed by Halle.

- (1) *Noyer’s Impoverishment Hierarchy*
 Person > Number > Gender

In fact, Noyer (1992: 93) makes a further claim about the hierarchy: It does not only govern Impoverishment, but also the order of spellout — if the relevant vocabulary items are disjoint or overlapping, then person is spelled out before number, and number is spelled out before gender. Taking Bobaljik’s (2000) position that spellout operates in a bottom-up fashion, I argue that we can account for both the linear and the paradigmatic distribution of Classical Arabic agreement by taking Noyer’s hierarchy to represent an insight into the syntactic structure of MSA agreement, rather than an independent hierarchy governing morphological operations: It represents an inversion of the syntactic hierarchy, and person is spelled out first, precisely because it is at the bottom of the agreement structure. Taking the Distributed Morphology notion of *syntactic hierarchical structure all the way down*, radically serious, I will assume that all syntactic hierarchy is composed of maximally simple heads, not feature bundles (Starke

2009, Caha 2009, Bobaljik 2012), and that the PF-interpretation of syntactic structure by vocabulary items targets contiguous spans of such maximally simple heads. In particular, I assume that person is an internally complex region of the agreement structure, and that a containment relationship as in (2) holds (following e.g., Béjar and Rezac 2009, Blix under review, Harley and Ritter 2002).

- (2) Internal Structure of Person
- a. 3rd [3]
 - b. 1st [1[3]]
 - c. 2nd [2[1[3]]]

Concretely, I adopt the following Nanosyntactic assumptions: Firstly, a vocabulary item lexicalizes a span, or a span of spans (by means of a Pointer, Caha and Pantcheva 2012, Blix under review). Secondly, vocabulary items match all their subspans (the *Superset Principle*). Thirdly, spellout of such spans targets the largest span that can be matched by a vocabulary item (*Cyclic Overwrite*). Fourthly, the commonly shared Elsewhere Principle assumption that the more specific vocabulary item takes precedence over a less specific one in case they match the same span.

From that perspective, *t*' is argued to be a first person singular feminine marker, lexicalizing a pointer between number and person, as in (3a). Pointers have been argued to account for Blansitt's generalization (Caha and Pantcheva 2012), as well as certain omnivorous number and person hierarchy effects (Blix under review). A vocabulary item may, under this perspective, lexicalize two spans X, Y with a pointer $[X \rightarrow Y]$. Each of these two spans characterizes a set of matching sub-spans, and the vocabulary item then matches any span that is formed by contiguity between a subspan of X and a subspan of Y. Under inclusion of the empty span as a trivial subspan, this gives rise to the possibility of a disjunctive surface distribution, since the vocabulary item in question can spell out a subspan X or Y, or a combination thereof, since a subspan X_s of X together with the empty subspan is identical to X_s by definition. Applying this previously developed theory to the data at hand, I argue that the structure in (3a) allows us to account for the disjunctive properties of the *y/t* contrast in these spanning terms.

- (3) a. $/t/ \Leftrightarrow '[FEM[SG \rightarrow [1[3]]]]'$
- b. $/y/ \Leftrightarrow '[SG[3]]'$
- c. $/\emptyset/ \Leftrightarrow '[SG[2]]'$
- d. $/na/ \Leftrightarrow '[FEM [PL]]'$

Crucially, the pointer, denoting the fact that this vocabulary item lexicalizes a *span of spans*, allows for the item to spell out the two internally contiguous spans $[FEM[SG]]$ and $[3]$ together, as $[FEM[SG[3]]]$, i.e. a third person singular feminine, as in (4a).

This is possible, because $[3]$ is a subspan of $[1[3]]$, i.e., matched by the lower span below the

pointer. The [FEM[SG]] is matched trivially by the higher part, due to their identity. Finally, the whole structure is contiguously matched by 't' at large, since no head that is not lexicalized by 't' intervenes between the two spans, and thus 't' can spell out all of [FEM[SG[3]]].

- (4) a. $\overbrace{[\text{TENSE} [\text{FEM} [\text{SG} [3 [\text{aktub}]]]]]]}$ 3FS
- b. $\overbrace{[\text{TENSE} [\text{FEM} [\text{PL} [2 [1 [3 [\text{aktub}]]]]]]]]}$ 2FP
- c. $\overbrace{[\text{TENSE} [\text{FEM} [\text{PL} [3 [\text{aktub}]]]]]]}$ 3FP
- d. $\overbrace{[\text{TENSE} [\text{SG} [3 [\text{aktub}]]]]}$ 3MS

In contrast, in the second person in (4b), the affix 't' can spell out part of the second person's structure, namely [1[3]], since this is a trivial subspan of [1[3]], and contiguity with the *empty* subspan of [FEM[SG]] is trivially fulfilled. However, since the person head [2] blocks contiguity with gender, it cannot spell out person and number/gender together in the second person, thus accounting for its presence in both the masculine and the feminine second person.

In the third person feminine plural, [FEM[PL[3]]] in (4c), where we find 'y', the plural head below gender blocks contiguity with [FEM], and therefore 't' cannot spell out the whole structure that includes Person, Number and Gender. Instead, both 'y' and 't' are candidates for the spellout of [3], and the smaller, more specific item 'y' wins due to the Elsewhere Principle. In a parallel fashion, the third person singular masculine in (4d), where no FEM head is in the structure, has both 't' and 'y' as candidates for the spellout of [SG[3]], and 'y' wins the competition for the same reason.

We thus derive the distribution of 'y' and 't' as natural classes as characterized by the superset principle. The remainder of the material is then spelled out in further cycles, deriving what Noyer called *discontinuous bleeding*: When 't' is able to spell out feminine gender in the first (lowest) cycle, and thus *y-aktub-a* (3MS) and *t-aktub-a* (3FS) are syncretic at the suffix. In contrast, when 't' is unable to spell out gender at the prefix, as in *t-aktub-na* (2FP), or *y-aktub-na* (3FP) we see gender expressed at the suffix instead — a syncretism that the zero affix for [2] derives, since the third cycle of 2FP and the second cycle of 3FP are identical, as shown in (5):

- (5) a. $\overbrace{[\text{TENSE} [\text{FEM} [\text{PL} [2 [1 [3 [\text{aktub}]]]]]]]]}$ 2FP
- b. $\overbrace{[\text{TENSE} [\text{FEM} [\text{PL} [3 [\text{aktub}]]]]]]}$ 3FP

The linear order of these affixes will then be derived by suggesting that the phrase headed by [3] moves to the specifier of the Tense head, pied-piping all material that is spelled out

within the same span as [3], and stranding the remaining material; under an Anti-Symmetry approach (see Kayne 1994, 2017 broadly, as well as more narrowly for morpho-syntactic issues Koopman 2017a, Starke 2009, Caha 2009, Blix under review), this derives the correct order. Unlike previous approaches, which stipulate the prefix/suffix distinction as a property of the vocabulary item, and thus miss a generalization that holds for them *as a class*, this approach provides an explanatory account of the set of prefixes as a derivational result: Whatever affix spells out [3], may become a prefix.

The same approach is then shown to extend naturally to the suffixal paradigm. In particular, I show that the morphological evidence points to the Perfect being characterized by a head PERF between Person and Number. I then argue that the same constraint for linear adjacency between the affix that spells out [3] and the verbal stem will hold in both prefixal and suffixal paradigms, and allows for a uniform characterization of the paradigmatic and linear distribution of ‘t’. As Table 3 shows, there is no suffixal counterpart to the smaller third person affix, ‘y’, but instead the contrast between the third person singular masculine/feminine is encoded by *addition* of ‘t’, rather than by the *y/t* contrast from the prefixal paradigms.

P/G/N	SUBJUNCTIVE	PERFECT
3MS	y-aktub-a	katab-a
3FS	t-aktub-a	katab-a-t
2MS	t-aktub-a	katab-t-a

Table 3: Prefix/Suffix Alternations and Their Absence

I take this to show the presence of a zero affix that spells out a larger structure than ‘y’, namely $\emptyset \Leftrightarrow [\text{PERF}[3]]$. From that perspective, it follows, that ‘t’ cannot spell out [3] in the third person singular feminine of the Perfect, since ‘ \emptyset ’ can spell out a larger span $[\text{PERF}[3]]$ that ‘y’ and ‘t’ do not match. However, this first cycle leaves FEM uninterpreted, i.e., subject to a later cycle, for which ‘t’ is the matching candidate: The span $[\text{FEM} [\text{SG}]]$ is spelled out by ‘t’, as in (6).

$$(6) \quad \begin{array}{c} \text{‘t’} \quad \text{‘}\emptyset\text{’} \\ \underbrace{\hspace{1.5cm}} \quad \underbrace{\hspace{1.5cm}} \\ [\text{TENSE} [\text{FEM} [\text{SG} [\text{PERF} [3 [\text{aktub}]]]]]] \end{array} \quad 3\text{FS}$$

Under this perspective, the correlation between the affix encoding a gender contrast vs a person contrast with its linear position as a prefix or a suffix receives an explanation that is unified with the account of the location of the other affixes, by simply stating that the affix that spells out [3] must be adjacent to the root, a more precise implementation of which will be given below, in terms of anti-symmetry and Heck’s (2008) edge condition on pied-piping. The current approach advances a fully *atemplatic* notion of morphology, where linear order is derived purely in syntactic terms, with movement targeting phrases, and pied-piping being determined by spans; the lesson from the variation in linear order that a single affix may exhibit, show that a lexical specification for prefixhood/suffixhood cannot be empirically correct, *and* misses a generalization about the set of prefixes. Instead of assuming templatic effects, I show that it

is precisely the flexibility of matching that the pointer theory provides that corresponds to the paradigmatic and linear distribution of this affix, and the contrasts that it can encode; the linear and paradigmatic peculiarities of the distribution of ‘*t*’ find a uniform explanation in the terms developed in Blix (under review). I further show that from this perspective, not only does Noyer’s (1992) hierarchy find a well-defined place in the syntactic theory, as part of the functional sequence, but also that the syncretism effects in Standard Arabic that were characterized by Noyer as Impoverishment can be captured purely as syncretism effects of vocabulary insertion without a second mechanism such as Filters.²

The paper is organized as follows: Section 2 will provide the theoretical machinery that I am employing. Section 3 will discuss the prefixal paradigms, focussing first on the paradigmatic distribution, and then deriving the linear effects, and their derivation. Section 4 will extend this approach to the suffixal Perfect paradigm, and show how certain affixes can occur as either a prefix or a suffix. Section 5 will offer a brief discussion of the current approach against Halle’s and Noyer’s perspectives, and Section 6 concludes.

2 Theoretical Background

This section introduces the technical framework in which this work is couched, i.e., Nanosyntax. For the basic notions of span based spellout, it follows Starke (2009), Caha (2009), with some technical details adopted from Svenonius (2018); the discussion of the Pointer is based on Caha and Pantcheva (2012), as well as Blix (under review).

The general tenants of Nanosyntax lie in the idea that morphological items interpret contiguous “chunks” of syntactic structure. Lexical access occurs after every instance of Merge, and cyclically overwrites the previous spellout, until no vocabulary item can be found that is able to interpret the newly built chunk — in this case, the previous cycle of spellout is finalized, and a new cycle of spellout begins, starting with the head that could not be spelled out in the previous cycle.

(7) *Cyclic Overwrite*

Spellout proceeds in a cyclical, bottom-up fashion, paralleling the syntax. Every cycle of spellout overwrites the previous cycle, until no vocabulary item can be found for a span, making the previous cycle effective. The next cycle is anchored at the head for which no span could be found.

²Note that in the kinds of cases I discuss here, what is at issue is whether syncretisms, partial or total, should be captured by multiple mechanisms — the empirical fact that two morpho-syntactic contexts find (partially) identical expression is in principle a possible effect of the matching mechanics (e.g., the subset principle, the superset principle): The contexts [A,B] and [A] can be syncretic, because an item [A] matches both of them, or because an Impoverishment rule deletes, say, [B] in the context of A. While I argue here that the matching mechanism should, if plausible and possible, be the only mechanism to achieve this goal, there is a more general argument in favor of Impoverishment, given for example by Bobaljik (2002), who argues that trans-paradigmatic syncretisms are not properly captured by reducing them to vocabulary insertion, since it would be an accident of the set of items, when in fact it appears to be a property of the language. While the boundary between these two cases is not always clear-cut, I leave this issue aside here.

Closely intertwined with this conceptualization, is the notion that head-movement and the Distributed Morphology process of Fusion can be replaced by vocabulary items lexicalizing spans of heads. By doing so, the fact that morphological co-exponence of two or more heads by a single morpheme/vocabulary item occurs, is derived from the content of the vocabulary item itself, i.e., Fusion is *vocabulary driven*. The notion of a span itself is a contiguous n-tuple of heads in a syntactic structure, such that each head has the following head as the one heading its complement. This is formalized as in (8).

(8) *Span*

An n-tuple of heads $\langle X_n, \dots, X_1 \rangle$ is a span in a structure S, if and only if $X_{n-1}P$ is the complement of X_n

Adapted from Svenonius (2018: 90)

Based on this notion, we can construct a matching condition, as in (9): A vocabulary item lexicalizes a span, which characterizes a set of subspans that it matches, i.e., that it can potentially spell out (and will spell out unless it is overwritten cyclically, or a better candidate exists).

(9) *Matching*

A Vocabulary Item that lexicalizes a span $\langle X_n, \dots, X_1 \rangle$ matches any syntactic span $\langle Y_m, \dots, Y_1 \rangle$, s.t.:

(i) $X_1 = Y_1$, and

Anchoring

(ii) for any Y_p , s.t. $p < m$: $X_p = Y_p \rightarrow X_{p+1} = Y_{p+1}$

Contiguity

Matching thus derives what has been dubbed the *Superset Principle*: A Vocabulary item matches all its sub-spans, subject to an identity condition for the lowest element of the respective spans, called *Anchoring*, as well as one on the order of items, called *Contiguity*. A Vocabulary item that lexicalizes a span $[A[B[C]]]$ will thus match all spans that are identical with respect to the bottommost element, $[C]$, and show the same contiguity, i.e., it will match the spans $[A[B[C]]]$, $[B[C]]$, as well as $[C]$.³ A more simple way of thinking of this is in terms of subspans, as in (10).

(10) *Subspan*

Any vocabulary item $\langle X_n, \dots, X_1 \rangle$ characterizes a set of contiguous subspans $\{\langle X_m, \dots, X_1 \rangle \mid m \leq n\}$ that it matches.

That is to say a span $\langle X, Y, Z \rangle$ characterizes the set of subspans $\{\langle X, Y, Z \rangle, \langle Y, Z \rangle, \langle Z \rangle\}$, i.e., its matching spans. In this paper, I defend an extension of this basic matching principle that has been advocated in Caha and Pantcheva (2012) and Blix (under review), in order to account

³I continue to use the familiar bracketing notation for spans here, despite the fact that a span is not necessarily a constituent, or vice versa. For similar approaches in terms of constituency rather than spans, however, see Svenonius (2018), Starke (2018).

for certain regularities in “multidimensional paradigms”, i.e., in cases where a vocabulary item may spell out heads that belong to adjacent syntactic regions, in our case regions like Person and Number. Formally speaking, a region may be defined by an internal hierarchy, the bottom-element of which itself selects for a region, rather than a specific head. To pick up the example of Person and Number, as touched upon in the Introduction: While the participant head [1] always subcategorizes the third person structure [3P], the singular head may subcategorize any person structure, thus characterizing Person and Number as two distinct regions.

Under the current proposal, a vocabulary item may lexicalize parts of two adjacent regions rigidly, i.e., without a pointer, in which case Subspans are defined as before. In such a case, exemplified in (11) the only subspan of a first person singular [SG[1[3]]] would be the first person [1[3]], or the third person [3], but crucially not the third person singular span [SG[3]], because this is not a *contiguous* subspan of the first person singular:

- (11) a. VI: $\alpha \Leftrightarrow \text{'[SG[1[3]]]}'$
- b. Matching Subspans:
- i. [SG[1[3]]]
 - ii. [1[3]]
 - iii. [3]

It may also, however, lexicalize the two regions as individual spans, with a pointer, as per (12).

(12) *Pointers*

A Vocabulary Item that lexicalizes two spans $\langle X_n, \dots, X_1 \rangle, \langle Y_m, \dots, Y_1 \rangle$ by means of a pointer $X \rightarrow Y$ matches any syntactic span that is formed by contiguity between a subspan characterized by X and a subspan characterized by Y (including the empty ones):

$$\{ \langle X_q, \dots, X_1 \rangle, \langle Y_r, \dots, Y_1 \rangle, \langle X_q, \dots, X_1, Y_r, \dots, Y_1 \rangle \mid q \leq n \wedge r \leq m \}$$

Under these circumstances, the contiguity requirement between the two spans is relaxed, in that it is required to hold between the spans, rather than between the individual heads. Transposing the previous example, this allows such a corresponding vocabulary item β that differs from the previous example only in the Pointer to spell out [SG[3]] as a subspan, as shown in (13). In contrast to the pointerless version, this affix can spell out two additional spans, namely [SG[3]], and [SG]. The former can be matched by β , because contiguity between a subspan of [SG] (i.e., the span itself) and a subspan of [1[3]], namely [3] holds, the latter, because the same is true if we take the empty span as a trivial subspan of [1[3]].

- (13) a. VI: $\beta \Leftrightarrow \text{'[SG} \rightarrow \text{[1[3]]]}'$
- b. Matching Subspans:

- i. [SG[1[3]]]
- ii. [1[3]]
- iii. [3]
- iv. [SG[3]]
- v. [SG]

I will show below that the flexibilities that this interpretation allows, can be motivated by showing that it allows for a unification of diverse facts about the distribution of certain affixes that are otherwise treated as stipulative distributions of an elsewhere marker, with conditions for insertion being derived by a set of independent means such as lists of Impoverishment rules.

Finally, the system adopts the usual Elsewhere Principle, by which competition among multiple matching items is resolved in favor of the more specific item, as in (14).

(14) *Elsewhere Principle*

If two vocabulary items match the same span, the item that lexicalizes the fewest heads wins.

In the next section, I detail the individual regions that we can assume to be relevant for the problem at hand, and derive the prefixal paradigms along these lines, focussing on the paradigmatic distribution of the affix ‘t’.

3 The Non-Perfect Paradigms

MSA has four basic inflectional paradigms for finite verbs, the Jussive, the Subjunctive, the Imperfect and the Perfect. The Perfect differs from the other three in two basic regards: While the Perfect is exclusively suffixal, the other three exhibit both prefixes and suffixes for agreement; the same three also share are a vocalic melody that is not shared by the Perfect.⁴ This is exemplified in (15).

- (15) a. *y-aktub* (3MS.JUSS)
 b. *y-aktub-a* (3MS.SBJV)
 c. *y-aktub-u* (3MS.IMPF)
 d. *katab-a* (3MS.PERF)

⁴I follow Kastner’s (2018) analysis for Hebrew here, in assuming that the melody is in fact a contextually conditioned spellout of *Voice* (or, from the current perspective, possibly a span of such argument structure related heads). This raises interesting questions from the current perspective, but I will only be able to touch on this briefly, when I return to the Perfect below.

While I have no intention of developing an elaborated theory of the internal structure of Tense/Aspect/Mood in Arabic here, there is some evidence for a containment relation among the Jussive, the Subjunctive, and the Imperfect, and I will assume that this is reflected in their internal structure. The contrast in (15a,b) provides some evidence that the Subjunctive might properly contain the Jussive, given that one is derived from the other by adding the suffix ‘-a’. The same can, of course be said about the Imperfect, which exhibits the suffix ‘-u’ in the same place; there is, however, another contrast that suggests that the Imperfect contains both the Subjunctive and the Jussive, as in (16).

- (16) a. *t-aktub-ii* (2FS.JUSS, 2FS.SBJV)
 b. *t-aktub-ii-na* (2FS.IMPF)

I therefore assume that these three can be characterized by a containment relation as in (17): Since ‘-ii’ can spell out the subjunctive, it can, by the superset principle, also spell out the jussive, accounting for the syncretism; ‘-na’ spells out the IMPF head in this case.

- (17) a. *Jussive*: [JUSS]
 b. *Subjunctive*: [SBJV[JUSS]]
 c. *Imperfect*: [PRS[SBJV[JUSS]]]

As it is evidently the simplest case, I will begin with the Jussive, as it will allow me to focus mostly on the agreement structure itself, in particular the distribution of ‘y’ and ‘t’. I will then derive the Subjunctive and Imperfect from it. For now, I abstract away from the linear order of the relevant affixes as well, returning to it only once I have accounted for the paradigmatic distribution of the relevant affixes, showing that the paradigmatic account extends to the linear account. I later link it to the distribution in the Perfect, showing how a single head can account for the differences between the prefixal and suffixal paradigms, both with respect to the linear and the paradigmatic aspects, under the assumption that the agreement structure is built on top of the verbal domain, and movement targets various sub-constituents within this syntactic structure in Cinque (2005) U20 style approach to linear order.

3.1 ‘y’, ‘t’ and the Jussive

Table 4 shows the complete paradigm of the Jussive, with the distribution of ‘y’ and ‘t’ highlighted. We can see that ‘t’ occurs in all second person cells, as well as the third person feminine singular and dual cells; not, however, in the third person feminine plural one, where ‘y’ is found in the prefixal position instead. The prefix ‘y’ is also found in all third person masculine cells. Crucially for the present purpose, this distribution is also found in all other paradigms, modulo the Perfect, which shows a related distribution that I will return to below.

Person/Gender	Number		
	Singular	Dual	Plural
1 st	ʔ-aktub		n-aktub
2 nd m.	t-aktub	t-aktub-aa	t-aktub-uu
2 nd f.	t-aktub-ii	t-aktub-aa	t-aktub-na
3 rd m.	y-aktub	y-aktub-aa	y-aktub-uu
3 rd f.	t-aktub	t-aktub-aa	y-aktub-na

Source: Ryding (2005: 616)

Table 4: Arabic — Jussiv

In this analysis, I adopt the same structures for person I adopted in Blix (under review), in turn based on ideas in Béjar (2003), Béjar and Rezac (2009), Harley and Ritter (2002): Third person forms simplest case, containing only a REF head, merged in the clausal spine on top of other structure.^{5,6} The first person is composed by merging a PART(icipant) node on top of this, and the second person is in turn composed by adding ADD(ressee) on top of the first person.⁷

(18) The Internal Structure of Person

- a. Third Person [REF [...]]
- b. First Person [PART[REF [...]]]
- c. Second Person [ADD[PART[REF [...]]]]

As I noted in the introduction, I take number to be the region above person, in line with the idea of re-interpreting Noyer's (1992) hierarchy as reflecting syntactic structure. I do, however, not assume that gender is a distinct region, but rather that gender is part of the number hierarchy, following Ritter (1993), who argued that gender can be *on* number in certain languages. The

⁵I adopt this notation from Harley and Ritter (2002), but REF(erential) is a slight misnomer, in particular when it comes to agreement systems, since not all third person elements are referential. While third person may thus well have a complex internal structure, it is sufficient for the current purposes to assume these structures, however.

⁶One way of conceiving of agreement in the current system where it is part of the functional spine, is in terms of Sportiche (2005, 2006) determiners; this perspective raises serious questions about clauses without agreement, as well as those with multiple agreeing verbs, however. Since there is no general consensus on the nature of agreement in the larger generative world either, I leave these questions aside for further research.

⁷Many languages have some syncretisms between second and third person to the exclusion of first person. I generally assume that a SPEAKER node is also available as an option of UG, and that languages may vary parametrically with respect to which participant is marked (cf. Harley and Ritter 2002). Crucially for the current study, I will assume that in Arabic, this partial syncretism with respect to 't' comes about as a *ABA violation induced by higher material. In a recent paper, Vanden Wyngaerd (2018) takes this kind of possibility to be an argument against the Pointer-based approach, which I argue here to be wrong — I return to this question in more detail below.

assumptions I make are laid out in (19), with the brackets around FEM denoting its presence in the feminine, and absence in the masculine forms, as motivated by pairs such as *katab-a-t* (3FS.PERF) / *katab-a* (3MS.PERF). In empirical terms, this assumption is grounded in the fact that we find ‘*t*’ in the third person feminine only in the singular and the dual: Under these structural assumptions, we can account for the fact that FEM is spelled out by ‘*t*’ in the third person feminine singular and dual, but suffixally, by ‘*na*’, in the third person feminine plural: FEM is contiguous with SG only in the singular and the dual, but not in the plural. Further arguments for this containment structure will be given below, when I turn to the Perfect.

- (19) The Internal Structure of Number+Gender
- a. Singular [(FEM) [SG [...]]]
 - b. Plural [(FEM) [PL [SG [...]]]]
 - c. Dual [DU [PL [(FEM) [SG [...]]]]]

With these assumptions in place, we are ready to account for the paradigmatic distribution of affixes in the Jussive, assuming the larger order of the “regions” Tense, Number/Gender, and Person, as in (20).

- (20) [Tense [Number/Gender [Person]]]

In particular, we can solve the issue of ‘*y*’ and ‘*t*’ by assuming the following specifications for the person-sensitive affixes.⁸

- (21) REF Lexicalizing Affixes
- a. /n/ ⇔ ‘[FEM[PL[SG[PART[REF]]]]]’
 - b. /ʔ/ ⇔ ‘[JUSS → [FEM[SG[PART[REF]]]]]’
 - c. /t/ ⇔ ‘[FEM[SG → [PART[REF]]]]’
 - d. /y/ ⇔ ‘[SG[REF]]’

Since the person-sensitive affixes are sensitive to the lowest part of the structure, they necessarily determine the earlier cycles of spellout, given the assumptions about bottom-up, cyclic spellout that were laid out above. Spellout in the first person is rather trivial, since both the singular and the plural have their complete person/number/gender structure spelled out immediately in the first cycle, by ‘*ʔ*’ and ‘*n*’, respectively (21a,b). In the second person, however, no monomorphemic spellout of all the phi-structure is possible. As the examples in (22) show, there is no vocabulary item available to spell out the whole structure [ADD[PART[REF]]], and therefore only [PART[REF]] receives spellout in the first effective cycle. Three vocabulary items, ‘*t*’, ‘*ʔ*’,

⁸Note in passing that I will slightly revise some of the affixes later, and that Appendix A provides a final list for a better overview.

and ‘*n*’ all compete for insertion, since they all match the span [PART[REF]]. The Elsewhere Principle determines the outcome in this case, and decides in favor of ‘*t*’, since the other two have a higher number of “unused” heads.⁹ Since the first effective cycle of spellout occurs within the person region, this holds for all person/number combinations of the second person, explaining why it is not ‘*t*’ that encodes these differences, but other affixes, i.e., later cycles.

(22) *Second Person – First Cycle*

- a. 2MS: [JUSS[SG[ADD[PART[REF]]]]]
- t
n/a
- b. 2FS: [JUSS[FEM[SG[ADD[PART[REF]]]]]]]
- t
n/a

In the third person, we derive the fact that the distribution of gender encoding is not uniformly prefixal or suffixal, in contrast to the second person: In the singular and the dual, gender is spelled out in the first cycle (and therefore, as I will show below, prefixal), it is encoded suffixally in the plural. Consider first the examples in (23), where we see that in both the singular and the dual, the presence of FEM leads to its spellout by ‘*t*’, due to cyclic overwrite. As the structure [FEM [SG [REF]]] is the largest structure that can be spelled out contiguously in (23b,d), with ‘*t*’ as the solve candidate. In contrast, examples (23a,c) show that in the absence of FEM (i.e., in the third person masculine singular/dual) leads to the spellout of [SG[REF]] as the largest contiguous structure that finds a match in the vocabulary. Both ‘*y*’ and ‘*t*’ are candidates that match said structure — and since ‘*y*’ has zero superfluous heads, while ‘*t*’ has two, the EP decides in favor of ‘*y*’.

(23) *Third Person – Singular & Dual*

- a. 3MS: [JUSS[SG[REF]]]
- y'
n/a t'
- b. 3FS: [JUSS[FEM[SG[REF]]]]]
- n/a y'
- c. 3MD: [JUSS[DU[PL[SG[REF]]]]]
- n/a

⁹Note that this is partly due to the stipulation that ‘?’ spells out juss. The structure that ‘*t*’ lexicalizes will be argued to be somewhat more extended, once we get to the perfect, to the point where I need to extend this stipulation somewhat. This is easily solved by assuming that juss is in fact a span that consists of two or more heads. Since nothing about this is surprising, or, from the current perspective, particularly interesting, I gloss over this fact here.

as shown in (26):

(26) *Third Person – Singular*

- a. 3MS: $\begin{array}{c} \overbrace{\emptyset'} \quad \overbrace{y'} \\ [\text{JUSS} [\text{SG} [\text{REF}]]] \end{array}$
- b. 3FS: $\begin{array}{c} \overbrace{\emptyset'} \quad \overbrace{t'} \\ [\text{JUSS} [\text{FEM} [\text{SG} [\text{REF}]]]] \end{array}$

Under the assumption that the dual affix ‘*aa*’ lexicalizes the structure in (27), the third person dual forms, *y-aktub-aa* (3MD) and *t-aktub-aa* (3FD), are derived in the same fashion, i.e., with the remaining higher material spelled out fully in the second cycle, as in (28).

(27) /*aa*/ \Leftrightarrow ‘[JUSS[DU[PL]]]’

(28) *Third Person Dual*

- a. 3MD: $\begin{array}{c} \overbrace{aa'} \quad \overbrace{y'} \\ [\text{JUSS} [\text{DU} [\text{PL} [\text{SG} [\text{REF}]]]]] \end{array}$
- b. 3FD: $\begin{array}{c} \overbrace{aa'} \quad \overbrace{t'} \\ [\text{JUSS} [\text{DU} [\text{PL} [\text{FEM} [\text{SG} [\text{REF}]]]]]] \end{array}$

Finally, consider the third person plural forms, where FEM had not been spelled out in the first cycle. Consequently, we do not (necessarily) expect a partial syncretism (i.e., a syncretism for the second cycle) that would parallel the way the second cycle was identical for the masculine and the feminine forms of the singular and the dual respectively: In these cases, the first cycle of the feminine and the singular spelled out different structures, with different affixes, but the second cycle spelled out the same structure. The result was a first cycle difference, and a second cycle syncretism. The opposite effect holds in the plural, where the first cycle was identical, but the second cycle results in a difference, namely *y-aktub-uu* (3MP) and *y-aktub-na* (3FP). We can simply assume that the second cycle spells out the remaining material with the affixes in (29), as in (30). This way, the present system derives Noyer’s *discontinuous bleeding*, without reference to autonomous morphological structure, or templates of any kind.

- (29) a. /*uu*/ \Leftrightarrow ‘[JUSS[PL]]’
- b. /*na*/ \Leftrightarrow ‘[JUSS[FEM[PL]]]’

(30) *Third Person Plural*

- a. 3MP: $\begin{array}{c} \text{'uu'} \\ \text{[JUSS [PL [SG [REF]]]]} \end{array}$
- b. 3FP: $\begin{array}{c} \text{'na'} \\ \text{[JUSS [FEM [PL [SG [REF]]]]]} \end{array}$

Returning to the second person, and its subsequent cycles of spellouts, it is worth partly repeating the paradigm to point out some further interesting distributional facts. Table 5 shows the second and third person of the Jussive.

Person/Gender	Number		
	Singular	Dual	Plural
2 nd m.	t-aktub	t-aktub-aa	t-aktub-uu
2 nd f.	t-aktub-ii	t-aktub-aa	t-aktub-na
3 rd m.	y-aktub	y-aktub-aa	y-aktub-uu
3 rd f.	t-aktub	t-aktub-aa	y-aktub-na

Source: Ryding (2005: 616)

Table 5: Arabic — Jussiv Second/Third Person (repeated)

Notice that, with the exception of *t-aktub-ii* (2FS), there is a general suffixal syncretism between the second and the third person: Whatever suffix a number/gender combination in the third person shows, is also found in the corresponding second person. That is to say, we find 'Ø' in the masculine singular, 'aa' in the dual, 'uu' in the masculine plural, and 'na' in the feminine plural, both in the second, and in the third person. Notice further that there is no overt gender contrast in the second person dual, with both the masculine and the feminine form being *t-aktub-aa*.

The sole exception is easily derived by assuming that 'ii', once again, simply spells out the remainder of the structure (i.e., 'ii' lexicalizes the structure in (31a)), after 't' has spelled out [PART[REF]] in the first cycle, as in (22b). The remaining facts are captured simply by postulating a zero spellout for ADD, as in (31b).

(31) *ADD lexicalizing affixes*

- a. /ii/ \Leftrightarrow '[JUSS [FEM [SG [ADD]]]]'
- b. /Ø/ \Leftrightarrow '[FEM [SG [ADD]]]'

In the singular and plural, spellout is fairly straightforward: Only in the second person singular feminine does ‘*ii*’ spell out the whole remaining structure. In the second person singular masculine, as well as the plural, ‘ \emptyset ’ spells out [SG[ADD] — ‘*ii*’ cannot cyclically overwrite ‘ \emptyset ’, due to contiguity. In particular, in the masculine singular, [JUSS] cannot be spelled out, because ‘*ii*’ does not lexicalize [JUSS[SG]], only [JUSS[FEM[SG]]], of which [JUSS[SG]] is not a contiguous sub-span.

In the plural, it is PL that blocks the contiguity with JUSS. In these cases, both ‘*ii*’ and ‘ \emptyset ’ are candidates for insertion, but since ‘ \emptyset ’ is the smaller affix, the EP decides in its favor. Since ‘ \emptyset ’ spells out [SG[ADD]] in both cases, the remaining structure to be spelled out is identical to the second cycles in the third person plural, and consequently we derive the suffixal syncretism.

(32) *Second Person – Singular & Plural*

- a. 2MS: $\overbrace{[\text{JUSS} [\text{SG} [\text{ADD} [\text{PART} [\text{REF}]]]]]}^{\emptyset} \overbrace{[\text{PART} [\text{REF}]]]}^{\emptyset} \overbrace{[\text{REF}]]}^t$
 n/a
 ii
- b. 2FS: $\overbrace{[\text{JUSS} [\text{FEM} [\text{SG} [\text{ADD} [\text{PART} [\text{REF}]]]]]]}^{\emptyset} \overbrace{[\text{PART} [\text{REF}]]]}^t$
- c. 2MP: $\overbrace{[\text{JUSS} [\text{PL} [\text{SG} [\text{ADD} [\text{PART} [\text{REF}]]]]]]}^{uu} \overbrace{[\text{PART} [\text{REF}]]]}^{\emptyset \emptyset} \overbrace{[\text{REF}]]}^t$
- d. 2FP: $\overbrace{[\text{JUSS} [\text{FEM} [\text{PL} [\text{SG} [\text{ADD} [\text{PART} [\text{REF}]]]]]]}^{na} \overbrace{[\text{PART} [\text{REF}]]]}^{\emptyset} \overbrace{[\text{REF}]]}^t$

Note that I postulated that ‘ \emptyset ’ in (31b) lexicalizes FEM, but is overwritten by ‘*ii*’ in the second person singular feminine, as shown in (32b). This accounts for the fact that the second person exhibits a gender syncretism in the dual, as can be seen in (33).

(33) *Second Person – Dual*

- a. 2MD: $\overbrace{[\text{JUSS} [\text{DU} [\text{PL} [\text{SG} [\text{ADD} [\text{PART} [\text{REF}]]]]]]}^{aa} \overbrace{[\text{PART} [\text{REF}]]]}^{\emptyset} \overbrace{[\text{REF}]]}^t$
- b. 2FD: $\overbrace{[\text{JUSS} [\text{DU} [\text{PL} [\text{FEM} [\text{SG} [\text{ADD} [\text{PART} [\text{REF}]]]]]]}^{aa} \overbrace{[\text{PART} [\text{REF}]]]}^{\emptyset} \overbrace{[\text{REF}]]}^t$

Here, the second cycle shows a simple superset effect, resulting in a simple syncretism: There is no affix that is anchored at ADD that spans all the heads up to PL, and therefore the cycles

[SG[ADD]] (33a) and [FEM[SG[ADD]]] (33b) receive spellout. The smallest vocabulary item that can lexicalize this span is, in both cases, ‘Ø’. Note that this is similar to the situation we saw in the second person feminine singular (32b), where ‘Ø’ also matched [FEM[SG[ADD]]], but was overwritten by ‘ii’. Here, however, we find the heads PL and DU blocking the contiguity between JUSS and FEM that are required for ‘ii’ to match the whole span. Thus it competes with ‘Ø’ for the spellout of [FEM[SG[ADD]]], and loses due to the EP, and this is what produces the syncretism.

We have thus derived the paradigmatic distribution of the affixes relevant to the paradigm of the Jussive. In assuming that Noyer’s (1992) hierarchy reflects properties of a syntactic structure that is spelled out cyclically, in a bottom-up manner, and span by span, the current system still can account for the effects modeled as Impoverishment, both hierarchy governed, such as the loss of overt gender marking in 2FS, and arbitrary, such as the distribution of ‘t’ and ‘y’ (in the analysis of Halle 2000).

In the next steps I will very briefly discuss the subjunctive and the imperfect, and then show how we can derive the linear order of the affixes from the simple fact that it is, in all cases, the first cycle of spellout that becomes the prefix.

3.2 The Imperfect and the Subjunctive

Both the Imperfect and the Subjunctive are fairly trivial extensions of the Jussive. Insofar as the main concern here is the agreement structure, and insofar as the relatively small amount of additional morphology is not particularly informative with respect to their possible internal structures, I will only provide a very brief account for the sake of completeness. Table 6 provides the subjunctive paradigm. As highlighted, the only obvious difference between the Subjunctive and the Jussive is the fact that the former shows a suffix ‘a’ in all and only those cases where the Jussive has no overt suffix.

Person/Gender	Number		
	Singular	Dual	Plural
1 st	ʔ-aktub-a		n-aktub-a
2 nd m.	t-aktub-a	t-aktub-aa	t-aktub-uu
2 nd f.	t-aktub-ii	t-aktub-aa	t-aktub-na
3 rd m.	y-aktub-a	y-aktub-aa	y-aktub-uu
3 rd f.	t-aktub-a	t-aktub-aa	y-aktub-na

Source: Ryding (2005: 609)

Table 6: Arabic — Subjunctive

The Imperfect, in Table 6, is characterized partly by the same description as the Subjunctive, in that the same context that show no overt suffix in the Jussive, and ‘a’ in the Subjunctive, show

‘u’ in the Imperfect. In addition, however, we find ‘na/ni’ suffixed to those forms ending in ‘aa’, ‘ii’, or ‘uu’; the only forms that are identical across all three paradigms are the ones ending in ‘na’, i.e., the second and third person feminine plural.

Person/Gender	Number		
	Singular	Dual	Plural
1 st	ʔ-aktub-u		n-aktub-u
2 nd m.	t-aktub-u	t-aktub-aa-ni	t-aktub-uu-na
2 nd f.	t-aktub-ii-na	t-aktub-aa-ni	t-aktub-na
3 rd m.	y-aktub-u	y-aktub-aa-ni	y-aktub-uu-na
3 rd f.	t-aktub-u	t-aktub-aa-ni	y-aktub-na

Source: Ryding (2005: p.441) , Noyer (1992: p. 60)

Table 7: Arabic — Imperfect

We can account for the absence of any additional affixes with ‘-na’ by simply assuming that it is in fact capable of spelling out the whole Tense structure, and revising (29b) as (34). Given that it is anchored at PL, and spells out the remaining structure in all cases, we account for the syncretism in the usual way, that is, by containment.

$$(34) \quad /na/ \Leftrightarrow '[PRS[SBJV][JUSS[FEM[PL]]]]'$$

It has long been recognized, of course, that the distribution of the suffixes ‘a’, ‘u’, and ‘na/ni’ in the remaining can be described well in morpho-phonological terms: We get ‘a’ and ‘u’ at the edge of the verbal stem, and ‘na/ni’ after long vowels. I follow this line of thought by simply assuming that ‘a’ spells out the SBJV head, but deletes after long vowels, for phonological reasons¹⁰, i.e., to avoid an illicit structure /V:V/. To keep the phonological characterization of the distribution of ‘u’ and ‘nV’ in place, I will simply assume a phonologically driven allomorph selection for ‘u’ / ‘na’ / ‘ni’, and assume that the difference between ‘na’ and ‘ni’ is also phonologically resolved.¹¹

$$(35) \quad a. \quad /a/ \Leftrightarrow '[SBJV]' \quad (\text{with } /a/ \rightarrow / \emptyset / \text{ if } V: \underline{\quad})$$

$$b. \quad \left\{ \begin{array}{l} /u/, \\ /nV/ \text{ if } V: \underline{\quad} \end{array} \right\} \Leftrightarrow '[PRS[SBJV]]'$$

¹⁰See e.g. Brame (1970), Rosenthal (2006) for details on the deletion of short vowels in the context of long ones.

¹¹A characterization of these distributions in the terms advanced so far is, of course, also plausible, with the varying affixes just below SBJV and IMPF spelling out different sizes of the Tense region. However, insofar as the internal structure of Tense is of limited importance, given that it does not affect the distribution of the agreement markers themselves, at least insofar as limited to the contrasts between Imperfect, Subjunctive, and Jussive. It would also lose the insight that the distribution of these extra affixes appears to be characterized by phonological criteria. However, nothing crucial hinges on either take here.

Insofar as the differences between the Imperfect, the Subjunctive and the Jussive are not of great interest for the distribution of the agreement affixes, which show otherwise identical distribution across these three paradigms, I leave it at this brief description.

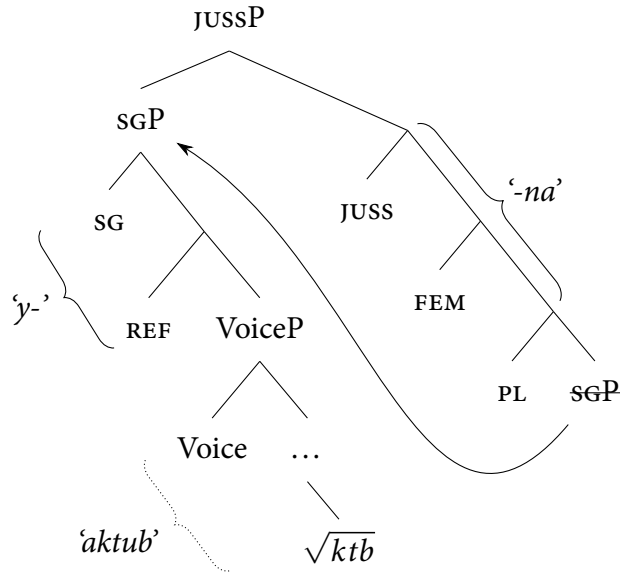
3.3 Deriving a Prefix

The discussion so far has abstracted away from the linear order of affixes, both with respect to each other, and with respect to the verbal stem. The perspective developed so far does, however, offer the possibility for a simple characterization of the distribution of the relevant affixes as prefixes. In every case of the prefixal paradigms, it is the *first cycle* that becomes a prefix, and the first cycle is uniquely characterized by spelling out REF, as this is the first cycle's anchor in every agreement configuration. In this subsection I show how this correlation may be captured under an Antisymmetry perspective (Kayne 1994, Koopman 2017b) of linear order, and derived by phrasal movement. In particular, I assume that the JUSS head carries an EPP feature that attracts REF, and that movement is constraint so as to not break up a span that received spellout, along the lines of (36).

- (36) *Span-based Pied-Piping — No Breakup*
 EPP-driven movement of HP targets the phrase headed by the highest head in the span that spells out H.

Consider, for example, the third person feminine plural form *y-aktub-na*, as in (37). The highest head, JUSS, has an EPP property, attracting REF. Since REF is spelled out in a span [SG[REF]], the whole phrase headed by SG moves to the specifier of JUSS, as per the span-based pied-piping introduced above. Antisymmetry now gives us the correct result: Since every element of the span spelled out by 'y' c-commands the VoiceP, 'y' must linearly precede it. As the whole SGP c-commands the elements of the span spelled out by 'na', it must linearly precede it as well, i.e. 'y' must precede 'aktub', and they together must precede 'na', resulting in *y-aktub-na*.

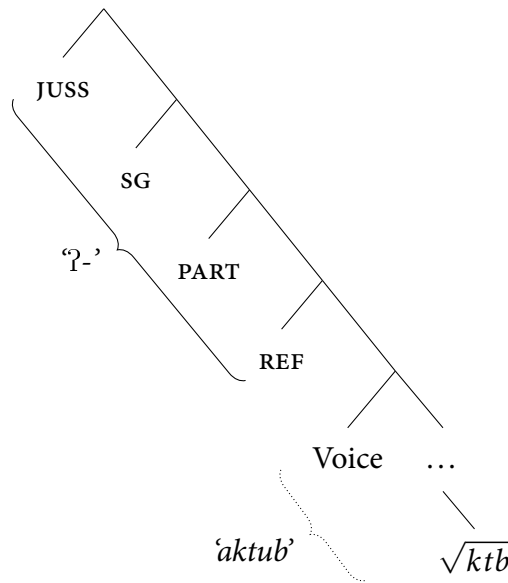
- (37) 3FP: 'y-aktub-na'



The same applies to most other prefixes: Since REF pied-pipes the part of the structure that is contained in the span it is spelled out with, we derive 't' as a prefix in a parallel way. However, 'ʔ' has been argued to spell out JUSS, i.e., JUSS and REF receive spellout in the same span. Since movement out of the span that includes both JUSS and REF is blocked, nothing happens in this case.¹²

(38) 1S: 'ʔ-aktub'(Jussive)

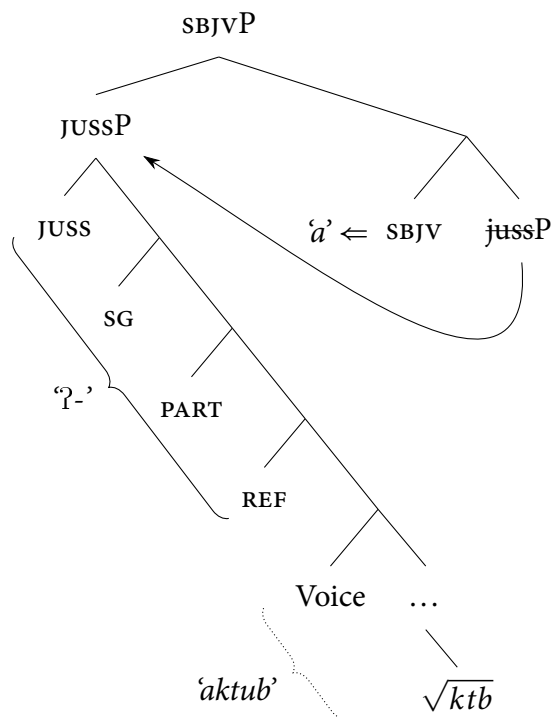
¹²If an unchecked EPP property always crashes a derivation, as some approaches hold, this would suggest that being interpreted within the same span is a different way of providing the correct locality conditions. If (at least some) EPP properties are instructions to the syntactic algorithms that apply only if they can, we do not need to say anything additional.



Since no movement occurs in this structure, we still derive a prefix; every element of the span that ‘ʔ’ spells out, c-commands the VoiceP, and thus ‘ʔ’ must precede ‘*aktub*’. We do, however, see a suffix in conjunction with ‘ʔ’ in the Subjunctive and the Imperfect. Koopman (2017b) argues that suffixes may be marked with an EPP feature that moves the whole complement to its specifier — in the current approach, we can translate this into a property of a head, rather than an affix, and suggest that *SBJV* bears such an EPP feature.¹³ Once again, under the assumption that movement may not break apart a span (i.e., move neither out of a span, nor into a span), we derive a system under which such an EPP feature triggers movement of the complement of the lowest element of the span to the specifier of the highest element. In the simplest case, such as ‘*a*’, which spells out a single head, we derive the Subjunctive counterpart *ʔ-aktub-a* to the Jussive *ʔ-aktub* simply via movement of the *SBJV*’s complement to its specifier position, as in (39).

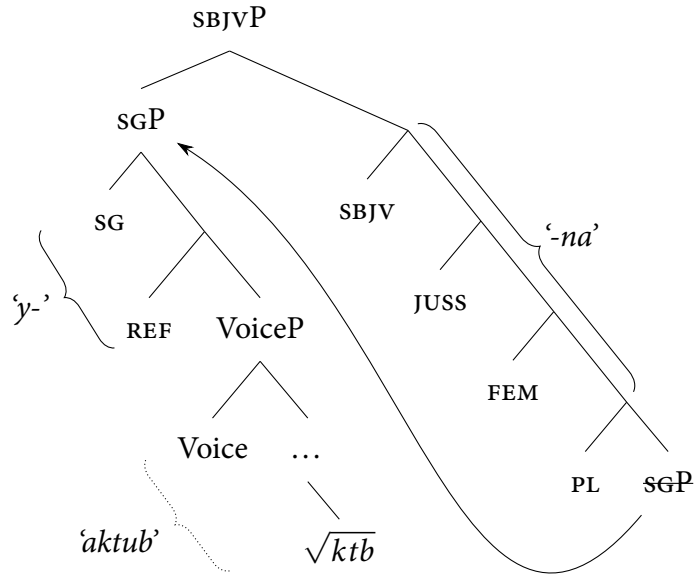
(39) 1S: ‘*ʔ-aktub-a*’ (Subjunctive)

¹³Starke (2018) develops some ideas for a more principled account for this kind of movement, frequently dubbed “snowball movement” in the cartographic literature, by deriving it from a constituent based spellout, rather than a phrase-based one. In that perspective, prefixes are specifier-like structures, i.e., complex left branches with a binary structure [A B] at its bottom, whereas suffixes are structures with a unary bottom, [A [B [X]]], that cause movement of the complement XP to form a constituent that can receive spellout.



In the case of affixes like *'na'* that can spell out *'sbjv'* together with JUSS, the movement of REF to the specifier of SBJV may satisfy the requirements of both JUSS and SBJV at the same time. In (40), the movement of SGP is simultaneously the movement of the phrase pied-piped by REF into the nearest specifier available to JUSS that does not break up a span, and the movement of the highest phrase below SBJV that is not spelled out within the same span as SBJV.

(40) 3FP: *'y-aktub-na'* (Subjunctive)



What is particularly interesting about this approach is, of course, not merely that it can derive the linear order of the affixes, but that it does so by linking it once again to the structural interpretation of the hierarchy discovered by Noyer (1992). In doing so, the current approach provides an explanatory account of a number of interrelated properties of the Arabic agreement system: It accounts for the *y/t* contrast purely in terms of matching, rather than stipulating accidental homophony, or arbitrary Impoverishment rules; in fact all relevant Impoverishment is reduced to matching as well. It provides an account of discontinuous bleeding, i.e., the fact that a feature that is spelled out by the prefix is not spelled out at a suffix position, that is derived in purely from the syntactic order of merge. Finally, it accounts for the set of prefixes in an explanatory manner, rather than just stipulating certain affixes as prefixes, in the same manner: The first cycle must necessarily spell out [REF], since it is the lowest head, and it is the cycle that spells out REF that becomes a prefix.

As I have thus shown in this section, the structural approach to the spellout of agreement can explain facts that are merely a list of accidents (such as limited competition among prefixes only) in competing approaches. In the next section, I discuss the suffixal paradigm, which shows that the listing approach is not only less elegant, but in fact contradictory: The affixes in question *cannot* be prefixes by stipulation, since they occur as suffixes in other paradigms.

4 The Perfect

We can now consider the Perfect, i.e., the suffixal paradigm. As in the previous section, I begin by focussing on the paradigmatic distribution, and discuss the linear facts after that. Table 8

shows an interesting pattern to the distribution of ‘*t*’: In every case (i.e., person/gender/number combination) that had a prefixal ‘*t*’ in the non-perfect paradigms discussed above, we also see a suffixal ‘*t*’ in the perfect, highlighted in light gray. In particular, we see that ‘*t*’ occurs in the third person feminine non-plural, as well as all second person cells. I take this identity in distribution to strongly suggest that they are indeed the same object. In addition, however, we find that the first person singular, highlighted in a darker shade, also shows a suffixal ‘*t*’ — a fact not entirely unsurprising, given the fact that I argued ‘*t*’ to lexicalize the structure of first person.

Person/Gender	Number		
	Singular	Dual	Plural
1 st	katab-t-u		katab-naa
2 nd m.	katab-t-a	katab-t-um-aa	katab-t-um
2 nd f.	katab-t-i	katab-t-um-aa	katab-t-un-na
3 rd m.	katab-a	katab-aa	katab-uu
3 rd f.	katab-a-t	katab-a-t-aa	katab-na

Source: Ryding (2005: p.443)

Table 8: Arabic — Past Tense Indicative (Perfect)

There are a number of facts that need to be accounted for: First and foremost, the fact that ‘*t*’ is a prefix in the non-perfect paradigms, but a suffix here. In addition, suffixal ‘*t*’ varies in its position, preceding ‘*a*’ in the second person singular masculine, but following it in the third person singular feminine, differing in a highly interesting manner from the prefixal paradigms, where these two are always syncretic, as shown in Table 9. I will relate this to the pointer in the structure of ‘*t*’, and suggest that the difference in position is a result of ‘*t*’ spelling out either the top or the bottom span that it lexicalizes.

P/G/N	SUBJUNCTIVE	PERFECT
2MS	t-aktub-a	katab-t-a
3FS	t-aktub-a	katab-a-t

Table 9: The Loci of ‘*t*’

Secondly, the Dual shows a curious pattern of containment: As Table 10 shows, the Dual properly contains the Plural form in the second person masculine. In the third person singular feminine, however, the Dual properly contains the Singular form, yet the same suffix ‘*aa*’ is added in both cases.

P/G	SG	DU	PL
2M	katab-t-a	katab-t-um-aa	katab-t-um
3F	katab-a-t	katab-a-t-aa	katab-na

Table 10: Dual Containment in the Perfect

Note in particular, that the suffix ‘*um*’ in the second person masculine dual/plural is strictly limited to a highly specific context: It does only occur in the second person non-singular, and only in the Perfect, i.e., not in any of the prefixal paradigms. It is thus clearly reflective of both the second person structure, and the structure of the perfect, but cannot spell out the complete number structure, since the dual affix ‘*aa*’ appears to still spell out DU. However, the Dual clearly breaks contiguity of Person and the Tense structure — I therefore conclude that the Perfect is marked lower than the Tense structure we have seen in the prefixal paradigms, namely between Number and Person. We thus extend Noyer’s hierarchy slightly, as follows:¹⁴

- (41) *Revised Hierarchy*
Tense > Number/Gender > Perfect > Person

As for the Tense structure that the Perfect is co-occurring with, I take pairs such as *katab-t-a* (2SM.PERF), *t-aktub-a* (2SM.SBJV) from Table 9, to suggest that the Perfect shares the higher structure with the Subjunctive.¹⁵

From that perspective, then, we have additional evidence for the head ADD that has been spelled out by a zero affix in most cases seen so far; we can revise the previous instance of the zero affix, as in (42a), and add the two new affixes ‘*i*’ (42b) and ‘*um*’ (42c) to our lexicon.¹⁶

¹⁴Arguing that the Arabic morphological facts point towards a mixed Tense/Aspect system has some (albeit contested) support from other works on the matter: (Bahloul 2008: 51-57) makes the point that the Imperfect denotes a relation between utterance time and topic time, i.e., it behaves like Tense proper, whereas the Perfect can actually occur with past, present and future meanings in different contexts. Similarly, Comrie (1998: §4.4) argues that the Imperfective/Perfective contrast in Standard and Classical Arabic is a mixed Tense/Aspect system. There appears to be no general consensus on the matter, however, on the question of the precise meaning and structure of the categories that these forms express. It is my hope that the investigation undertaken here might be fruitful in further exploring the intricacies of the meaning and structure of these categories, but for now I leave the more semantic side of the question aside, and point the reader to Bahloul (2008: §3) for a general overview of stances that have been taken in the literature.

¹⁵A more plausible take might be to suggest that the structure of the imperfect is more complex, embedding the subjunctive first under an indicative structure which is then in turn embedded under the present tense structure, as in (i). From that perspective, affixes like ‘*a*’ might lexicalize [IND[SBJV]], leading to the desired syncretism without implying that the Perfect is a form of the Subjunctive. I leave that issue aside both for expository reasons, and since I do not have much evidence to bear on the internal structure of the Tense/Aspect/Mood configurations themselves, beyond claims about their containment.

(i) [PRS[IND[SBJV[JUSS]]]]

¹⁶This obviously does not account for the similarity between ‘*i*’ and ‘*ii*’ that both occur only in the second

(42) *ADD Lexicalizing Affixes (Perfect)*

- a. $/\emptyset/ \Leftrightarrow [\text{SG}[\text{PERF}[\text{ADD}]]]$
- b. $/i/ \Leftrightarrow [\text{SBJV}[\text{JUSS}[\text{F}[\text{SG}[\text{PERF}[\text{ADD}]]]]]$
- c. $/um/ \Leftrightarrow [\text{SBJV}[\text{JUSS}[\text{PL} \rightarrow [\text{F}[\text{SG}[\text{PERF}[\text{ADD}]]]]]]]$

These specifications derive the containment facts that hold for the second person in the Perfect; in particular it accounts for the fact that the second person masculine dual contains the second person masculine plural form.

Consider first the second person singular. Its spellout proceeds essentially in a way that is parallel to the spellout we have seen in the prefixal paradigms, modulo the difference between ‘i’ and ‘ii’, as can be seen in (43).

(43) *Second Person Singular – Perfect*

- a. 2MS: $\begin{array}{c} \text{a} \quad \emptyset \quad \emptyset \quad t \\ \text{[SBJV [JUSS [SG [PERF [ADD [PART [REF]]]]]] } \end{array}$
- b. 2FS: $\begin{array}{c} i \quad t \\ \text{[SBJV [JUSS [FEM [SG [PERF [ADD [PART [REF]]]]]] } \\ \emptyset \end{array}$

Next, we derive the second person plural masculine, in (44). Again, spellout proceeds in the usual way, with ‘t’ spelling out [PART[REF]], and ‘um’ spelling out the remaining structure.

(44) *Second Person Plural Masculine – Perfect*

- 2MP: $\begin{array}{c} \text{um} \quad t \\ \text{[SBJV [JUSS [PL [SG [PERF [ADD [PART [REF]]]]]] } \end{array}$

The second person plural feminine, however, has a curious property. In the form *katab-t-un-na*, we can clearly identify ‘na’, which spells out the feminine plural in the second and third person, across all paradigms. The form appears to properly contain the masculine plural, *katab-t-um*, however, presumably with a process of nasal assimilation changing *um* to *un*.¹⁷ There thus

person singular feminine. A plausible alternative might be to suggest that these are allomorphic variants of the same affix (i.e., lexicalizing a pointer above PERF), with lengthening (or shortening) determined on other grounds.

¹⁷If the reader is opposed to such an analysis, suggesting that ‘unna’ is a simple morpheme does, of course, pose no further problems, it would be solved rather trivially by suggesting that *unna* lexicalizes the same structure as ‘um’, modulo a FEM head above PL. The fact, however that a string *um* appears in all other second person perfect non-singular forms, coupled with evidence for ‘na’ being a morpheme in its own right, suggests to me that analyzing the string *unna* as bimorphemic is a more plausible path to take.

(45) *Second Person Plural Feminine – Perfect*

I propose that the reason for this double marking lies in the fact that there is no Vocabulary item that can be anchored at FEM. That is, at the point at which ‘*um*’ has spelled out the structure up to PL, there is no applicable vocabulary item for the next cycle of spellout. I suggest that a “last resort” mechanism may lead to lower material being part of the target of spellout, along the lines of (46).¹⁸

(i) a. *te-saper* 'she will tell'
 b. *ye-saper* 'he will tell'
 c. *te-sapr-na* 'they (fem) will tell'
 d. *ye-saper-u* 'they (masc) will tell'

(ii) *Hebrew (Toy) Lexicon*

- The spellout would thus proceed as in (iii), with rewinding causing the dual marking in both cases.

a. 3MP $\underbrace{\text{[PL [SG [REF]]]}}_{\text{u}}$ $\overbrace{\text{no anchor } Y}$

b. 3FP $\underbrace{\text{[PL [FEM [SG [REF]]]]}}_{\text{na}}$ $\overbrace{\text{no anchor } t}$

29

(46) *Rewind*

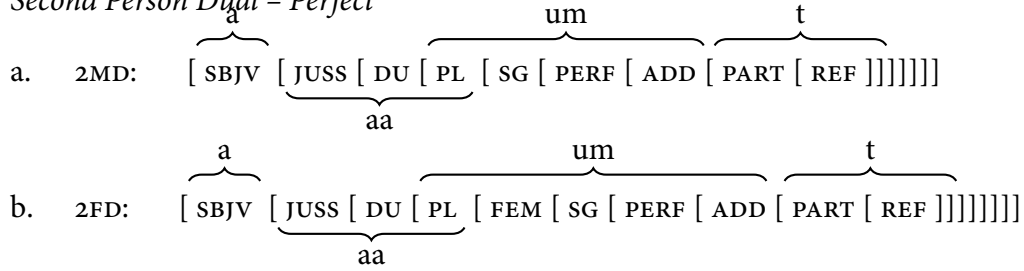
If no Vocabulary Item can be anchored at the current cycle, the target of spellout includes the head of the (previous) anchor's complement.

In fact, the same mechanism allows us to explain the containment facts that hold for the dual. Recall that 'aa' occurs across all paradigms in all the Dual cells, and that we postulated the structure in (27). Crucially, the fact that it occurs in *all* dual cells (and only there) leads us to naturally assume that it is also the only affix to lexicalize DU.

(27, repeated) /aa/ \Leftrightarrow '[JUSS[DU[PL]]]'

Since there is no other affix that can spell out DU, we expect the same kind of rewinding to occur if the previous cycle spelled out PL, in order to find an anchor for 'aa'. As (47) shows, this assumption immediately derives the correct set of affixes, assuming, as before, that 'aa' and 'a' merge phonologically. Note that we derive the same gender syncretism as in the prefixal paradigms in an identical way, i.e., by suggesting that 'um', like 'Ø' (31b) lexicalizes the low FEM.

(47) *Second Person Dual – Perfect*



Turning to the first person forms, we find *katab-t-u* in the singular, and *katab-naa* in the plural. For the plural, we thus have to account for the fact that 'n' occurs across paradigms, and appears to include both person and number. Given that we determined PERF to be structurally located between these two regions, we thus have to conclude that 'n' can in fact spell out PERF as well, given that it must span across both PL and the first person structure. Furthermore, given that 'n' can spell out PL without spelling out PERF, as we saw in the previous discussion of the prefixal paradigms, we can conclude that PERF must be under a pointer, i.e., lexicalized without requiring strict contiguity. The distributional facts thus lead to the specification in (48). As for the fact that the suffixal structures result in *naa*, rather than *na*, I simply follow

of prefixal Afro-Asiatic paradigms that Noyer (1992) provides. In his approach, affixes can be secondary exponents of a feature, i.e., apply only in those contexts that bear the relevant feature, but without blocking application of other affixes. All the affixes that exhibit secondary exponence that he provides refer either to a context of number and gender, such as "pl (f)" (i.e., plural in the context of feminine), like the one provided in (45), or to second person as the secondary feature, a case that the current approach deals with by suggesting that application of 't' leaves ADD as the anchor of the next cycle. It appears, then, that the current interpretation of his hierarchy might be extendable to account for the distribution of multiple exponence as well, but further research is needed to ensure that this is indeed a correct characterization of the facts.

Noyer (1992: 98) in assuming that the affix' form is underlyingly /na/, but that a truncation process applies in the prefixal position.

$$(48) \quad /n(a)/ \Leftrightarrow '[FEM [PL [SG \rightarrow [PERF [PART [REF]]]]]]' \quad (\text{revised (21a)})$$

(49) *First Person Plural – Perfect*

$$1PL: \quad \underbrace{a}_{[SBJV]} \underbrace{\emptyset}_{[JUSS]} \underbrace{n(a)}_{[PL [SG [PERF [PART [REF]]]]]}]$$

This analysis raises an issue for the first person singular: Since '*n(a)*' can spell out the whole span from SG to REF in the first cycle, '*t*' must at least be able to spell out the same span, so as to not be overwritten. That is, we need to revise '*t*' to include PERF as well, as in (50).

$$(50) \quad /t/ \Leftrightarrow '[FEM[SG \rightarrow [PERF [PART [REF]]]]]' \quad (\text{revised (21c)})$$

This accounts for the fact that '*t*' spells out the first person singular in the perfect, while '*ʔ*' does so in the prefixal paradigms: While the latter can overwrite '*t*' in the absence of PERF, it is '*t*' that overwrites '*ʔ*' in its presence: Since '*ʔ*' does not lexicalize PERF, it is merely a candidate for [PART[REF]], and thus overwritten cyclically by '*t*'. The analysis cannot account naturally for the presence of a suffix '*u*', however, given that all person/number/gender material will receive spellout by '*t*'. Comparing the first cycle in (51) to the first two cycles in (43a), we find that the next cycle should be identical; we do however find *katab-t-u* in the first person singular, and *katab-t-a* in the second person singular masculine. Given that situation, I am currently left to stipulate that '*a*' has an allomorphic variant [u], conditioned by the first person singular perfect structure.¹⁹

¹⁹The issue would not arise, if number on the first person is marked not in the number region, but rather in the person region; we could then argue that '*t*' does not lexicalize PERF at all, but cannot be overwritten by '*n(a)*', because the relevant head, say, MULTISPEAKER, would break contiguity between PERF and PART in a vocabulary item like (i), and thus not be able to overwrite '*t*' for [PERF[PART[REF]]]. If we further assume, that a first person structure only encodes presence or absence of a PL head, the following specification would resolve two issues:

$$(i) \quad /n(a)/ \Leftrightarrow '[FEM [PL \rightarrow [PERF [MULTISPEAKER [PART [REF]]]]]]'$$

Firstly, from that perspective, '*t*' would not lexicalize PERF. Insteadl, '*u*' could spell out the relevant structure, anchored at PERF, thus avoiding the contextual allomorphy rule. This is compatible with the proposed spellout for the second and third person, where PERF is spelled out with ADD or REF respectively. Secondly, this affix points towards a unification of '*n(a)*' and '*na*' as a plausible analysis, since it now matches the feminine plural structure. I have not pursued this path here, insofar as I mostly focused on contrasts between and within second and third person, but Ritter (1997) provides some arguments along those lines, arguing that Arabic does in fact mark the first person plural in the person domain, rather than the number domain. Harley and Ritter (2002) provide similar points, suggesting that in some languages that distinguish number only in the first person, the relevant difference is found in the person domain. A future refinement of the current analysis that is based on a larger, crosslinguistic dataset, might thus take this as a plausible direction to take.

(51) *First Person Singular – Perfect*

$$1SG: \quad \underbrace{a (\rightarrow [u])}_{[SBJV]} \underbrace{\emptyset}_{[JUSS]} \underbrace{t}_{[SG [PERF [PART [REF]]]]}$$

Turning to the third person, a number of aspects are of interest. Firstly, the comparison between the third person singular feminine and masculine across the prefixal and the suffixal paradigm, as given in Table 11, shows that there is no overt suffixal counterpart to ‘y’: While the prefixal paradigms mark the difference in gender with a different prefix, the suffixal paradigms show that the feminine form *katab-a-t* (3FS.PERF) properly contains the masculine form *katab-a* (3MS.PERF).

P/G/N	SUBJUNCTIVE	PERFECT
3MS	y-aktub-a	katab-a
3FS	t-aktub-a	katab-a-t

Table 11: Third Person Singular

The same absence of ‘y’ extends to the plural forms, where we find ‘y’ in the prefixal paradigms: While the prefixal subjunctive forms are *y-aktub-uu* (3MP.SBJV) and *y-aktub-na* (3FP.SBJV), the corresponding perfect forms are *katab-uu* and *katab-na*, i.e. we find the same suffixes, but no corresponding ‘y’. In contrast, we find ‘t’ in the third person singular/dual feminine, i.e., we find suffixal ‘t’ in precisely those contexts where we find prefixal ‘t’, and no suffixal counterpart to ‘y’. These facts follow immediately, if we assume another zero affix, as in (52), that can cyclically overwrite ‘y’ in the perfect.²⁰

(52) $/\emptyset/ \Leftrightarrow [SG[PERF[REF]]]$

In the third person singular, this derives the surface containment facts as in (53): In both the masculine and the feminine, ‘Ø’ spells out the structure [SG[PERF[REF]]], since no other vocabulary item can spell out a bigger structure. In particular, ‘t’ requires contiguity between PERF and PART in order to spell out PERF and is thus not a candidate for insertion. The first cycle is thus identical between the feminine and the masculine in the third person singular perfect, contrasting with the same cells in the prefixal paradigms, where the contrast was established here. In masculine, the remaining structure to be spelled out is the Tense structure, and spellout proceeds in the usual fashion. In the feminine, however, we find the same issue as before, namely that no vocabulary item can be anchored at FEM, and we thus rewind, and

²⁰A plausible alternative is that ‘Ø’ actually is the suffixal counterpart of $/y/ \Leftrightarrow [SG \rightarrow [PERF[REF]]]$, but that ‘y’ is phonologically deleted in suffixal position. According to Rosenthal’s (2006) analysis of the verbal phonology of Classical Arabic, glides are deleted unless they occur in a position where they are the only available onset, or in certain positions where they are the final element of a root. Since neither would protect ‘y’ against deletion in a suffix position, this would therefore result in a zero realization of ‘y’ in the cases under discussion in this section.

(53) *Third Person Singular – Perfect*

- The facts of the dual containment, i.e., that the dual form contains the plural form in the second person masculine, but the singular form in the third person feminine, receives an explanation as well: Because the cycle that spells out PERF in the second person, anchored at ADD, spells out the span up to (and including) PL, the dual contains that form. We see this in (54), where the spellout proceeds largely parallel to the singular, modulo ‘*aa*’ spelling out the span [JUSS[DU[PL]]]. Because there is no affix that could be anchored at REF and spell out a structure larger than the span up to SG, ‘ \emptyset ’

- (54) *Third Person Dual – Perfect*

- The *Rewind* proposal thus accounts for the containment facts that hold for the dual forms, i.e., the pairs *katab-t-um* (2MP.PERF) vs. *katab-t-um-aa* (2MD.PERF) and *katab-a-t* (3FS.PERF) vs. *katab-a-t-aa* (3FD.PERF): In the second person masculine, plural is spelled out together with the cycle that spells out ADD, but the fact that no item can be anchored at DU causes rewinding. In the third person feminine, in contrast, ‘t’ does not spell out PL, but only the structure just below that. Both of these, however, lead to the next cycle targeting [JUSS[DU[PL]]], and therefore lead to the partial syncretism with respect to ‘aa’. Crucially, the same is not true in the prefixal paradigms, because ‘um’ is not applicable there, since the absence of PERF blocks it from matching the span between SG and ADD, i.e., the system derives the (a)symmetry

between second and third person, as well as the fact that it is restricted to the suffixal perfect paradigm simply from the matching algorithm.

This leaves the third person plural to be accounted for. In particular, we see that the suffixes here are identical between the suffixal and the prefixal paradigms, while the contrast involves ‘y’ vs ‘Ø’, as shown in Table 12.

P/G/N	SUBJUNCTIVE	PERFECT
3MP	y-aktub-uu	katab-uu
2MP	t-aktub-uu	katab-t-um
3FP	y-aktub-na	katab-na
2FP	t-aktub-na	katab-t-um-na

Table 12: Second/Third Person Plural

Like the dual asymmetries discussed just above, this follows from the specification of ‘Ø’ and the fact that the perfect differs from the other paradigms in being marked lower: Because ‘Ø’ wins out against ‘y’, which cannot spell out PERF, but both affixes do not spell out the structure above SG, we derive the partial syncretism as in (55), with the second cycle identical to the one in the prefixal paradigms, while the first cycle varies. Crucially, this differs from the facts about the second person (which, in the prefixal paradigms also exhibits ‘uu’/‘na’) that we saw early, insofar as ‘um’ disrupts the remaining parallelism between the spellout of the prefixal and the suffixal structures by spelling out PL. Thus, in the prefixal paradigms, both the second and the third person plural show ‘uu’ and ‘na’, but in the second person that syncretism breaks down partly, for reasons we saw above, and that I showed to be linked to the containment facts about the dual as well. In the third person, however, the partial syncretism under discussion remains intact, and this follows immediately from the system:

(55) *Third Person Plural – Perfect*

- a. 3MP: $\overbrace{[\text{SBJV} [\text{JUSS} [\text{PL} [\text{SG} [\text{PERF} [\text{REF}]]]]]]]] }^{\text{uu}} \quad \overbrace{[\text{SG} [\text{PERF} [\text{REF}]]]]]] }^{\emptyset}$
- b. 3FP: $\overbrace{[\text{SBJV} [\text{JUSS} [\text{FEM} [\text{PL} [\text{SG} [\text{PERF} [\text{REF}]]]]]]]] }^{\text{na}} \quad \overbrace{[\text{SG} [\text{PERF} [\text{REF}]]]]]] }^{\emptyset}$

As I have shown then, the nanosyntactic interpretation of Noyer’s (1992) hierarchy advanced here can be extended to the suffixal perfect paradigm of Standard Arabic by assuming that the Perfect is at a lower position in the same hierarchy, namely between Number and Person. In doing so, a variety of facts about the ways these paradigms differ have been shown to be implementable naturally: First, we saw that ‘t’ extends to the first person singular in the perfect,

while having an otherwise identical distribution, a fact that followed from assuming that ‘*t*’ is underlyingly a first person marker. Secondly, we saw that the containment facts about the dual are different between the prefixal and the suffixal paradigms, and that the dual containing the plural form only in the second person masculine of the perfect followed from the presence of a specific suffix ‘*um*’ that was non-applicable in the prefixal paradigms. Thirdly, we saw the parallelism between the second and the third person with respect to the plural marking that the prefixal paradigms exhibit is absent due to the same suffix, while the same suffixes are retained in the third person where said affix does not apply.

In the next section I will lay out how the linear distribution of these affixes follows from the same presence of PERF in a low position, focussing in particular on the fact that certain affixes alternate between prefixes and suffixes, and the fact that certain

4.1 Deriving a Suffix

It should be clear that the perspective on morpheme order in current approach is in a sense preliminary, insofar as the the Cinque style Universal 20 / Antisymmetry perspective is a typological one that needs to be tested against a range of languages, insofar as specific ways to implement this make subtly different predictions, and insofar as the predictions for possible postverbal orders are much weaker within a Universal 20 approach than those for preverbal orders. That being said, the current approach does provide a clear intuition for how to characterize the linear distribution in both the prefixal and the suffixal paradigms: REF needs to be local to the verb in both of them. In particular, this intuition links the fact that whenever ‘*t*’ spells out REF, it is adjacent to the verb, to the Pointer approach developed to account for its paradigmatic distribution: In the repeated Table 13, we see that ‘*t*’ is non-adjacent to the verb in the third person singular feminine of the perfect only, i.e., in the context where I argued that it spells out [FEM[SG]] only, but not the REF-containing part, i.e., the part below the pointer.

P/G/N	SUBJUNCTIVE	PERFECT
2MS	t-aktub-a	katab-t-a
3FS	t-aktub-a	katab-a-t

Table 13: The Loci of ‘*t*’ (repeated)

This is shown in the repeated spellouts of the relevant forms in (56). In all three forms where ‘*t*’ is adjacent to the verb, it spells out REF, but in (56d) it does not. The same holds for the other alternating affix, in the first person plural forms, *n-aktub-a* and *katab-na-a*, where we find ‘*n(a)*’ adjacent to the verbal stem, paralleling the behavior of ‘*t*’ in those cases where it spells out REF.

(56) ‘*t*’ in 3FS vs 2MS

- a. 2MS.SBJV: $\begin{array}{ccccccc} \text{'a'} & \emptyset & \emptyset & t \\ \hline [\text{SBJV} [\text{JUSS} [\text{SG} [\text{ADD} [\text{PART} [\text{REF}]]]]]] \end{array}$
- b. 3FS.SBJV: $\begin{array}{ccccccc} \text{'a'} & \emptyset' & t' \\ \hline [\text{SBJV} [\text{JUSS} [\text{FEM} [\text{SG} [\text{REF}]]]] \end{array}$
- c. 2MS.PERF: $\begin{array}{ccccccc} a & \emptyset & \emptyset & t \\ \hline [\text{SBJV} [\text{JUSS} [\text{SG} [\text{PERF} [\text{ADD} [\text{PART} [\text{REF}]]]]]] \end{array}$
- d. 3FS.PERF: $\begin{array}{ccccccc} a & \emptyset & \emptyset \\ \hline [\text{SBJV} [\text{JUSS} [\text{FEM} [\text{SG} [\text{PERF} [\text{REF}]]]]]] \\ \hline t \end{array}$

With this in mind, the differences between the prefixal and the suffixal paradigms can be accounted for by postulating two things: Firstly, the difference is characterized purely by PERF attracting the VoiceP.²¹ Secondly, REF requires the VoiceP to be local to it on the surface. In the prefixal paradigms, PERF is absent, and the locality of REF and VoiceP is trivially given. In contrast, the suffixal paradigms show the verbal structure (i.e., VoiceP) moving to the edge of the span that spells out REF (in line with the landing sites being relativized to spans, as in the discussion of the derivation of a prefix), and pied-piping it. This type of obligatory movement to an edge followed by pied-piping is, of course, attested elsewhere, and discussed as *The Edge Generalization* by Heck (2008, 2009), as well as Cable (2012), for examples such as (57).

- (57) a. Bill would never buy [[that big] a car]
 b. Bill would never buy [[a car] that big]
 c. [[How big] a car] did Bill buy?
 d. * [A car [how big]] did Bill buy?

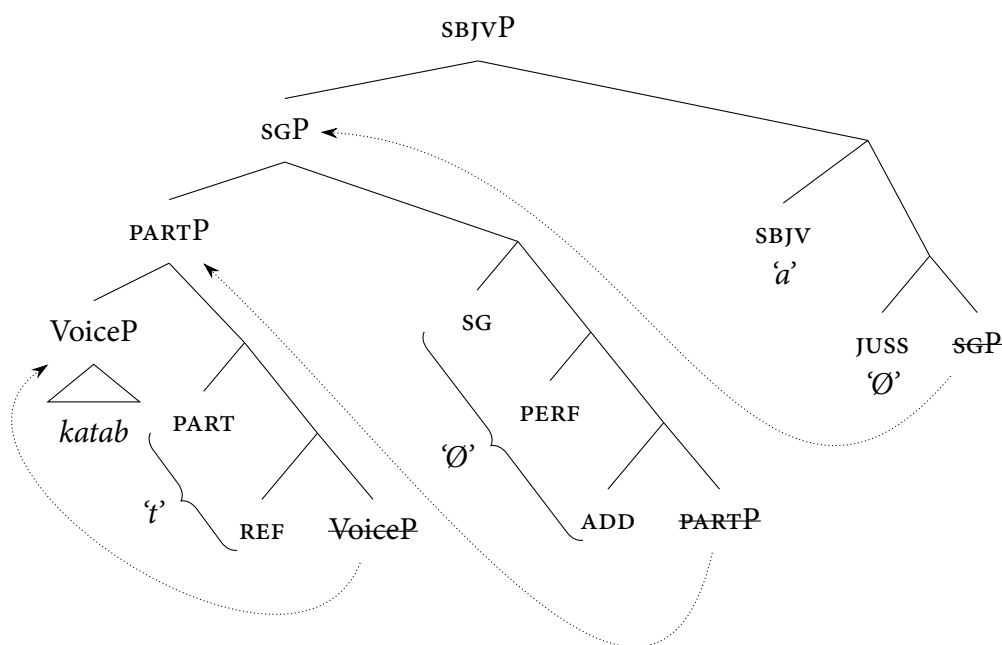
Source: Cable (2012)

If the locality requirements of REF with respect to Voice blocks movement of the VoiceP to the specifier of PERF in the same manner, with the same repair strategy, namely movement to the edge plus pied-piping, we derive the desired facts: In the perfect, whatever affix spells out REF is right-adjacent to the verbal stem. To see this, consider the two trees for the second person singular masculine and the third person singular feminine in (58) and (59) respectively. In

²¹Note again that Kastner (2018) argues that the vowels spell out the voice structure in Hebrew, contextually conditioned by Tense. Benmamoun (1999) argues that in Arabic, the vowels occurring in the prefixal paradigms are the default, whereas the ones occurring in the suffixal Perfect paradigm are special. While I do not intend to advance a theory of how Kastner's theory could be implemented under the current view here, I would like to tentatively point out the fact that the fact that Voice receives a special spellout in the presence of PERF, and that PERF attracts the VoiceP to its specifier might provide a hint towards the mechanism of and reason for this relation.

the second person singular masculine, we see that ‘*t*’ is pied-piped by the verb, since the first movement targets VoiceP, and the VoiceP moves to the edge of the span that spells out REF, i.e. it moves to the specifier of PARTP. The whole phrase headed by PART then moves to the specifier of the span that spells out PERF, i.e., the head that attracted Voice. Since the Tense structure, too attracts REF, as argued in Section 3.3, the whole structure moves to the specifier of SBJVP. Note in passing that I left out the movement to the specifier of JUSS; I follow Koopman (2017a), in assuming that the typology of EPP features makes available a type that requires surface true movement (i.e., movement that requires subsequent pied-piping if another EPP feature targets a piece of the structure), as those indicated in the tree, as well as a weaker type that only requires successive cyclic movement. Independent evidence for this is provided by Cinque’s (2005) approach where both successive cyclic movement and pied-piping inducing movement are required to derive the various postnominal orders of nominal modifiers.

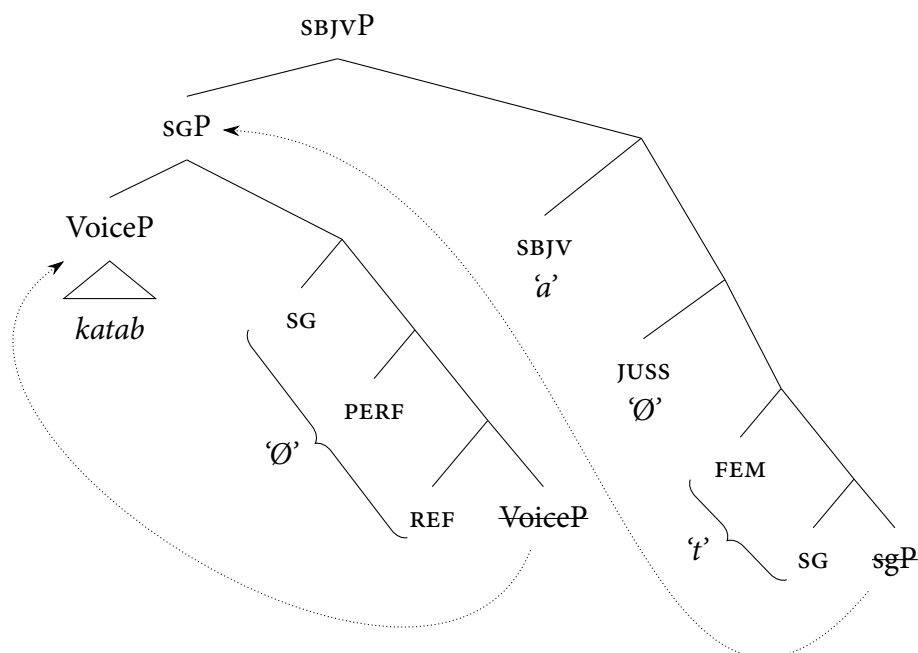
(58) 2MS.PERF *katab-t-a*



In contrast, the same EPP features will derive a different structure in the third person singular feminine, crucially stranding the structure that ‘*t*’ spells out, and thus deriving the desired result. Since it is ‘*Ø*’, not ‘*t*’ that spells out REF and PERF in this structure, a single movement operation suffices to fulfill both head’s locality requirements. As in the previous derivation, the

whole structure then continues to move to the Tense region; the crucial difference lying in the fact that [FEM[SG]] is stranded. Note that the Rewind approach suggests that SG is doubled in the structure, presumably due to the fact that the whole structure is copied, but SG cannot be deleted, due to its presence in the span spelled out by 't'.

(59) 3FS.PERF *katab-a-t*



The same mechanism accounts trivially for all forms that have two overt suffixes: It is always the one expressing REF that is adjacent to the verb. It also accounts for the trimorphemic 2FP *katab-t-um-na*: Since 't' spells out REF, it is linearly adjacent to the verb; and since 'um' spells out PERF, it moves PARTP into its specifier, followed by 'na' moving the whole structure to the specifier of SBJV, paralleling the derivation of 2SM *katab-t-Ø-a*, modulo 'um' being in the position of the zero element, as expected, since 'um' and 'Ø' spell out PERF. The dual forms, however, need an additional comment: While the second person dual *katab-t-um-aa* could be derived by merely stranding 'aa' (which would cause its adjacency and thus phonological fusion with 'a'), the third person feminine dual *katab-a-t-aa* poses a problem: If 't' is stranded, we would expect 'aa' to precede it. There are various possible ways of addressing this: We

might assume that the re-ordering of *t* and *aa* is really a morpho-*phonological* phenomenon, triggered in order to avoid the fusion of *a* and *aa*, along the lines of a REALIZE MORPHEME constraint. Alternatively, DU might have an EPP feature for SG that is not demanding a surface specifier; under this approach, *t* would be smuggled above *aa* in the sense of Collins (2005): The whole FEMP moves to the specifier of DUP, but only the sGP moves out after that. This approach would not interfere with the explanation for the second person's form *katab-t-um-aa*, as *um* independently needs to be pied-piped. It would hold for the prefixal paradigms as well, but since all smuggled material is phonologically zero, there is currently no way for me to test this analysis; it does, however, weaken the predictions of the Universal 20 approach, with respect to the possible set of orders — a proposal that has independently been advanced (see Abels 2011, but also Cinque in p.c. to Koopman 2018). As of right now, however, I do not see a possibility to test these hypotheses within MSA, and thus future work on a larger set of languages that fall under Noyer's (1992) hierarchy, and their postverbal morpheme orders will have to decide between these types of analyses, as both are compatible with the larger argument in this paper.

Crucially, what I have shown in this section is that the perfect can be properly integrated into the f-seq interpretation of Noyer's (1992) hierarchy. Doing so allows for a natural integration, both of the distribution of *t* in paradigmatic terms, with its occurrence in the first person singular of the perfect, but not the prefixal paradigms, and its linear distribution: The pointer approach that was developed above to account for the fact that *t* occurs in the third person feminine non-plural as well as the second person, but that it cannot spell out both second person and feminine at the same time, was shown to lend itself to a natural characterization of the linear distribution of *t*: The suffixal nature of the perfect in general is captured by a single EPP feature on the single head that distinguishes the two paradigms, while the fact that *t* occupies varying positions follows from the perfect head as well: When PERF blocks the contiguity between REF and [FEM[SG]], *t* must be anchored at SG instead of REF, which leads to its being stranded, rather than pied-piped, and thus not be adjacent to the root. The pointer approach does thus not only account for the paradigmatic distribution of *t*, but also for its linear distribution, unifying them under a single lexical specification.

5 Discussion

In this paper I have argued for a structural interpretation of Noyer's (1992) hierarchy for Modern Standard Arabic, and extended it to the Perfect. Under the current theoretical perspective, a variety of phenomena reduce to the notion that the vocabulary drives the morpho-syntactic *Fusion* (in DM parlance) of maximally simple heads, and independently motivated syntactic operations. It is worth briefly comparing this system to the approaches of both Noyer (1992) and Halle (2000), who employ a large set of independent mechanisms to derive these facts (alongside many similar phenomena in other languages that the current theory still needs to be tested against), among which are Fission, Impoverishment, an independently existing hierarchy, Fusion, a subset principle, as well as a lexical specification of affixes as prefixes or suffixes.

On the theoretical side, it is surely worth noting that a smaller set of mechanisms ought to be

preferable, and if we can get by with only a Fusion-like mechanism, such as spanning, that is itself an interesting result, offering not only fewer mechanisms, but also a perspective on the theoretical status on Noyer's hierarchy: It is simply a part of the functional sequence. It is also worth noting that in the current perspective, the hierarchy extends to governing Fusion effects as well, i.e., since an expounded span is a contiguous part of the hierarchy, no vocabulary item can expone non-contiguous parts of the hierarchy, thus making the theory more restrictive — while the paradigmatic distribution of affixes can be understood purely in terms of a linear system, the f-seq, reducing a five dimensional system (Tense, Aspect, Person, Number, Gender) to a more restrictive one-dimensional one (modulo the effects of pointers), their linear distribution is subject to the usual syntactic mechanisms of feature driven displacement. The system proposed here offers an account in which the effects that Noyer attributed to Impoverishment are reduced to vocabulary insertion,²² the notion of discontinuous bleeding (the fact that certain prefixes block certain suffixes) has been accounted for without a template, and linked to the “continuous bleeding” counterparts in the perfect paradigm, and the order of the affixes has been accounted for in the same terms, by suggesting that affixes that spell out REF must retain the local relation to the verbal stem.

More crucial, however, are the empirical facts: Firstly, both Noyer and Halle rely on the notion that it is the vocabulary items themselves that are prefixes or suffixes, a notion that runs into obvious trouble given the prefix/suffix alternations of *t'* and *n(a)* that we have seen.²³ Insofar as Noyer does not deal with the suffixal paradigms, it is not obvious whether his system could be amended to deal with these paradigms, but it has to retreat to treating the distribution of *t'* as an accidental homophony of two different affixes, an approach that Halle takes issue with. In addition to a prefixal Arabic paradigm, Halle's approach does treat both the prefixal and suffixal paradigms of Biblical Hebrew, and the issues that would arise in extending it to his analysis of Classical Arabic are obvious: Halle treats *t'* as an elsewhere prefix that encodes nothing, and argues that all prefixal paradigms have a requirement to exhibit at least one prefix. Since no other prefix encodes a subset of the second person specification [+PART, -AUTHOR], *t'* is inserted in these contexts. As for its occurrence in the third person feminine singular/dual, he posits an impoverishment rule for these contexts that deletes the feature [-PART] that *y'* spells out, and they are thus subject to the insertion of elsewhere *t'* as well.²⁴ There are two major issues with this proposal: Firstly, it is clearly a violation of exactly the hierarchy-based restriction on Impoverishment that Noyer discovered: Given his hierarchy of *Person* > *Gender*, it should be gender that is impoverished here, not person, i.e., Halle's approach is incompatible with Noyer's insights. Secondly, this mechanism of limiting competition to a set of prefixes, does clearly not extend to the perfect paradigm — *t'* does occur as a suffix as well, and thus it cannot be a lexical property of the affix to be a prefix. Even if *t'* were underspecified with respect to [±prefix], and thus able to compete in both paradigms, we run into trouble: There are

²²See Trommer (1999) for a similar notion, where Impoverishment is reduced to the insertion of zero affixes.

²³Though Noyer somewhat contradicts himself: On page 92, he argues that affixes bear a polarity property [±prefix] that determines which templatic slot an affix will be competing for, but on page 98 he notes that *n'* appears as a suffix.

²⁴Halle (2000: 140) actually posits an Impoverishment rule that deletes [-Pse] (his name for participant) in the context of [+fem,-sg], but insofar as that would derive the wrong distribution of *t'*, I assume this is an error, and the rule is meant to apply in the context [+fem, -pl], i.e., the singular and the dual.

no obvious “positions” (as in a fissioned terminal) where ‘*t*’ could apply, and nothing that could distinguish 2SM *katab-t-a* from 3FS *katab-a-t* with respect to the linear order of these two affixes. His analysis of Biblical Hebrew posits no Fission in the perfect, and five monomorphemic suffixes that all have ‘*t*’ as their first segment; clearly an analysis that does not capture the Arabic paradigms discussed here, where every cell that has ‘*t*’ as a prefix has ‘*t*’ as a suffix in its perfect counterpart. In contrast, the current analysis gives an account of the paradigmatic distribution of ‘*t*’ that accounts for the prefixal as well as the suffixal paradigms, and provides an account of its linear distribution that derives from the same specification: We can capture the variation in linear distribution by a single descriptive statement, namely that REF needs to be adjacent to the verb; the prefix/suffix distinction is a derived generalization over different spellouts, rather than a list of individual stipulations that combines with an autonomous morphological template. The radically atemplatic approach advanced here accounts for the variation in linear distribution by linking it to the paradigmatic distribution purely in terms of matching, a possibility that is excluded in the other approaches.

That is not to say that the current approach is without issues: Unlike Noyer’s and Halle’s approach, it has not yet been tested against a wide range of languages. The movement approach to affix order within a broader Antisymmetry approach necessitates syntactic movement of arguments to evacuate the Tense structure, if it is to fit into the wider analysis of the language. More crucial is the fact that I have tacitly assumed that there is no first person dual, while simultaneously assuming that the first person does bear gender that is always neutralized (in order to allow for the specification of ‘*t*’ as a first person singular feminine affix); a treatment of two identical surface properties in entirely different ways. Ritter’s (1997) approach to number in the first person as part of the person domain (through a MULTISPEAKER head above the PART head) that I mentioned in footnote 19 might provide a perspective on this that solves that problem, but for now it remains an open question. Lastly, and possibly most importantly, the proposal introduced here basically suggests that the peculiar distribution of ‘*t*’ is part of an *ABA violation in the prefixal paradigms, where the largest and the smallest structures, third and second person, are spelled out by ‘*t*’, while the medium sized first person is instead spelled out by ‘*ʔ*’, which capable of overwriting ‘*t*’ since it lexicalizes additional higher material. This is a fairly unique property of the pointer approach, and the reason Vanden Wyngaerd (2018) rejects it. To my knowledge, no parallel effects are known for cases of root suppletion, and if this is indeed a difference that characterizes morphology at least in cases like the one discussed here, it begs the question of its boundaries and the reasons these differences would arise for. Finally, let me offer a brief note on predictions: The approach proposed here captures the Impoverishment effects Noyer described for MSA (modulo the absence of the first person Dual, to which Ritter’s proposal might provide a solution, as just discussed), but it does make subtly different predictions with respect to the possible effects we might find elsewhere. While Noyer’s proposal allows any type of filter to impoverish a lower ranked feature, a strikter locality is required under the current approach, such that person should not be able to create a syncretism with respect to gender, unless it is also expressing part of the number structure, person should not be able to create a syncretism with respect to Tense, unless it also expresses Number and Gender, etc. As of now, I have to leave it to future research to test these predictions, but it provides clear and testable predictions, as any theoretical stance should.

6 Conclusion

In this paper I applied the Nanosyntax system for the spellout of agreement that was developed in Blix (under review) to a completely different dataset, arguing that certain peculiar predictions of the pointer approach account for effects that cannot be captured properly in a subset-based approach to matching. In arguing that Noyer's hierarchy is a description of the functional sequence, and that the vocabulary items spell out differently sized "chunks" of this functional sequence, I have shown that an account of the distribution of 't' can be given that does provide an explanation for an apparent disjunction: The affix in question spells out the feminine, or the second person, but not both. I have shown that the pointer account, by which 't' lexicalizes two contiguous spans, derives this effect, and I have shown that it makes available an implementation of affix order that relies on a coherent set of requirements, in particular linking it to the fact that 't' can, but does not have to spell out the person structure REF in order to spell out FEM, and that it is non-adjacent to the root only in case it is not part of this pied-piping inducing head. I have shown that the perfect can be understood within this implementation of Noyer's hierarchy by arguing that it is a single head within the hierarchy that derives both the distribution of affixes, and the fact that these paradigms are suffixal. In doing so, I have shown that Impoverishment can be unified with the syncretisms introduced by the fact that vocabulary items match a set of structures determined by the matching algorithm, I have derived discontinuous bleeding in Arabic from a purely local relation of (spans of) heads, and provided a hypothesis about the nature of Noyer's hierarchy that implements it in the narrow syntax. Finally, I believe that I have shown that the atemplatic approach that derives all affix order from syntactic movement is empirically superior to approaches that restrict competition semi-templatically by lexically specifying affixes as prefixes and suffixes; an approach that the data itself shows to be untenable, but that also misses interesting generalizations about *why* a group of affixes can be prefixal, and why an affix may turn up in a variety of positions. While I think these are very promising results, it must be said that the current approach has not yet been shown to have the same empirical scope as the many DM approaches to agreement have. It is my hope, however, that the results shown here can inspire future research into and refinements of the span-based perspective on the syntax-morphology interface.

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Appendix — List of Affixes

- (A1) a. $/y/ \Leftrightarrow '[\text{SG} [\text{REF}]]'$
- b. $/t/ \Leftrightarrow '[\text{FEM} [\text{SG} \rightarrow [\text{PERF} [\text{PART} [\text{REF}]]]]']'$
- c. $/ʔ/ \Leftrightarrow '[\text{JUSS} \rightarrow [\text{FEM} [\text{SG} [\text{PART} [\text{REF}]]]]']'$
- d. $/n(a)/ \Leftrightarrow '[\text{FEM} [\text{PL} [\text{SG} \rightarrow [\text{PERF} [\text{PART} [\text{REF}]]]]]]']'$
- e. $/\emptyset/ \Leftrightarrow '[\text{SG} [\text{PERF} [\text{REF}]]']'$
- f. $/uu/ \Leftrightarrow '[\text{JUSS} [\text{PL}]]'$
- g. $/ii/ \Leftrightarrow '[\text{JUSS} [\text{FEM} [\text{SG} [\text{ADD}]]]]']'$
- h. $/\emptyset/ \Leftrightarrow '[\text{FEM} [\text{SG} [\text{ADD}]]']'$
- i. $/na/ \Leftrightarrow '[\text{PRS} [\text{SBJV} [\text{JUSS} [\text{FEM} [\text{PL}]]]]']'$
- j. $/aa/ \Leftrightarrow '[\text{JUSS} [\text{DU} [\text{PL}]]']'$
- k. $/a/ \Leftrightarrow '[\text{SBJV}]'$ (with $/a/ \rightarrow [\emptyset] / \text{V:} __$)
- l. $\left\{ \begin{array}{l} /u/, \\ /nV/ / \text{V:} __ \end{array} \right\} \Leftrightarrow '[\text{PRS} [\text{SBJV}]]'$
- m. $/\emptyset/ \Leftrightarrow '[\text{JUSS}]'$
- n. $/\emptyset/ \Leftrightarrow '[\text{SG} [\text{PERF} [\text{ADD}]]']'$
- o. $/i/ \Leftrightarrow '[\text{SBJV}[\text{JUSS}[\text{F} [\text{SG} [\text{PERF} [\text{ADD}]]]]]]']'$
- p. $/um/ \Leftrightarrow '[\text{SBJV}[\text{JUSS}[\text{PL} \rightarrow [\text{F} [\text{SG} [\text{PERF} [\text{ADD}]]]]]]]]']'$