Negative Concord and Restructuring in Palestinian Arabic: A Comparison of TAG and CCG Analyses

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Abstract

This paper discusses interactions between negative concord and restructuring/clause union in Palestinian Arabic. Analyses formulated in Tree Adjoining Grammar and Combinatorial Categorial Grammar are compared, with the conclusion that a perspicuous analysis of the the intricacies of the data requires aspects of both formalisms; in particular, the TAG notion of the extended domain of locality and the CCG notion of flexible constituency.

1 Palestinian Arabic Negative Concord

In Palestinian Arabic (PA), negative concord occurs with the determiner **wɛla** "(not) even one," where negative concord describes the failure of an expression which expresses negation in some sentences to do so in others. Phrases formed with **wɛla** ("**wɛla**-phrases") are interpreted either as negative quantifiers ("NQ-**wɛla**)" or as polarity-sensitive indefinites ("NPI-**wɛla**"). **wɛla**-phrases have an NQ-interpretation preceding the finite verb or verb complex in a clause (1-2) or in fragment answers (3-4):

(1) **wɛla ḥada** fiː-hʊm šæːf-ni.
not.even one.MS in-them saw.3ms-me
"Not even ONE of them saw me!"

(2) **wɛla yoːm** ʕağabni l-ɛkɪl.
not.even day pleased.3ms-me the-food
"There wasn't even one day the food pleased me!"

(3) Q: šu ḳal-l-ak? A: **wɛla iši**.
what said.3ms-to-you not.even thing
"What did he say to you? Nothing at all."

(4) Q: miːn šʊfti? A: **wɛla ṣuːṣ** ɪbn yomeːn.
who saw.2fs not.even chick son two-days
"Who did you see? Not even a two-day old chick!"

A preverbal **wɛla**-phrase preceding a sentential negation marker causes the sentence to have a double-negation reading (5: compare with 2):

(5) **wɛla yoːm ma**-ʕağabni l-ɛkɪl.
not.even day not-pleased.3ms-me the-food
"There wasn't one day the food didn't please me!"
"The food pleased me every day."

NQ-**wɛla** never occurs within the scope of negation but does occur in post-verbal positions which are not "thematically entailed" by the verb (6-7)[1]:

(6) huwwa **wɛla iši**!
he not.even thing
"He is NOTHING!"

(7) hiyya mağruːra ʕala **wɛla iši**.
she conceited.fs upon not.even thing
"She is conceited for absolutely NO reason!"

The NPI-interpretation is only available within the scope of antimorphic operators (Zwarts, 1993), like sentential negation or **bɪduːn** "without" (8-9):

(8) tɪlɪʕti **bɪduːn-ma** tḳuːli **wɛla iši**.
left.2fs without-that say.2fs even thing
"You left without saying even one thing!"

(9) la-s-sɛnna ma-baʕṭiː-hʊm **wɛlla lʊḳmi** ɛkl.
to-the-year not-give.1s-them even bite food
"Up to a year I don't give them even a bite of [solid] food."

More than one **wɛla**-phrase can have the NPI-interpretation at a time:

(10) ma-ḳʊlt **wɛla iši wɛla la-ḥada** fiː-hʊm.
not-said.1s even thing to-even one in-them
"I didn't give anything at all to even one of them."

It follows from the distributions of NQ- and NPI-**wɛla** that **wɛla**-phrases are blocked from post-verbal argument positions which are thematically entailed and which are not within the scope of an antimorphic operator.

[1] Following (Herburger, 2001), "thematically entailed" means that the meaning of the verb entails the existence of an entity filling the thematic role in question.

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1.1 Negative Concord and Locality

PA negative concord is generally subject to strict locality constraints: a **wɛla**-phrase must be contained within the smallest inflected clause containing its licensor. It cannot be separated from its licensor by the boundary of either an indicative (11) or a subjunctive/irrealis (12) complement:

(11) * **ma**-waʕatt [ɛḥki **wɛla maʕ ḥada** fiː-hʊm].
not-promised.1s talk even with one in-them

(12) * batwaḳḳaʕ-**ıš** [ınnhæ bıtḥıbb **wɛla ḥada**].
believe.1s-neg that.3fs likes.3fs even one

Similar sentences with weaker polarity items such as **ḥada** or **ʔaiy ḥada** "anyone" are acceptable:

(13) ma-**waʕatt** ɛḥki maʕ (**ʔaiy**) **ḥada** fiː-hʊm.
not-promised.1s talk with any one in-them
"I didn't promise to talk with any of them."

(14) **batwaḳḳaʕ**-ıš ınnhæ bıtḥıbb (**ʔaiy**) **ḥada**.
believe.1s-neg that.3fs likes.3fs any one
"I don't think that she likes ANY one."

This suggests that negative concord is a strictly bounded dependency like agreement marking, argument realization, or reflexive binding.

However, there are exceptions to this generalization. "Long-distance" negative concord is possible between a matrix negation morpheme and **wɛla**-phrases inside the complements of a small class of verbs, including **bıdd**- "want" (15), **χalla** "to allow" (16), **ḥaːwal** "to try" (17, 25 below) or **ʕırıf** "to know how to, to be able to" (18 below):

(15) ma-**bıddna** nχalli **wɛla zɛlami**.
not-want.1s leave.1p even fellow
"We don't want to leave even one man."

(16) ma-**χalluː**-niː-š æːkɔl **wɛla lʊḳmi**
not-allowed.3mp-me-neg eat.1s even bite
"They wouldn't let me eat even one bite!"

The embedding can be recursive, provided that only verbs in this class are used (17).

(17) **bıddiː**-š **aḥaːwıl** ɛḥki wɛla maʕ ḥada.
want.1s-neg try.1s speak.1s even with one
"I don't want try to talk with anyone at all."

These verbs correspond to verbs found in many other languages which trigger a process often referred to as *restructuring* or *clause union*. I follow (Aissen and Perlmutter, 1983) in calling them *trigger verbs*. Restructuring involves the "stretching" of the domain of locality for certain kinds of bounded dependencies from the complement of a trigger verb to include the clause that it heads.

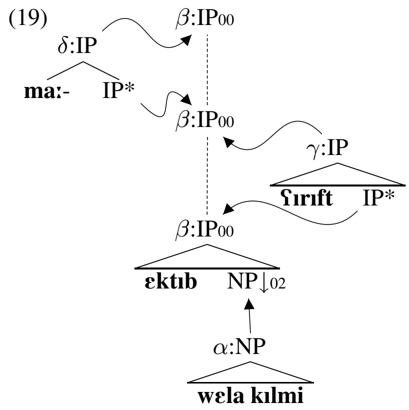
At present no other phenomena have been identified in PA which independently confirm that it has restructuring. However, long-distance negative concord is identified as a restructuring phenomenon in several languages such as West Flemish (Haegeman and Zanuttini, 1996), Polish (Dziwirek, 1998), and Serbian (Progovac, 2000). As such, I assume for now that long-distance negative concord in PA is a form of restructuring as well.

2 A TAG Analysis

Restructuring involves a seeming paradox involving a dependency which is non-local in the hierarchical structure of a sentence but local in its semantics. Tree Adjoining Grammars are well suited for analyzing restructuring because the distinction between a derived tree and the derivation tree associated with it provides two notions of locality. Restructuring phenomena which have been analyzed with TAGs include clitic-climbing in Spanish and Italian (Bleam, 2000; Kulick, 2000), long-distance scrambling in German (Rambow, 1994), and long-distance agreement in Tsez (Frank, 2006). It therefore is natural to explore a TAG analysis for long-distance negative concord in PA.

To illustrate with a simple example, the negative concord dependency in (18) is licensed within an initial tree headed by **ɛktıb** "write," and is then "stretched" by adjunction of the auxiliary tree headed by **ʕırıft** "I was able to" (19):

(18) ma-ʕırıft ɛktıb wɛla kılmi.
not-knew.1s write.1s even word
"I wasn't able to write even one word."

(19)


The locality constraint on negative concord can then be expressed as a generalization about the derivation tree (20): a **wɛla**-phrase and its licensor must be sisters:

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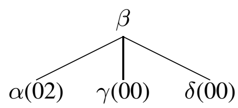


However, several properties of negative concord in PA preclude a simple analysis like this.

2.1 Clause-local Dependencies

The first property is the domain of locality of the negative concord dependency. In a simple TAG, syntactic dependencies are licensed within an elementary tree: they are *tree-local*. However, negative concord in PA is *clause-local*, because **wɛla**-phrases are not licensed within the immediate tree to which they are attached, but instead within the immediate clausal tree containing them. For example, **wɛla**-phrases can be inside prepositional phrases attached to a negative clause (21-22):

(21) ma-kaʕatt [$_{PP}$ **ğanıb** wɛla ḥada fiː-hʊm]
not-sat.1s next.to even one in-them
"I didn't sit next to even one of them."

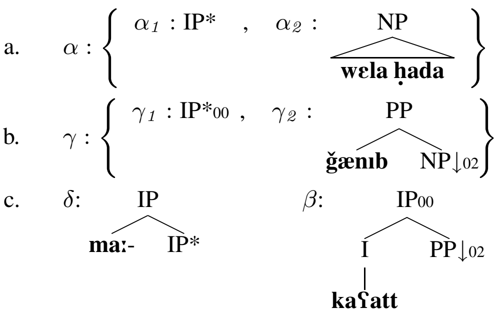
(22) bıtχallıfuː-š ʕan-na [$_{PP}$ **bi**-wɛla **iši**].
disagree.2mp-neg from-us with-even thing
"You don't disagree with us about even one thing."

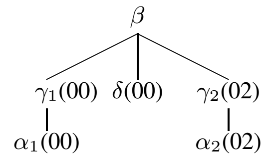
In a simple TAG analysis, the **wɛla**-phrase first substitutes into the initial tree headed by the preposition, which is then attached to the clausal tree. The relationship between the **wɛla**-phrase and its licensor would therefore not be tree-local.

Clause-locality can be modeled with what I refer to as "Scope TAG" (Kallmeyer and Joshi, 2003), a multi-component TAG (MC-TAG) in which quantificational NPs are tree sets containing two parts: a "defective" auxiliary tree IP* which specifies the scope of the quantifier, and an NP-tree which specifies its restriction. I refer to such tree sets as "scope sets."

While Kallmeyer & Joshi's proposal is intended to capture the semantic scope of quantifiers, it can also be used to express clause locality by assigning PPs to scope sets as well, and by stipulating that scope sets can combine with each other by means of set-local adjunction. The IP*-node in the scope-set of a **wɛla**-phrase can then adjoin to the IP*-node in the PP scope set, which in turn adjoins to the IP-node of the initial tree.

For example, (21) above can be analyzed with the elementary trees in (23) (trees are in abbreviated form), producing the derivation tree in (24):

(23)


(24)


However, given (24) it is still not possible to state a generalization about negative concord locality in terms of sisterhood in the derivation tree.

This can be remedied by adopting the "node-sharing" relation proposed by (Kallmeyer, 2005). Informally, two nodes α and β are in a node-sharing relation in a derivation tree T iff they are either in a mother-daughter relation in T at a node address A, or there is a sequence S of nodes $N_1 \ldots N_n$ which is the transitive closure of a mother-daughter relation in T in which the node pairs are related in terms of the root node or foot node in an auxiliary tree.

On this basis, the negative concord locality generalization is that a **wɛla**-phrase and its licensor are "shared-node sisters" in the derivation tree, where shared-node sisters are two nodes A and B which are each in a shared-node relation with a single node C. For example, in (24) β is a shared-node parent of both α_1 and δ. Accordingly, α_1 and δ are shared-node sisters with respect to β.

2.2 Trigger Verbs and Complement Type

The second property of PA long-distance negative concord that complicates a TAG analysis has to do with the kinds of complement that they take. TAG approaches to restructuring exploit "reduced complement" analyses in which trigger verbs take "smaller" complements than other kinds of subordinating verbs do (Bleam, 2000; Kulick, 2000). However, PA trigger verbs are mixed in terms of the types of complements they take: **ḥa:wal** "try to" or **ḳıdır** "be able to" optionally allow a complementizer **ʔınn**- (25-26), while **bıdd**- "want" or **ʕırıf** "know to, be able to" exclude it (27-28):

(25) ma-ḥaːwalt (**ınni**) ɛḥki wɛla maʕ ḥada.
not-tried.1s that.1s speak.1s even with one
"I didn't try to talk with even one of them."

(26) ma-ḳıdırt (**ınni**) ɛḥki wɛla maʕ ḥada.
not-could.1s that.1s speak.1s even with one
"I wasn't able to speak with even one of them."

(27) ma-bıdd-iː-ıš (***ınni**) ašuːf wɛla ḥada.
not-want.1s-neg that.1s see.1s even one
"I don't want to see even ONE of them."

(28) ma-ʕırıft (***ınni**) ɛktıb wɛla kılmi.
not-knww.1s that.1s write.1s even word
"I wan't able to write even one word."

Assuming that the presence of a complementizer indicates a CP category, and that the presence of agreement marking on the verb indicates an IP category, what these data show is that some trigger verbs allow either CP or IP complements, while others allow only IP complements. It follows that complement category cannot be exploited as a way to distinguish trigger verbs from non-trigger verbs.

This is an essential distinction because restructuring is not the only phenomenon which involves adjunction. For example, long-distance $\overline{\text{A}}$-dependencies are analyzed in TAG as involving adjunction of auxiliary trees. (29-30) show that the same verbs which block long-distance negative concord allow long-distance $\overline{\text{A}}$-dependencies, indicating that they must also be analyzed as auxiliary trees. Moreover, (30) can include the complementizer **ʔınn-**, indicating that it takes the same kinds of complements as do trigger verbs like **ḳıdır** "be able" and **ḥaːwal** "try":

(29) miːn **bıtıtwaḳḳaʕ** yaḥsal ʕala kæːs ıl-ʕæːlım?
who believe.2ms get.3ms upon cup the-world
"Who do you think will get the World Cup?"

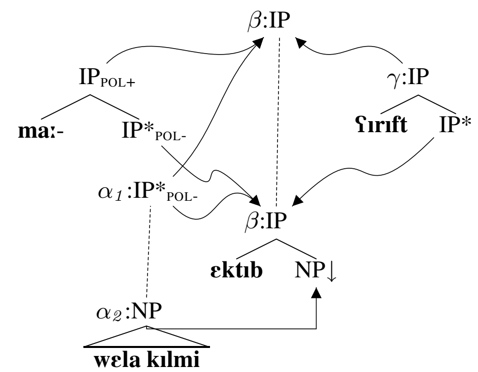
(30) šu **waʕatt** (ınnak) taʕṭiː-hæ?
what promised.2ms that.2ms give.2ms-her
"What did you promise to give her?"

A failure to distinguish between trigger verbs and non-trigger verbs will over-predict the availability of long-distance negative concord.

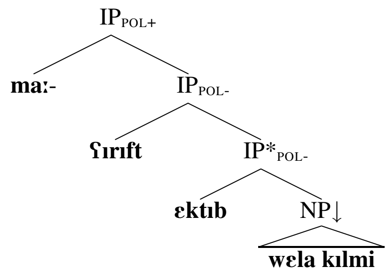
To make this distinction, I use Dowty's (Dowty, 1994) analysis of negative concord licensing. Dowty models negative concord with a "polarity" feature which takes "+" or "-" values. When a negative concord item combines with a clausal category it specifies (by unification) the clause as having a negative value for this feature. In addition, Dowty assumes that root clauses must have a positive value for the feature: I refer to this as the *root clause polarity constraint*. Negation morphemes (as well as **bıduːn** "without") take a complement specified as POL- and return a constituent with a POL+ feature. A root clause containing a negative concord item and lacking a negation morpheme will have a POL- feature for its root node and violate the root clause polarity constraint. This derives the requirement that **wɛla** phrases in root clauses be "roofed" by a negation morpheme.

Turning to long-distance negative concord, trigger verbs can be distinguished from non-trigger verbs by stipulating that non-trigger verbs take POL+ complements, while trigger verbs (and auxiliary verbs) impose no polarity specification and instead inherit the polarity feature with which their complement is specified[2]. An analysis of this kind applied to (18) would result in a derived tree (32) which satisfies the root clause polarity constraint.

(31)



(32)



2.3 Negation Morphology

The last property of long-distance negative concord sentences to be dealt with has to do with negation morphology in PA. Negation is expressed with some combination of the proclitic **maː-** and the enclitic **-š**. **-š** appears to be a second-position attaching to the first word-sized constituent in the string produced by an IP-constituent, provided that the word contains a morpheme expressing person features (Awwad, 1987; Eid, 1993).

The most frequent distribution has **-š** attached to the leftmost verb stem in a clause, which may be the main verb in a mono-verbal predicate (33), or to the leftmost auxiliary in a clause with compound tense-aspect-mood marking (34-35):

(33) ma-**nımt**-ıš fi-l-leːl.
not-slept.1s-neg in-the-night
"I didn't sleep last night."

(34) ma-**kʊnt**-ıš ʕaːrıf weːn aḥʊṭṭ-u.
not-was.1s-neg know.actpart.ms where put.1s-it
"I didn't know where to put it."

(35) ma-**ʕad**-š ḳal-l-i ʔınnu
not-returned.3ms-neg said.3ms-to-me that.3ms
štara sayyaːra.
bought.3ms car
"He didn't tell me anymore that he bought a car."

[2]This is similar to Frank's (Frank, 2006) proposal for analyzing long-distance agreement in Tsez.

In other kinds of sentences, -š attaches to a variety of non-verbal expressions, including the indefinite pronoun **ḥada** "(any)one" (36), the existential particle **fi:** (37), inflected prepositions (38), and the adverb **ʕʊmr** "ever" (39):

(36) ma-**ḥada:**-š kæ:n yıʕǧır-na.
not-one.ms-neg was.3ms rent.3ms-us
"No one would rent to us."

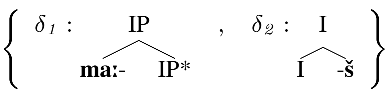
(37) ma-**fıš**-š fi-d-dınya mıþıl-hın.
not-exist-neg in-the-word like-them.fp
"There isn't [anything] in the world like them."

(38) bæḳi:-l-ɛ faras ma-**lhæ:**-š ʊχt.
was.3ms-to-him mare not-to-her-neg sister
"He had a mare [that was] without compare."

(39) fi: næ:s ma-**ʕʊmr**-hæ:-š ḥaṭṭat mawḍu:ʕ
exist people.3fs not-age-3fs-neg put.3fs subject
fi-l-mʊntada.
in-the-club
"There are people who have never posted a thread on `almontada.com`."

What these expressions all have in common with verb stems is that they occur as the first constituent in the clause and that they all contain a morpheme expressing person features. It follows that -**š** is constrained to occur in the second position attached to a word that is inflected for person.

The cases in which -**š** attaches to a verb can be modeled by assuming that **ma:**- and -**š** are part of a tree set and that -**š** adjoins to right of an I-node:

(40)


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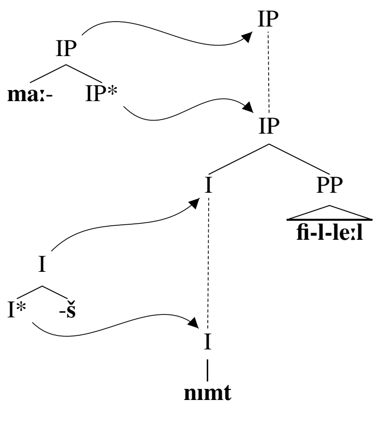
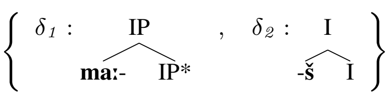


The cases with -**š** attached to a non-verbal expression require a second analysis. One possibility is to assume a second tree for -**š** like the first, except with -**š** preceding the foot node. This requires stipulating a morphological output filter that affixes -**š** to the preceding word and blocks use of δ_2 in (40):

(42)


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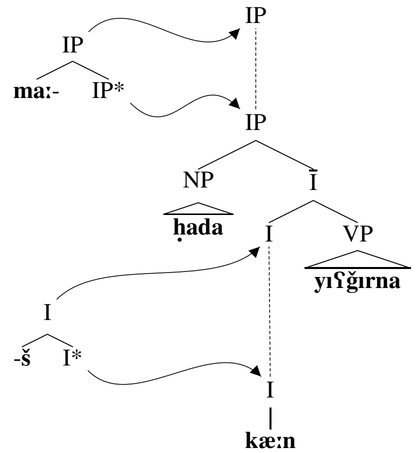
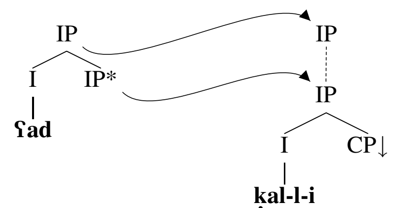


This is still not adaquate for (35), in which -**š** is attached to a "serial auxiliary" (Hussein, 1990), one of a small set of verb stems which function as aspectual adverbs and which "agree" with the main verb in aspectual form and agreement marking. Serial auxiliaries are plausibly analyzed as adverbial IP-auxiliary trees as in (44):

(44)


The structure resulting from (44) has two I-nodes, and another constraint would have to be stipulated forcing -**š** to adjoin to the leftmost of the two.

To sum up, a TAG analysis can be formulated for PA long-distance negative concord which allows the locality of negative concord licensing to be stated as a generalization about shared-node derivation trees. However, the analysis requires brute force stipulations to capture the morphological expression of negation in PA negative sentences. Moreover, the TAG analysis does not provide a way to express the simple morphological generalization that -**š** falls in the second position in the string generated by the clause.

3 A CCG Analysis

The TAG analysis has difficulty accommodating the distribution of -**š** because TAG trees are phrase structures, making it difficult to state constraints on strings of words rather than on hierarchical structure. Categorial Grammar, on the other hand, is a string calculus, and its operations result in string concatenation rather than structure expansion. For this reason, a CG can be constrained to not generate particular kinds of strings, rather than particular trees. A CG therefore provides a way to state constraints on the distribution of -**š** more directly than a phrase-structure grammar does.

I assume a *Combinatory Categorial Grammar* (Steedman, 1996; Steedman, 2000b; Baldridge, 2002). The basis of the CCG analysis is that npI-**wɛla**-phrases are treated as type-raised categories which look for an s category to their left. I continue following Dowty in assuming the *root clause polarity principle* and in assuming that **wɛla**-phrases specify a POL- feature on the s-headed category that they combine with. NQ-**wɛla** phrases, on the other hand, are treated as negative quantifiers which look for their s-headed argument to the right:

(45) NQ-**wɛla** :- $(S_{pol+}\$/(S_{pol+}\backslash\$/NP))/NP$: $\lambda P\lambda Q.\exists x[P(x)\ \&\ Q(x)]$

(46) NPI-**wɛla** :- $(S_{pol-}\$\backslash(S_{pol-}\$/NP))/NP$: $\lambda P\lambda Q.\neg\exists x[P(x)\ \&\ Q(x)]$

The negation morphemes are treated as follows (-**š** is semantically vacuous):

(47) **ma:-** :- $S_{pol+}\$/S_{pol-}\$$: $\lambda P_{st}.\neg P(e)$

(48) -**š** :- $S_{pol-}\$\backslash_{\times} S_{pol\pm}\$$

Verbs have the following types[3]:

(49) **šʊft** :- $S\backslash NP/NP$: $\lambda y.\lambda x.[x \text{ saw } y]$

(50) **ḥa:walt** :- $S\backslash NP/(s\backslash NP)$: $\lambda x.\lambda P_{st}.[x \text{ tries } P(x)]$

The -**š** morpheme fixes a clause with a POL- feature, while **ma:-** takes the POL- clausal category and changes its value for the polarity feature to POL+, satisfying the root clause polarity constraint. This works much as the TAG analysis did. The slash in the type for -**š** is marked with the "crossed composition" modality. This allows -**š** to combine with a preceding s-headed category while returning a category looking for its arguments to the right (Figures 1-2)[4].

Turning to long-distance negative concord, a CCG analysis, like the TAG analysis above, has to account for the distinction between trigger verbs and non-trigger verbs. The CCG analog of auxiliary-tree adjunction is function composition. The long-distance negative concord dependency therefore involves a specific kind of composition subject to stricter constraints than is the more general kind which produces $\overline{\text{A}}$-dependencies.

In order to model this, I adapt Hepple's (Hepple, 1990) approach to modeling island constraints in Categorial Type Logic. In brief, Hepple's approach is to assign unary modalities to the arguments of clausal categories (such as subordinating verbs or relative pronouns) as well as to the nominal argument of a type-raised extracted category (such as a question word or topicalized noun phrase). The former are referred to as "bounding modalities," and the latter as "penetrative modalities." *Interaction axioms* require the penetrative modality of an extraction category to be compatible with the bounding category of its argument in terms of a type hierarchy defined over modalities.

The unary modalities in CTL can be duplicated in CCG as features on category labels, so to approximate Hepple's proposal, I define a feature hierarchy as follows:

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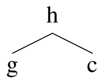

Each pair of sisters in the hierarchy consists of a "penetrative feature" and the "bounding feature" which blocks it (following Hepple's terminology). The feature *c* is an penetrative feature which is blocked by the *g* feature, and *h* is the most general or permissive bounding feature.

The idea is that categories which participate in restructuring dependencies are marked with the *c* penetrative feature, which is spread across all the arguments of a complex type:

(52) **wɛla ḥada** :- $S_c\$\backslash(S_c\$/NP_c)$

Trigger verbs impose the *h* bounding feature on their complements, while non-trigger embedding verbs impose the *g* feature:

(53) **bɪdd**- "want," **ʕɪrɪf** "be able to," **ḥa:wal** "try to" :- $S\backslash NP/(S_h\backslash NP_h)$

(54) **waʕad-yu:ʕɪd** "promise to" :- $S\backslash NP/(S_g\backslash NP_g)$

According to (51), categories marked with feature *h* are compatible with categories marked with feature *c*, while categories marked with feature *g* clash with it. The clash between *g* and *c* expresses the restriction on restructuring dependencies.

For example, in an analysis of (18), **wɛla kılmi** applies to the composed constituent, **ʕırıft ɛktıb**. This is possible because the penetrative feature *c* on the **wɛla**-phrase is compatible with the *h* bounding feature which **ʕırıft** passes to its complement (Figure 3).

Long-distance negative concord is blocked in two ways. A wide-scope derivation (in which the **wɛla**-phrase combines with the composition of the

[3]The type assignments ignore the representation of VS word order and pro-drop sentences.

[4]Logical forms are surpressed in the derivations.

matrix and embedded verbs) is blocked by a feature clash between the *g* and *c* features (Figure 4). A narrow scope derivation (in which the **wɛla**-phrase combines with the embedded verb only) is blocked because of a resulting clash in polarity features between the embedded clause and the matrix verb (Figure 5).

4 Comparison and Discussion

While the TAG analysis imposes certain limitations on the ordering of morphemes, it does provide a very simple and intuitive way to describe restructuring verbs as a natural class that includes auxiliary verbs, the other kinds of verb stems which are "transparent" to negative concord. In contrast, The CCG analysis has a technical flavor, and it is not clear to what extent it reflects a linguistic intuition. The CCG analysis does, however, capture the distribution of the negation morphemes in PA. It would therefore be interesting to explore further whether the Hepple-style feature/modality approach could be associated with some linguistic phenomenon.

One interesting possibility would be to use Steedman's theory of intonation (Steedman, 2000a) to explore the prosodic properties of restructuring sentences in Arabic (and in other languages) to see whether the availability of restructuring correlates with certain prosodic properties. There has been very little study of sentential intonation in Arabic, and so very little empirical basis for an investigation. However, should such an investigation bear fruit, it might suggest that Hepple's approach to extraction constraints could be recast as a theory of intonation. This would allow powerful generalizations to be stated relating the prosodic properties of sentences in PA and other languages to their syntactic properties.

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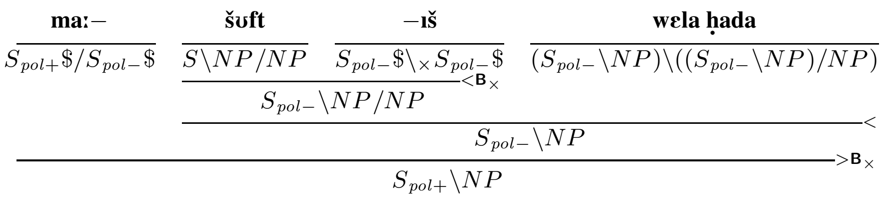
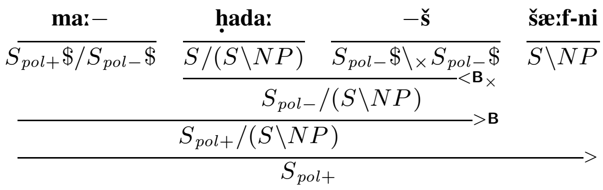


Figure 1:



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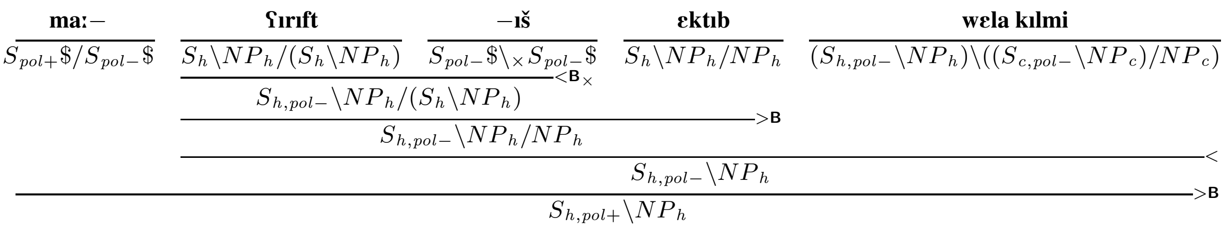

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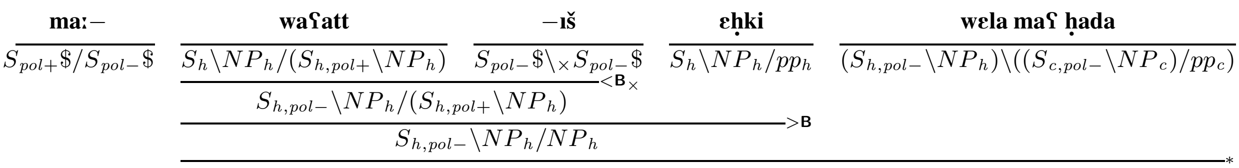

Figure 4:

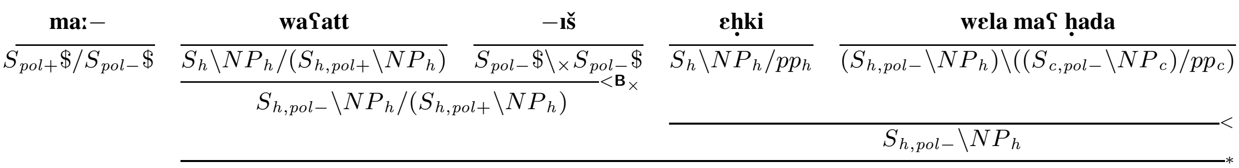

Figure 5: