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 Categorical Grammar are compared, with the conclusion that a perspicuous analysis of 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 **wəla** “(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 **wəla** (“**wəla**-phrases”) are interpreted either as negative quantifiers (“NQ-**wəla**”) or as polarity-sensitive indefinites (“NPI-**wəla**”). **wəla**-phrases have an NQ-interpretation preceding the finite verb or verb complex in a clause (1-2) or in fragment answers (3-4):

- (1) **wəla** **ħada** fi:həm šæ:f-ni.
not.even one.MS in-them saw.3ms-me
“Not even ONE of them saw me!”
- (2) **wəla** **yom** řağabni l-ekil.
not.even day pleased.3ms-me the-food
“There wasn’t even one day the food pleased me!”
- (3) Q: šu **kal-l-ak**? A: **wəla** **iši**.
what said.3ms-to-you not.even thing
“What did he say to you? Nothing at all.”
- (4) Q: mi:n šofti? A: **wəla** **šu:š** ibn yome:n.
who saw.2fs not.even chick son two-days
“Who did you see? Not even a two-day old chick!”

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

- (5) **wəla** **yom** **ma-řağabni** l-ekil.
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-**wəla** 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** **wəla** **iši**!
he not.even thing
“He is NOTHING!”
- (7) **hiyya** **mağru:ra** řala **wəla** **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 **bidu:n** “without” (8-9):

- (8) **tihfti** **bidu:n-ma** **tķurli** **wəla** **iši**.
left.2fs without-that say.2fs even thing
“You left without saying even one thing!”
- (9) **la-s-senna** **ma-bařti:həm** **wəla** **luķmi** ekil.
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 **wəla**-phrase can have the NPI-interpretation at a time:

- (10) **ma-ķult** **wəla** **iši** **wəla** **la-ħada** fi:həm.
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-**wəla** that **wəla**-phrases are blocked from post-verbal argument positions which are thematically entailed and which are not within the scope of an antimorphic operator.

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

1.1 Negative Concord and Locality

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

- (11) *ma-waʕatt [ɛhki wɛla maʕ ʔada fi-hom].
not-promised.Is talk even with one in-them
- (12) *batwakʕaʕ-iʃ [ɪnnhæ biʔhɪbb wɛla ʔada].
believe.Is-neg that.3fs likes.3fs even one

Similar sentences with weaker polarity items such as **hada** or **?aiy hada** “anyone” are acceptable:

- (13) ma-waʃatt ɛʎki maʃ (ʔaiy) ʎada fi:həm.
not-promised.3s talk with any one in-them
“I didn’t promise to talk with any of them.”
- (14) batwakkaʃ-iʃ innhæ biʎhubb (ʔaiy) ʎada.
believe.3s-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 **wela**-phrases inside the complements of a small class of verbs, including **bidd-** “want” (15), **ɣalla** “to allow” (16), **ha:wal** “to try” (17, 25 below) or **ɣurf** “to know how to, to be able to” (18 below):

- (15) ma-biddna nʒalli wɛla zɛlami.
not-want.1s leave.1p even fellow
“We don’t want to leave even one man.”
- (16) ma-ʒallu-ni-š æ:kol wɛla lʊkmi
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) **biddi:š** **aḥa:wil** **ɛḫki** **wela** **maʃ** **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 **ektub** “write,” and is then “stretched” by adjunction of the auxiliary tree headed by **ʕirift** “I was able to” (19):

- (18) ma-ṣııft ɛktib wɛla kılmı.
not-knew.Is write.Is even word
‘I wasn’t able to write even one word.’

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

- $$(20) \quad \begin{array}{c} \beta \\ \swarrow \quad \downarrow \quad \searrow \\ \alpha(02) \quad \gamma(00) \quad \delta(00) \end{array}$$

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 **wela**-phrases are not licensed within the immediate tree to which they are attached, but instead within the immediate clausal tree containing them. For example, **wela**-phrases can be inside prepositional phrases attached to a negative clause (21-22):

- (21) ma-kaʕatt [_{PP} **ḡaṇib** wela ḥada fi:hom]
not-sat.1s next.to even one in-them
 “I didn’t sit next to even one of them.”
- (22) biṭṭallifur:š ʕan-na [_{PP} **bi-wela 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 **wela**-phrase first substitutes into the initial tree headed by the preposition, which is then attached to the clausal tree. The relationship between the **wela**-phrase and its licenser 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 **wela**-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) a. $\alpha : \left\{ \begin{array}{l} \alpha_1 : \text{IP}^* \quad , \quad \alpha_2 : \begin{array}{c} \text{NP} \\ \text{wela ḥada} \end{array} \end{array} \right\}$
- b. $\gamma : \left\{ \begin{array}{l} \gamma_1 : \text{IP}^{*00} \quad , \quad \gamma_2 : \begin{array}{c} \text{PP} \\ \text{ḡaṇib NP}_{\downarrow 02} \end{array} \end{array} \right\}$
- c. $\delta : \begin{array}{c} \text{IP} \\ \text{ma:- IP}^* \end{array} \quad \beta : \begin{array}{c} \text{IP}_{00} \\ \text{I PP}_{\downarrow 02} \\ \text{kaʕatt} \end{array}$

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 $N_1 \dots N_n$ 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 **wela**-phrase and its licenser 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 **kıdır** “be able to” optionally allow a complementizer **ʔinn-** (25-26), while **bidd-** “want” or **ʕırf** “know to, be able to” exclude it (27-28):

- (25) ma-ḥa:walt (**ʔnni**) ʕḥki wela 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-kıdır (**ʔnni**) ʕḥki wela 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-bidd-i:ıš (***ʔnni**) aʕıf wela ḥada.
not-want.1s-neg that.1s see.1s even one
 “I don’t want to see even ONE of them.”
- (28) ma-ʕırf (***ʔnni**) ʕktıb wela kılmi.
not-know.1s that.1s write.1s even word
 “I wan’t able to write even one word.”

This is an essential distinction because restructuring is not the only phenomenon which involves adjunction. For example, long-distance $\bar{A}$ -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 $\bar{A}$ -dependencies, indicating that they must also be analyzed as auxiliary trees. Moreover, (30) can include the complementizer **?inn-**, indicating that it takes the same kinds of complements as do trigger verbs like **kidır** ‘be able’ and **ha:wal** ‘try’:

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

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

(31)

The diagram illustrates the syntactic structure of the sentence 'wela kulmi' (I am eating). The root node is IP_{POL+} , which branches into $ma:-$ and IP^*_{POL-} . IP^*_{POL-} branches into $\alpha_I:IP^*_{POL-}$ and $\beta:IP$. $\alpha_I:IP^*_{POL-}$ branches into $\alpha_2:NP$ and NP^* . $\alpha_2:NP$ branches into the phrase 'wela kulmi'. NP^* branches into $\epsilon ktub$ and $NP \downarrow$. $\beta:IP$ branches into $\gamma:IP$ and $\epsilon ktub$. $\gamma:IP$ branches into 'Sift' and IP^* .

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 **ma**- 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).

(33) ma-**mmt**-iš fi-l-le:l.
 not-slept. 1s-neg in-the-night
 “I didn’t sleep last night.”

(34) ma-**kunt**-iš ʔa:riʔ we:n aḥutt-u.
 not-was. 1s-neg know.actpart.ms where put. 1s-it
 “I didn’t know where to put it.”

(35) ma-**ʕad**-š ka:l-l-i ʔinnu
 not-returned. 3ms-neg said. 3ms-to-me that. 3ms
 šara sayya:ra.
 bought. 3ms car
 “He didn’t tell me anymore that he bought a car.”

52

In other kinds of sentences, $-\text{š}$ attaches to a variety of non-verbal expressions, including the indefinite pronoun **hada** “(any)one” (36), the existential particle **fi**: (37), inflected prepositions (38), and the adverb **ʕumr** “ever” (39):

- (36) *ma-hada-š kæn yɪŋgɪr-na.*
not-one.ms-neg was.3ms rent.3ms-us
 “No one would rent to us.”
- (37) *ma-fiš-š fi-d-dɪnya mɪpɪl-hɪn.*
not-exist-neg in-the-word like-them.fp
 “There isn’t [anything] in the world like them.”
- (38) *bækɪ:l-ɛ faras ma-lhæ:š ʊxt.*
was.3ms-to-him mare not-to-her-neg sister
 “He had a mare [that was] without compare.”
- (39) *fi: næ:s ma-ʕumr-hæ:š haʔtat mawdu:ʕ*
exist people.3fs not-age-3fs-neg put.3fs subject
fi-l-montada.
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 $-\text{š}$ is constrained to occur in the second position attached to a word that is inflected for person.

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

$$(40) \left\{ \begin{array}{l} \delta_1 : \begin{array}{c} \text{IP} \\ \text{ma:-} \quad \text{IP}^* \end{array}, \quad \delta_2 : \begin{array}{c} \text{I} \\ \text{I} \quad -\text{š} \end{array} \end{array} \right\}$$

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

$$(42) \left\{ \begin{array}{l} \delta_1 : \begin{array}{c} \text{IP} \\ \text{ma:-} \quad \text{IP}^* \end{array}, \quad \delta_2 : \begin{array}{c} \text{I} \\ -\text{š} \quad \text{I} \end{array} \end{array} \right\}$$

This is still not adequate for (35), in which $-\text{š}$ 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):

The structure resulting from (44) has two I-nodes, and another constraint would have to be stipulated forcing $-\text{š}$ 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 $-\text{š}$ 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 $-\text{š}$ because TAG trees are phrase structures, making it difficult to state constraints on strings of words rather than on hierarchical structure. Categorical 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 Categorical Grammar* (Steedman, 1996; Steedman, 2000b; Baldrige, 2002). The basis of the CCG analysis is that npI-**wela**-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 **wela**-phrases specify a POL- feature on the s-headed category that they combine with. NQ-**wela** phrases, on the other hand, are treated as negative quantifiers which look for their s-headed argument to the right:

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

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

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

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

$$(48) \quad \text{-š} :- S_{pol-} \$ \backslash \times S_{pol\pm} \$$$

Verbs have the following types³:

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

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

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 $\bar{A}$ -dependencies.

In order to model this, I adapt Hepple’s (Hepple, 1990) approach to modeling island constraints

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

⁴Logical forms are suppressed in the derivations.

in Categorical 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:

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:

$$(52) \quad \text{wela hada} :- S_c \$ / (S_c \$ / \text{NP}_c)$$

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

$$(53) \quad \text{bidd- “want,” } \text{širif “be able to,” ha:wal “try to”} :- \\ S \backslash \text{NP} / (S_h \backslash \text{NP}_h)$$

$$(54) \quad \text{wašad-yu:šid “promise to”} :- S \backslash \text{NP} / (S_g \backslash \text{NP}_g)$$

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), **wela kulmi** applies to the composed constituent, **širift ektib**. This is possible because the penetrative feature *c* on the **wela**-phrase is compatible with the *h* bounding feature which **širift** passes to its complement (Figure 3).

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

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 *wela*-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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$$\begin{array}{c}
\begin{array}{cccc}
\text{ma:} - & \text{šuft} & -\text{iš} & \text{wela ḥada} \\
\hline
S_{pol+}\$/S_{pol-}\$ & S \setminus NP / NP & S_{pol-}\$ \setminus_{\times} S_{pol-}\$ & (S_{pol-} \setminus NP) \setminus ((S_{pol-} \setminus NP) / NP) \\
\hline
& S_{pol-} \setminus NP / NP & & \\
\hline
& S_{pol-} \setminus NP & & \\
\hline
& S_{pol+} \setminus NP & &
\end{array}
\end{array}$$

Figure 1:

$$\begin{array}{c}
\begin{array}{cccc}
\text{ma:} - & \text{ḥada:} & -\text{š} & \text{šæ:f-ni} \\
\hline
S_{pol+}\$/S_{pol-}\$ & S / (S \setminus NP) & S_{pol-}\$ \setminus_{\times} S_{pol-}\$ & S \setminus NP \\
\hline
& S_{pol-} / (S \setminus NP) & & \\
\hline
& S_{pol+} / (S \setminus NP) & & \\
\hline
& S_{pol+} & &
\end{array}
\end{array}$$

Figure 2:

$$\begin{array}{c}
\begin{array}{ccccc}
\text{ma:} - & \text{ṣurift} & -\text{iš} & \text{ektib} & \text{wela kılmi} \\
\hline
S_{pol+}\$/S_{pol-}\$ & S_h \setminus NP_h / (S_h \setminus NP_h) & S_{pol-}\$ \setminus_{\times} S_{pol-}\$ & S_h \setminus NP_h / NP_h & (S_{h,pol-} \setminus NP_h) \setminus ((S_{c,pol-} \setminus NP_c) / NP_c) \\
\hline
& S_{h,pol-} \setminus NP_h / (S_h \setminus NP_h) & & & \\
\hline
& S_{h,pol-} \setminus NP_h / NP_h & & & \\
\hline
& S_{h,pol-} \setminus NP_h & & & \\
\hline
& S_{h,pol+} \setminus NP_h & & &
\end{array}
\end{array}$$

Figure 3:

$$\begin{array}{c}
\begin{array}{ccccc}
\text{ma:} - & \text{waṣatt} & -\text{iš} & \text{eḥki} & \text{wela maṣ ḥada} \\
\hline
S_{pol+}\$/S_{pol-}\$ & S_h \setminus NP_h / (S_{h,pol+} \setminus NP_h) & S_{pol-}\$ \setminus_{\times} S_{pol-}\$ & S_h \setminus NP_h / pp_h & (S_{h,pol-} \setminus NP_h) \setminus ((S_{c,pol-} \setminus NP_c) / pp_c) \\
\hline
& S_{h,pol-} \setminus NP_h / (S_{h,pol+} \setminus NP_h) & & & \\
\hline
& S_{h,pol-} \setminus NP_h / NP_h & & & \\
\hline
& & & &
\end{array}
\end{array}$$

Figure 4:

$$\begin{array}{c}
\begin{array}{ccccc}
\text{ma:} - & \text{waṣatt} & -\text{iš} & \text{eḥki} & \text{wela maṣ ḥada} \\
\hline
S_{pol+}\$/S_{pol-}\$ & S_h \setminus NP_h / (S_{h,pol+} \setminus NP_h) & S_{pol-}\$ \setminus_{\times} S_{pol-}\$ & S_h \setminus NP_h / pp_h & (S_{h,pol-} \setminus NP_h) \setminus ((S_{c,pol-} \setminus NP_c) / pp_c) \\
\hline
& S_{h,pol-} \setminus NP_h / (S_{h,pol+} \setminus NP_h) & & & \\
\hline
& & & & S_{h,pol-} \setminus NP_h \\
\hline
& & & &
\end{array}
\end{array}$$

Figure 5: