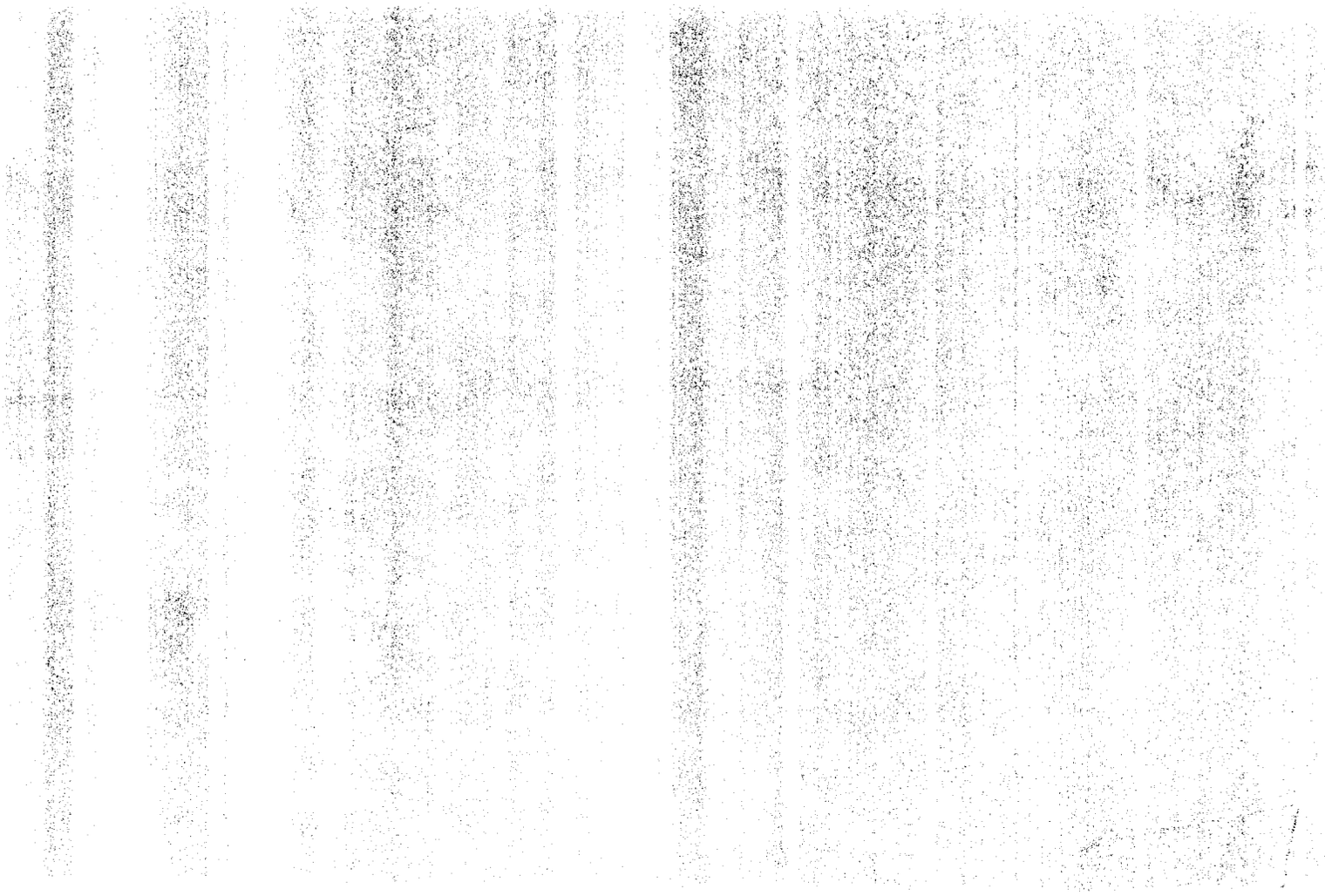


syntactically a gap, it would be, in Gazdar's (1981) notation, of category NP/NP, and therefore not conjoinable to the NP Bill. Under my approach we simply have here a conjunction of two NPs.

In section 2 I will present a fragment of Hebrew with relative clauses. In this fragment, gaps are phonological realizations of "links", whereas resumptive pronouns are nondistinguishable syntactically and phonologically from other pronouns. Semantically, what gets used in the translation of a sentence in place of a gap is a variable p_i, and the meaning of the gap's antecedent is kept in a store together with the index i of the variable. Resumptive pronouns on the other hand get the same translation as other pronouns (i.e. $PP\{x_i\}$), but for the fact that the index i is also kept in a store. The rules of storage retrieval will be different for gaps and for resumptive pronouns.

In section 3, I will show how the fragment handles syntactic and semantic differences between sentences with gaps and sentences with resumptive pronouns. Approaches that conflate gaps and resumptive pronouns would need ad-hoc machinery to account for such differences.

In section 4, I will show how the system developed in this paper accounts for the distribution of resumptive pronouns observed by Maling and Zaenen (1980) and by Engdahl (1979, 1980) in the Scandinavian languages. I will also show why my system is to be preferred to the ones proposed by these authors.

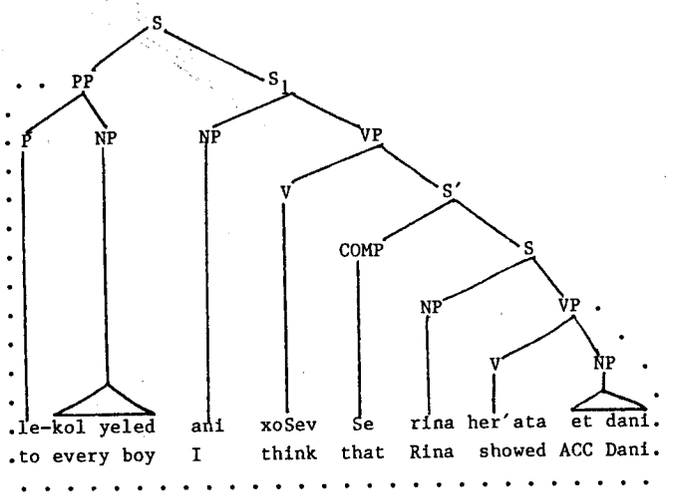
2. The Fragment

The rules for a fragment of Hebrew with relative clauses are given in Appendix A. The syntactic categories used are S' (S bar), S, VP, NP, PP etc.. I also use syntactic features such as [±tense], [±present] to account for the fact that VP complements are infinitival (cf. S3 b) and that there is a "rule of pro drop" when the VP is not in the present tense (cf. S1 b).

The grammar in Appendix A is an example of what has been called "phrase linking grammar" by Peters (1980, 1981). In a phrase linking grammar rules are interpreted as node admissibility conditions on data structures richer than the familiar trees, structures that Peters calls "linked trees". For a definition of linked trees see Appendix A. An example of a linked tree for a

topicalized sentence is shown in (2).[1]

(2)



The PP in (2) is an example of a "dislocated element" (see Appendix A). The link enables the PP node to participate in satisfying both rules S2 and S8, repeated here as 3 and 4:

(3) $[_{VP}\ V\ (XP_1 \ldots XP_n)]$
where XP_1 is NP or PP, and XP_i=PP for $1<i\leq n$

(4) $[_S\ XP\ S]$ (Topicalization)

Since show is subcategorized for both an NP and a PP complement, the structure in (2) would be starred by the grammar if it didn't have the link. Figuratively speaking, the link enables the PP node to "be" at two places in the tree at the same time.

---

[1] The indexing of nodes in trees is done purely for expository purposes and has no theoretical significance.

When the linked tree in (2) is interpreted by the phonological component, the link is dissolved, and a phonologically null element (gap) is the realization of the missing daughter of VP. We will now see how the semantic component interprets linked trees.

First notice a general convention in my system, adopted only for the sake of simplifying the translations: all NPs and PPs that a verb is subcategorized for are translated as arguments of that verb. (No other PPs appear in the fragment.) Prepositions are therefore treated as semantically void, and translations of PPs are of the same type as of NPs (see T2 and T5 in Appendix B).

A general feature of my system is stated in Appendix B as the "Translation Convention". It states that the translation X′ of every syntactic category X is a triplet. The first coordinate of the triplet is called the "head" of X′ (hX′), and consists of the familiar translation into IL. The second coordinate is basically Cooper's store as proposed in Cooper (1975), which I call "quantifier store" (following Bach and Partee (1980)). The third coordinate is the set of indices of the potential resumptive pronouns encountered so far in the translation, and I call it "resumptive-pronoun store". Notice that clause B of the Translation Convention ensures that only translations of the form <hS′,0,0> "count" for sentences, i.e. all stores must be empty at the end of the translation.

For the sentence in (2) to end up having an interpretation, the dislocated PP must be assigned the following translation:

$\langle {}^{\vee}p_i, \{\langle \widehat{P}Ax[boy'(x) \text{--}>P\{x\}], i\rangle\}, 0\rangle$.

p_i is the i-th variable that ranges over properties of properties of individuals. $\{\langle \widehat{P}Ax[boy'(x) \text{--}>P\{x\}], i\rangle\}$ is the quantifier store, where the familiar meaning of the NP <u>every boy</u> has been stored, together with the index of p_i. The resumptive-pronoun store in this case is 0. This translation of PP is used when translating S_1:

(5) $S_1' = \langle think'(x_0, \hat{}show'(r,d,p_i)]), \{\langle \widehat{P}Ax[boy'(x) \text{--}>P\{x\}], i\rangle\}, 0\rangle$

This is the same translation that the sentence would have were the PP a "real" daughter of VP, whose meaning is stored (see the

NP Storage Convention in Appendix B).[2]

We can now apply the A clause of T8 in Appendix B, which will quantify in the meaning of PP that was kept in store:[3]

(6) $S' = \langle [\widehat{p}_i think'(x_0, \hat{}show'(r,d,p_i))])(\hat{}\widehat{P}Ax[boy'(x) \text{--}>P\{x\}]), 0, 0\rangle$

$= \langle think'(x_0, \hat{}show'(r,d,\hat{}\widehat{P}Ax[boy'(x) \text{--}>P\{x\})]), 0, 0\rangle$

$= \langle think'(x_0, \hat{}Ax[boy'(x) \text{--}>show'_*(r,d,x)]), 0, 0\rangle$

The rule we have just applied "lowers" the meaning of PP into the scope of <u>think</u>. This is different from the outcome of the Store Retrieval Convention of Appendix B, that gives stored meanings scope over the whole sentence. Notice that nothing prevents us from applying this convention to (5), to get another meaning of S_1:

(7) $S_1' = \langle \widehat{P}Ax[boy'(x) \text{--}>P\{x\}](\hat{}x_i[\widehat{p}_i think'(x, \hat{}show'(r,d,p_i)](\hat{}PP\{x_i\})), 0, 0\rangle$

$= \langle Ax[boy'(x) \text{--}>think'(x0, \hat{}show'_*(r,d,x)], 0, 0\rangle$

But now neither clause A nor clause B of T8 is applicable to combine PP′ with S_1', so we cannot get from this a meaning for S.

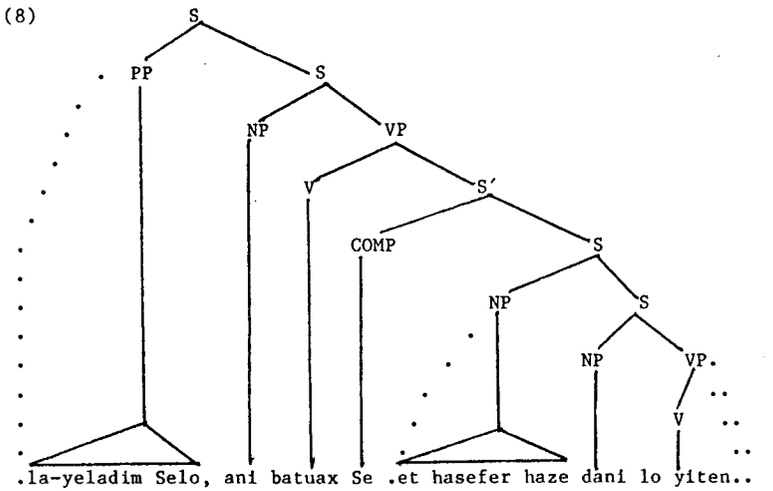
The following example shows that Hebrew allows multiple gaps.

---

[2] Notice that there would have been differences in implicatures were PP a "real" daughter of VP rather than being topicalized as in (2). Since I shall only be interested in the truth-conditional aspects of meaning, matters of implicatures will not be represented in my translations. See Karttunen and Peters (1979) for how this could be done.

[3] The notational convention I use for brackets is that brackets go around the lambda expression and its scope. I shall not write the outmost brackets in a formula, nor brackets that are immediately contained in parentheses.

(8)



The following too is grammatical:

(9) et hasefer haze, ani batuax Se la-yeladim Selo dani
ACC this book I am sure that to his kids Dani

lo yiten
won't give

For dealing with (8) and (9) phrase linking grammars are clearly superior to Gazdar's grammars. Gazdar would have to allow at this point an infinite number of multiply slashed categories and an infinite number of derived rules, since there is no principled way to fix an upper bound on the number of gaps. (See Engdahl (1980) for an elaboration on this point). Hebrew certainly allows for three gaps and more, though of course the examples become less natural the greater the number of gaps:

(10) et hasmartutim haele$_1$ ani lo mevin ex$_2$ be-mea
ACC this junk$_1$ I don't understand how$_2$ for 100

dolar$_3$ miSehu hicliax ___2 limkor ___1 ___3
dollars$_3$ anybody succeeded to sell

(11) et hasmartutim haele$_1$, dani amar Se la-Saxen
ACC this junk$_1$ Dani said that to the stingy

hakamcan$_2$ hu lo mevin ex$_3$ be-mea
neighbour$_2$ he doesn't understand how$_3$ for 100

dolar$_4$ miSehu hicliax ___3 limkor ___1 ___2 ___4
dollars$_4$ anybodysucceeded to sell

(12) mimi$_1$ dani amar Se et hasmartutim haele$_2$
from whom$_1$ Dani said that ACC this junk$_2$

hu lo mevin ex$_3$ be-mea dolar$_4$ et rina$_5$
he doesn't understand how$_3$ for 100 dollars$_4$ ACC Rina$_5$

hiclaxta ___3 leSaxnea ___5 liknot ___2 ___1 ___4
you succeeeded to convince to buy

A Gazdar grammar revised to account for multiple gaps generates non-context-free languages just as phrase linking grammars do (both apparently generate small supersets of the context-free languages), but is in great disadvantage where the semantic interpretation is concerned. For it has no way to ensure that the right dislocated element gets quantified in for the right variable in (8) and (9). A solution to this problem, suggested by Maling and Zaenen (1980), would account only for (8) and not for (9):

(13) a. * [A/D/E ...B/D...C/E...]

b. ✓ [A/D/E ...B/E...C/D...]

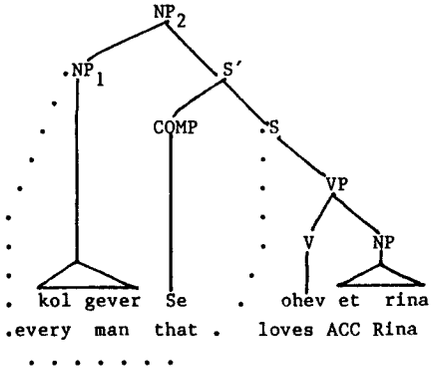
(= Maling and Zaenen's (1980))

Maling and Zaenen are simply stating in (13) that all dependencies involving gaps are nested, a generalization that (9) shows to be false. There are also examples in Norwegian and in Icelandic that falsify (13), as we shall see in section 4.

Let us now turn to relative clauses. Hebrew relative clauses are formed with NP gaps in subject or direct object position alternating with resumptive pronouns. No preposition stranding is

allowed, therefore resumptive pronouns are obligatory when relativizing on indirect object position. The examples in (14) and (15) involve gaps in subject and object positions respectively.

(14)

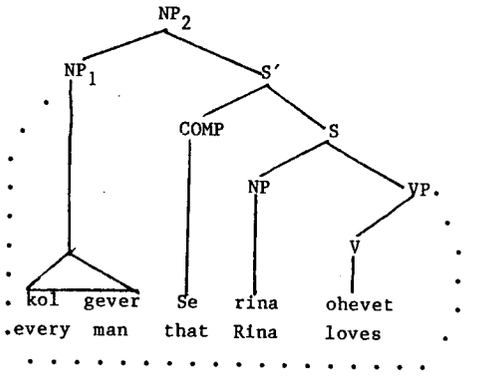


NP_1' = $\langle {}^{\vee}p_i, \{\langle \hat{P}Ay[man'(y) \;\&\; R\{y\} \text{-->} P\{y\}], i\rangle\}, 0\rangle$
VP' = $\langle love'(\hat{}\hat{P}P\{r\}), 0, 0\rangle$
S' = $\langle p_i\{\hat{}love'(\hat{}\hat{P}P\{r\})\}, qsNP_1', 0\rangle$

Since S' and NP' have an element in common in their quantifier stores (actually they happen to have identical quantifier stores) the A clause of T6 can be used to get a translation of NP_2. What this rule does is first to change the NP in store: PAy[man'(y) & R{y}-->P{y}] into RAy[man'(y) & R{y}-->P{y}] (so that the property that the NP eventually combines with will replace R rather than P), and then replaces p_i in S' by this NP.

NP_2' = $\langle P[\hat{p}_i p_i\{\hat{}love'(\hat{}\hat{P}P\{r\})\}](\hat{}\hat{R}[\hat{P}Ay[man'(y) \;\&\; R\{y\}$
$\text{-->}P\{y\}]](P)), 0, 0\rangle$
= $\langle \hat{P}[\hat{R}Ay[man'(y) \;\&\; R\{y\}\text{-->}P\{y\}]](\hat{}love'(\hat{}\hat{P}P\{r\})), 0, 0\rangle$
= $\langle \hat{P}Ay[man'(y) \;\&\; love'(\hat{}\hat{P}P\{r\})(y)\text{-->}P\{y\}], 0, 0\rangle$
= $\langle \hat{P}Ay[man'(y) \;\&\; love'_{\star}(y,r)\text{-->}P\{y\}], 0, 0\rangle$

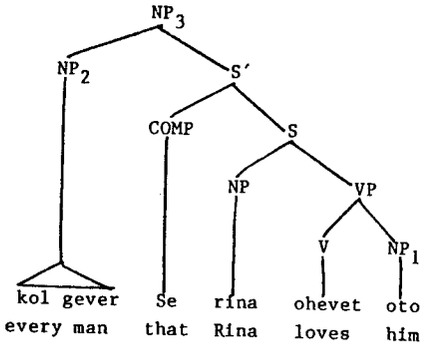
(15)



NP_1' = $\langle {}^{\vee}p_i, \{\langle \hat{P}Ay[man'(y) \;\&\; R\{y\}\text{-->}P\{y\}], i\rangle\}, 0\rangle$
VP' = $\langle love'(p_i), qsNP_1', 0\rangle$
S' = $\langle \hat{P}P\{r\}(\hat{}love'(p_i)), qsNP_1', 0\rangle$
= $\langle love'(r, p_i), qsNP_1', 0\rangle$
NP_2' = $\langle \hat{P}[\hat{p}_i love'(r, p_i)](\hat{}\hat{R}[\hat{P}Ay[man'(y) \;\&\; R\{y\}\text{-->}P\{y\}]](P)), 0, 0\rangle$
= $\langle \hat{P}love'(r, \hat{}\hat{R}Ay[man'(y) \;\&\; R\{y\}\text{-->}P\{y\}]), 0, 0\rangle$
= $\langle \hat{P}Ay[man'(y) \;\&\; love'_{\star}(r,y)\text{-->}P\{y\}], 0, 0\rangle$

I now give examples of relative clauses with resumptive pronouns. Parallel to (15) we have (16), where we see how the resumptive-pronoun-store is used. This store is similar to the pronoun-store that Bach and Partee (1980) argue is needed to account for anaphora. The difference is that in my system the index of a variable used in translating a pronoun is only optionally stored. Any pronoun is potentially resumptive, and the system has the option to make it a resumptive pronoun by storing the index of the variable used in its translation. This index will be used to quantify in the meaning of the head NP over the right variable, according to rules T6. or T7. Notice that the translation of a pronoun in this system has $\hat{P}P\{x_i\}$ as its head, whereas the translation of a gap has ${}^{\vee}p_i$ as its head.

(16)



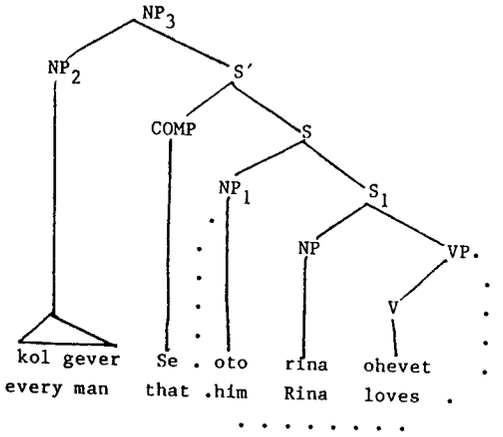
NP_1' = $\langle\widehat{PP}\{x_1\},0,\{i\}\rangle$
VP' = $\langle love'(\hat{}\widehat{PP}\{x_1\}),0,\{i\}\rangle$
S' = $\langle love'_{\star}(r,x_1),0,\{i\}\rangle$
NP_2' = $\langle\widehat{P}Ay[man'(y)\ \&\ R\{y\}\text{-->}P\{y\}],0,0\rangle$

Since qsS′ is empty and iErpsS′, we may use the B clause of T6 to get the translation of NP_3. What this rule does is replace R in hNP_2' by $\hat{}\widehat{x}_1 hS'$:

NP_3' = $\langle\widehat{R}\widehat{P}Ay[man'(y)\ \&\ R\{y\}\text{-->}P\{y\}](\hat{}\widehat{x}_1 love'_{\star}(r,x_1)),0,0\rangle$
= $\langle\widehat{P}Ay[man'(y)\ \&\ love'_{\star}(r,y)\text{-->}P\{y\}],0,0\rangle$

Rules S6 and S8 of Appendix A also accept the NP in (17), where the resumptive pronoun is topicalized inside the relative clause:

(17)



NP_1' = $\langle\check{}p_1,\{\langle\widehat{PP}\{x_1\},i\rangle\},\{i\}\rangle$
(by clause B of the NP Storage Convention)
VP' = $\langle love'(p_1),qsNP_1',\{i\}\rangle$
S_1' = $\langle love'(r,p_1),qsNP_1',\{i\}\rangle$

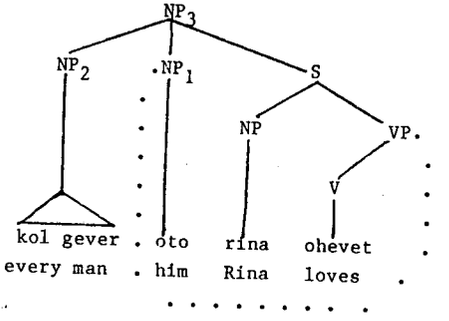
Since hNP_1' is $\check{}p_1$ and the quantifier stores of NP_1' and S_1' have an element in common, the A clause of T8 can be used to get the translation of S. What this rule does is replace p_1 in hS_1' by the store:

S' = $\langle[\widehat{p}_1 love'(r,p_1)](\hat{}\widehat{PP}\{x_1\}),0,\{i\}\rangle$
$\langle love'_{\star}(r,x_1),0,\{i\}\rangle$

This is the same as S′ under (16). From here we proceed as in (16) and get the same translation for NP_3.

Rule T7 accepts NP_3 in (18), where NP_2 has two sisters: NP_1 and S, rather than the familiar unique S′ sister.

(18)



NP_2' = $\langle\widehat{P}Ay[man'(y)\ \&\ R\{y\}\text{-->}P\{y\}],0,0\rangle$
NP_1' = $\langle\check{}p_1,\{\langle\widehat{PP}\{x_1\},i\rangle\},\{i\}\rangle$
VP' = $\langle love'(p_1),qsNP_1',\{i\}\rangle$
S' = $\langle love'(r,pi),qsNP_1',\{i\}\rangle$

Since hNP_1' is $\check{}p_i$ and the quantifier stores of NP_1' and S' have an element in common, which is moreover $PP\{x_i\}$, we may use T7 to get the translation of NP_3. What this rule does is replace p_i in hS' by the store, and then proceed like the B clause of T6, which is the rule for relative clauses with a resumptive pronoun.

NP_3' = $\langle[\widehat{RP}Ay[man'(y)$ & $R\{y\}$
$\text{-->}P\{y\}](\check{}\widehat{x}_i[\widehat{p}_i love'(r,p_i)](\widehat{}\widehat{P}P\{x_i\})),0,0\rangle$

= $\langle\widehat{P}Ay[man'(y)$ & $love'_*(r,y)\text{-->}P\{y\}],0,0\rangle$

Notice that the way T6 and T7 are set up takes care of the fact that in (17), oto may be a resumptive pronoun (which in this case it is, since it happens to be the only pronoun in a relative clause with no gaps), whereas in (18) oto is obligatorily the resumptive pronoun (i.e. it would necessarily be the resumptive pronoun even if the clause had other pronouns). The difference can be seen in the following:

(19) a. harofe Se otam Salaxti elav
the doctor that them I sent to-him

b.* harofe otam Salaxti elav
the doctor them I sent to-him

There are two pronouns in both (19a and b). Note that elav agrees with the head in number whereas otam does not. (19a) gets two readings by T6 that differ as to which one of the two pronouns is interpreted as a resumptive pronoun. The reading where otam is the resumptive pronoun gets ruled out for pragmatic reasons, and (19a) ends up having one reading where elav is the resumptive pronoun.[4] (19b) on the other hand gets only one reading by T7 - that in which otam is the resumptive pronoun. This reading gets ruled out for pragmatic reasons, which results in (19b) being unacceptable.

[4]Treating person, gender and number agreement of resumptive pronouns to the head as a pragmatic issue was suggested to me by Charles Kirkpatrick.

Notice also that a structure accepted by S7 is not given a semantic interpretation unless XP is a pronoun. This rules out (20a), whereas (20b) is accepted by S6 and S8:

(20) a. *haiS oto ve et axiv rina ohevet
the man him and ACC his-brother Rina loves

b. haiS Se oto ve et axiv rina ohevet

(21) is an example with a resumptive pronoun in subject position:[5]

(21) kol gever Se dina xoSevet Se hu ohev et rina
every man that Dina thinks that he loves ACC Rina

Notice that since NPs with PP heads are excluded on general grounds, we do not get PP gaps in relative clauses, only

[5]The following problem arises immediately:

(i) * kol gever Se hu ohev et rina
every man that he loves ACC Rina

The generalization is that nominative resumptive pronouns may not occur in the highest S sister of COMP. The following solution has been suggested to me by Lauri Karttunen: We add a new pronoun store called "local resumptive pronoun store", in which we store the indices of the variables translating nominative pronouns. The indices for all the other pronouns are stored as before in the resumptive pronoun store. At the stage where we combine the interpretation of S' with the interpretation of its sister node, whatever it may be, we transfer the contents of the local resumptive pronoun store into the pronoun store. If that sister node happened to be the head NP, we would have already retrieved an index from the resumptive pronoun store, and this index could not be one for a nominative pronoun in the highest S.

P+resumptive pronouns:[6]

(22) a. kol gever Se rina xoSevet alav
every man that Rina thinks about-him

b. * .[$_{NP}$ [$_{PP}$ al kol gever] Se rina xoSevet ___].

Topicalized elements may, on the other hand, be PPs (by S8), so that both (23a and b) are acceptable:

(23) a. kol gever, rina xoSevet alav
every man Rina thinks about-him

b. al kol gever rina xoSevet
about every man Rina thinks

Since dislocated PPs are necessarily link children (see the specification of dislocated constituents in Appendix A), the

[6]Definite NPs in object position are marked in Hebrew by the ACC marker et. This is not the case in (15), repeated here as (ii), the acceptable counterpart of (22b):

(ii) .[$_{NP}$ kol gever] Se rina ohevet ___.
every man that Rina loves

The reason is that the case marking of the whole NP percolates to the head NP. For example:

(iii) kol gever Se rina ohevet ohev ota
every man that Rina loves loves her

In (iii) kol gever is nominative since the NP kol gever Se rina ohevet is subject of the sentence. The rule of ACC marking would apply therefore only to NPs that are not directly dominated by NP.

I still have to explain why there is no preposition stranding in Hebrew, i.e. why (iv) is unacceptable where (22a) was acceptable:

(iv) *.[$_{NP}$ kol gever] Se rina xoSevet al ___.
every man that Rina thinks about

The reason I think has to do with the fact that prepositions in Hebrew are viewed as case-markings on NPs, and therefore have to be adjacent to those NPs.

following is ungrammatical:

(24) * al kol gever rina xoSevet alav
about every man Rina thinks about-him

Only dislocated NPs that are link children can be marked with the ACC marker, since only NP sisters of V get marked ACC. Since linking is not used in accounting for resumptive pronouns, it follows that (25a) is ungrammatical whereas (25b) is good.

(25) a. * et dani rina ohevet oto
ACC Dani Rina loves him

b. .[et dani] rina ohevet ___.

Finally, note that examples such as (26a) have nothing to do with topicalization, and are quite distinct from those like (23b). (26a) is an example of the Hebrew subject-verb inversion rule, that is optionally triggered by fronting an element of the verb's complement structure. This rule is not at all the same as topicalization, as it is not unbounded (cf. (26b)).

(26) a. al kol gever xoSevet rina
about every man thinks Rina

b. * al kol gever amar dani Se rina xoSevet ___
about every man said dani that Rina thinks

Another difference is that Topicalization may involve a resumptive pronoun (cf. (23a)), whereas the subject-verb inversion rule does not involve a pronoun to replace the fronted element (which is as expected, since think is not subcategorized for two about complements):

(27) * kol gever xoSevet rina alav
every man thinks Rina about-him

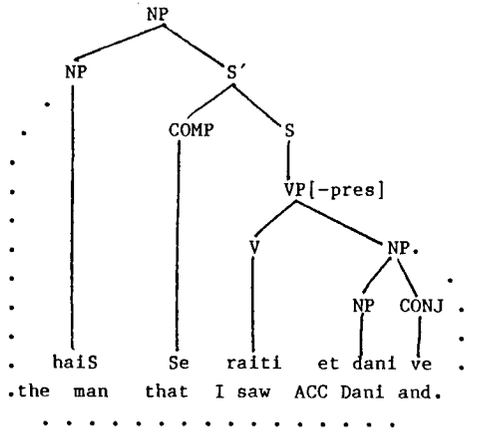
In summary, Hebrew has a rule of Topicalization (S8), where we find NP or PP preceding S, and where either the "linking" strategy is used, or the resumptive pronoun strategy. Relativization on the other hand involves an NP preceding S', and again either strategy may be used (cf. S6). Additionally, there is the tripartite NP construction for relativization (cf. S7), where an NP is followed first by a resumptive pronoun and then by S.

3. Differences betwen Resumptive Pronouns and Gaps

3.1. Syntactic differences

Our system still needs a constraint to block examples such as the following, similar to what the case is in English:

(28) *



Assume the constraint is stated as follows:

(29) If X directly dominates [X CONJ X...CONJ X], then every link descendant of the root X is also a link descendant of each daughter X.

If we treat resumptive pronouns as phonological realizations of gaps, we get the following counter-example to (29):

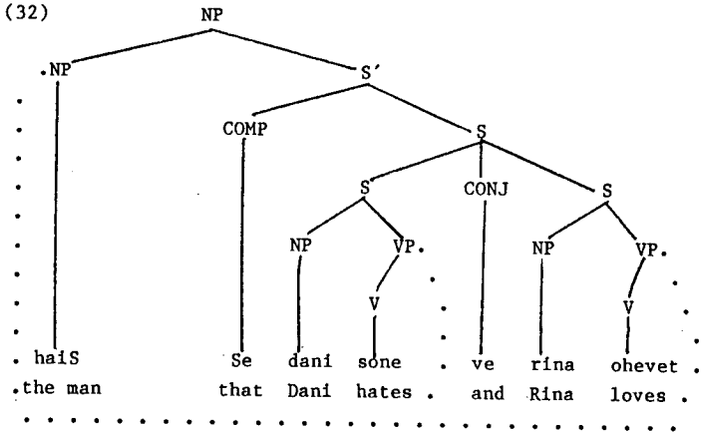
(30) haiS Se raiti et dani ve oto
the man that I saw ACC Dani and him

whereas if resumptive pronouns are independent nodes, (29) holds with no problems. A similar example was given in (1), repeated here as (31). (31) is acceptable not only in Hebrew but also in Irish and in the Scandinavian languages.

(31) This is the woman that John said that she and Bill are having an affair.

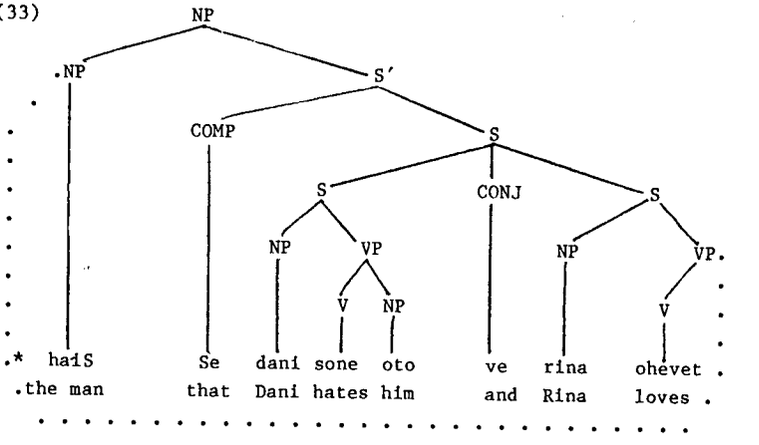
Another example that conforms to (29) is brought out in (32):

(32)



If resumptive pronouns were realizations of gaps, the following should be just as grammatical as (32), which it is not. And indeed under my analysis, (29) explains its ungrammaticality:

(33)



whereas if oto is seen just as the phonological realization of another link that starts at the first VP and ends at the head, the ungrammaticality of (33) is unexplained.

So I have established a syntactic distinction between gaps and resumptive pronouns, and we now turn to semantic distinctions.

3.2. Semantic differences

3.2.1. Relative clauses with both gaps and resumptive pronouns

I will now show that without any additional stipulation we get the right result when a relative clause contains both a gap and a pronoun. In this case the pronoun is never interpreted as a resumptive pronoun, rather it is the gap that gets bound by the head:[7]

(34) haiSa Se dani her'a la ___
the woman that Dani showed to-her

'The woman$_1$ that Dani showed her$_1$ to her.'

whereas in the case of two pronouns, either could be bound by the head:

(35) ha 'iSa Se dani her'a la ota
the woman that Dani showed to-her her

'The woman that Dani showed to her.'(same meaning as (34))
or 'The woman to whom Dani showed her.'

The representation for (34) is (36):[8]

---

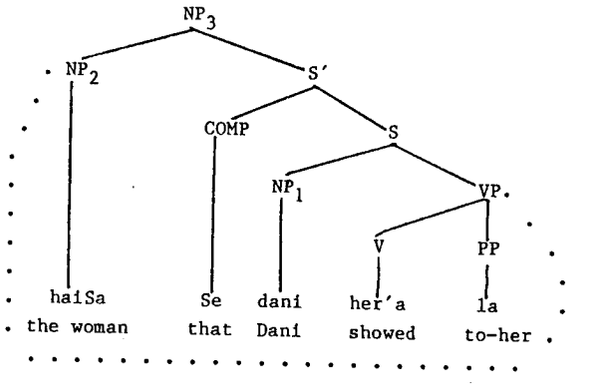
[7]Notice that pronominal PPs in Hebrew precede NPs (even pronominal NPs) in the VP. For example:

(iv) a. natati lo oto
I gave to-him it

b.? natati oto lo

[8]The reader is reminded that I use relational notation, e.g. A(B,C) not only when these denote expressions of type t, but also when they denote expressions of type <e,t> (cf. T2). Therefore in show'(p_i,PP{x_j}) below, p_i is the direct object and not the subject. Notice moreover that in the translations under (36), and everywhere else in the paper, I use qsX' ambiguously to refer to the quantifier store <α,i> and also to its first coordinate α. It should be clear each time which one is intended.

(36)

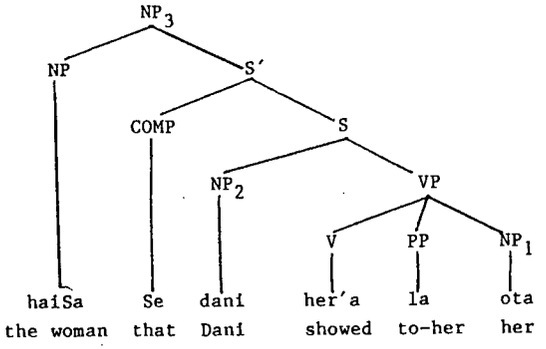


NP_1' = $\langle\hat{P}P\{d\},0,0\rangle$
PP' = $\langle\hat{P}P\{x_j\},0,\{j\}\rangle$
NP_2' = $\langle\check{p}_i,[\langle\hat{P}Ey[Az[(woman'(z) \& R\{z\})\langle--\rangle z=y] \& P\{y\}],i\rangle\},0\rangle$
VP' = $\langle show'(p_i,\hat{P}P\{x_j\}),qsNP_2',\{j\}\rangle$
S' = $\langle show'(d,p_i,\hat{P}P\{x_j\}),qsNP_2',\{j\}\rangle$
NP_3' = $\langle\hat{P}[\check{p}_i show'(d,p_i,\hat{P}P\{x_j\})](\hat{R}qsNP_2'(P)),0,\{j\}\rangle$
= $\langle\hat{P}E!y[woman'(y) \& show'_*(d,y,x_j) \& P\{y\}],0,\{j\}\rangle$

Notice that x_j cannot be bound by NP' since when qsS' is not empty it is the variable whose index is stored in qsS' that gets bound, in this case p_i. x_j may be bound by a head further up the tree or by another dislocated element. Notice that I am for simplicity writing down only one possible translation of the pronoun la. The other one is simply $\langle\hat{P}P\{x_j\},0,0\rangle$, i.e. the meaning of a regular pronoun rather than that of a resumptive pronoun.

The representation for (35) is (37):

(37)



NP_1' = $\langle\hat{P}P\{x_i\},0,\{i\}\rangle$
PP' = $\langle\hat{P}P\{x_j\},0,\{j\}\rangle$
NP_2' = $\langle\hat{P}P\{d\},0,0\rangle$
S' = $\langle show'(d,x_i,x_j),0,\{i,j\}\rangle$

The semantics will give us the right ambiguity, since depending on which index is retrieved from rpsS', the meanings of NP_3 will be:

$\langle[\hat{\bar{R}}\hat{P}E!y[woman'(y) \& R\{y\} \& P\{y\}]]$
$(\hat{x}_i show'_\star(d,x_i,x_j)),0,\{j\}\rangle$

or

$\langle[\hat{\bar{R}}\hat{P}E!y[woman'(y) \& R\{y\} \& P\{y\}]]$
$(\hat{x}_j show'_\star(d,x_i,x_j)),0,\{i\}\rangle$

and after lambda conversion:

$\langle\hat{P}E!y[woman'(y) \& show'_\star(d,y,x_j) \& P\{y\}],0,\{j\}\rangle$
(same as for 36)

or

$\langle\hat{P}E!y[woman'(y) \& show'_\star(d,x_i,y) \& P\{y\}],0,\{i\}\rangle$

3.2.2. Coindexing of gaps and resumptive pronouns

Consider the following examples:

(38) a. haiS Se imo ohevet ___
the man that his mother loves

b. haiS Se imo ohevet oto
the man that his mother loves him

(38b) uses a resumptive pronoun where (38a) has a gap. Even though this is the only difference between them, the two NPs do not have the same readings. In (39) and (40) we present all the coindexing possibilities for (38a) and (38b) respectively:[9]

(39) the man_1 that his_2 mother loves $\_\_\__1$

(40) a. the man_1 that his_2 mother loves him_1
b. the man_1 that his_1 mother loves him_1
c. the man_1 that his_1 mother loves him_2

Notice that (38a) has only one reading, it does not have a reading where the pronoun and the gap are coindexed. The gap is of course always coindexed with the head, therefore the head and the pronoun are not coindexed. In other words, (38a) does not have a reading where the pronoun is a resumptive pronoun for the man. (38b), on the other hand, has a reading where the two pronouns are coindexed, i.e. (40b). When they are not, either can be the one coindexed with the head, in other words - either can be the resumptive pronoun. This is shown in (40a and c).

It is interesting now to see that our system gives exactly the right readings for (38a and b). We will see that (38a) gets the meaning in (41), that corresponds to (39):[10]

(41) $\hat{P}E!y[mother'(y) \& possess'_\star(z,y) \& E!x[man'(x) \& love'_\star(y,x) \& P\{x\}]]$

whereas (38b) gets the meanings in (42a-c) corresponding to the readings in (40a-c):

---

[9] I use the term "coindexed" (rather that "coreferential") in the sense emphasized by Bach and Partee (1980):"...coindexing a pronoun with some other expression is a shorthand of saying that the pronoun in question is being interpreted as a bound-variable..."(p. 7).

[10] I do not claim this is the best possible translation for his mother, but it will do for the purposes of this paper. Also I will from now on use a (somewhat misleading) notation, according to which the translation of the woman, for example, looks like (i), but means (ii):

(i) PE!y[woman'(y) & R{y} & P{y}]
(ii) PEy[Az[(woman'(z) & R{z})<-->z=y] & P{y}]

(42) a. $\widehat{PE}!x[man'(x) \& E!y[mother'(y) \& possess'_{\star}(z,y) \& love'_{\star}(y,x)] \& P\{x\}]$

b. $\widehat{PE}!x[man'(x) \& E!y[mother'(y) \& possess'_{\star}(x,y) \& love'_{\star}(y,x)] \& P\{x\}]$

c. $\widehat{PE}!x[man'(x) \& E!y[mother'(y) \& possess'_{\star}(x,y) \& love'_{\star}(y,z)] \& P\{x\}]$

The crucial point is the following: the variable z in (41), that stands for the pronoun his in (39), is outside the scope of the head NP, which is the quantifier that binds the variable x (that stands for the gap in (39)). Therefore even if while translating (38a) we assign the pronoun and the gaps translations with the same index for the respective variables, eventualy one will be bound and the other not. Notice that (41) can really be rewritten as:

(43) $\widehat{PE}!y[mother'(y) \& possess'_{\star}(x,y) \& E!x[man'(x) \& love'_{\star}(y,x) \& P\{x\}]]$

As pointed out to me by Charles Kirkpatrick, I still have to show why we do not get accidental binding in (38a). The answer I believe lies in the domain of pragmatics, as argued by Reinhart (1981) for a similar question. Since the language has the means to indicate that it intends the head NP to bind the pronoun (i.e. by using another pronoun in place of the gap), it would be infelicitous of the speaker to use (38a) when he intends to communicate (40b).

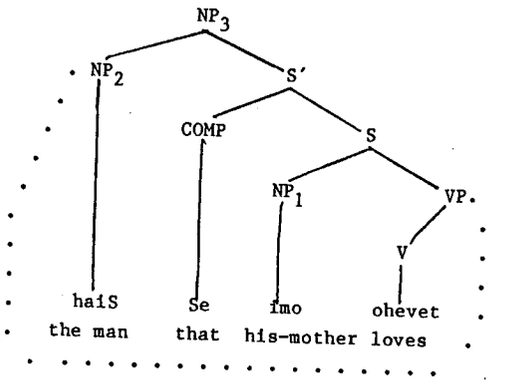
In (42) the situation is different. x stands for the resumptive pronoun (cf. the difference between (42a) and (42c)). But if the other pronoun is translated using the same variable as in the translation of the resumptive pronoun, resulting for example in x in (42b) where there is z in (42a), this occurrence of the variable will be bound by the quantifier that binds the other occurrences of x. Therefore we do get in (38b) a reading where the

two pronouns are coindexed.[11]

We still have to show how our system gives the right meanings. I will only show how to get the translations of (38a and b) where we do choose the variables with the same index twice in the translations, since this is the interesting case.

Under (44) I show the relevant translation of (38a).

(44)



[11] The general question of where it is permissible to use the same variable in the translation of two pronouns is beyond the scope of this paper. See Keenan (1974), Reinhart (1979, 1981) or Bach and Partee (1980) for different approaches to the question of anaphora. I will assume that we use the same variable for both pronouns in order to get the readings in ((v)a and b).

(v)a. imo ohevet oto
his$_1$ mother loves him$_1$

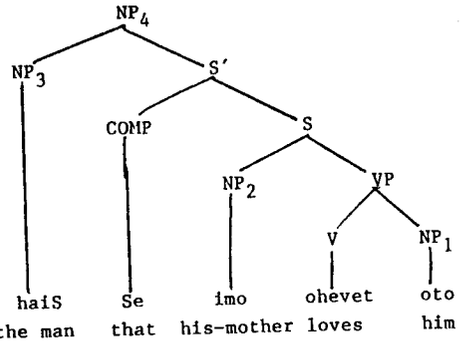
b. imo ohevet et dani
his$_1$ mother loves ACC Dani$_1$

NP_1' = $\langle \widehat{P}E!y[mother'(y) \& possess'_*(x,y) \& P\{y\}],0,0\rangle$
NP_2' = $\langle \check{}p_1,\{\langle \widehat{P}E!x[man'(x) \& R\{x\} \& P\{x\}],i\rangle\},0\rangle$
S' = $\langle hNP_1'(\hat{}love'(p_1)),qsNP_2',\{i\}\rangle$
= $\langle E!y[mother'(y) \& possess'_*(x,y) \& love'(y,pi)],$
$qsNP_2',0\rangle$
NP_3' = $\langle \widehat{P}[\widehat{p_1}hS'](\hat{}\widehat{R}qsNP_2'(P)),0,0\rangle$
= $\langle \widehat{P}[\widehat{p_1}[E!y[mother'(y) \& possess'_*(x,y)$
$\&$ love'(y,p_1)](^$\widehat{R}$qsNP$_2$'(P)),0,0$\rangle$
= $\langle \widehat{P}E!y[mother'(y) \& possess'_*(x,y)$
$\&$ love'(y,$\hat{}\widehat{R}E!x[man'(x) \& R\{x\} \& P\{x\}]],0,0\rangle$
= $\langle \widehat{P}E!y[mother'(y) \& possess'_*(x,y) \& E!x[man'(x)$
$\&$ love$_*$(y,x) $\&$ P{x}]],0,0$\rangle$

hNP_3' is indeed the reading in (43). (Notice that nothing would have changed had we stored anything in the resumptive pronoun stores.)

Under (45) I give the relevant translation of (38b).

(45)



NP_1' = $\langle \widehat{P}P\{x_1\},0,\{i\}\rangle$
NP_2' = $\langle \widehat{P}E!y[mother'(y) \& possess'_*(x_1,y) \& P\{y\}],0,0\rangle$
S' = $\langle E!y[mother'(y) \& possess'_*(x_1,y)$
$\&$ love$'_*$(y,x_1)],{i}$\rangle$
NP_3' = $\langle PE!x[man'(x) \& R\{x\} \& P\{x\}],0,0\rangle$
NP_4' = $\langle [\widehat{R}hNP_2'](\hat{}\widehat{x}_1hS'),0,0\rangle$
= $\widehat{P}E!x[man'(x) \& E!y[mother'(y) \& possess'_*(x,y)$
$\&$ love$'_*$(y,x)] $\&$ P{x}],0,0$\rangle$

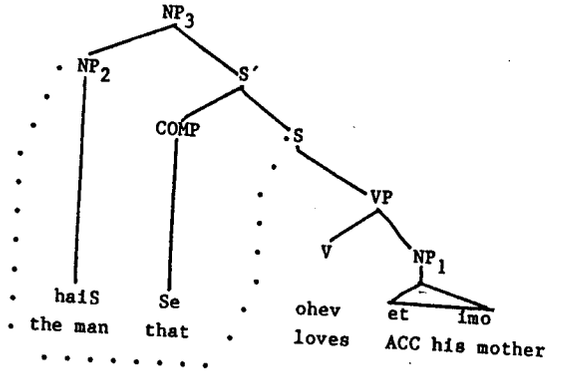
hNP_4' is indeed the translation in (42b).

Notice that we could not have explained (38a) by a general prohibition on coindexing of gaps and pronouns, since the following is acceptable:

(46) haiS Se ___ ohev et imo
the man$_1$ that ___$_1$ loves ACC his$_1$-mother

My system gets this reading:

(47)



NP_1' = $\langle \widehat{P}E!y[mother'(y)\hat{}possess'_*(x,y) \& P\{y\}],0,0\rangle$
NP_2' = $\langle \check{}p_1,\{\langle \widehat{P}E!x[man'(x) \& R\{x\} \& P\{x\}],i\rangle\},0\rangle$
S' = $\langle p_1\{\hat{}love'(\hat{}hNP_1')\},qsNP_2',0\rangle$
NP_3' = $\langle P[\widehat{p_1}p_1\{\hat{}love'(\hat{}hNP_1')\}](\hat{}\widehat{R}qsNP_2'(P)),0,0\rangle$
= $\langle \widehat{P}[\widehat{R}E!x[man'(x) \& R\{x\} \& P\{x\}]](\hat{}love(\hat{}hNP_1')),$
$0,0\rangle$
= $\langle \widehat{P}E!x[man'(x) \& love'(x,\hat{}hNP_1') \& P\{x\}],0,0\rangle$
= $\langle \widehat{P}E!x[man'(x) \& E!y[mother'(y) \& possess'_*(x,y)$
$\&$ love$'_*$(x,y)],0,0$\rangle$

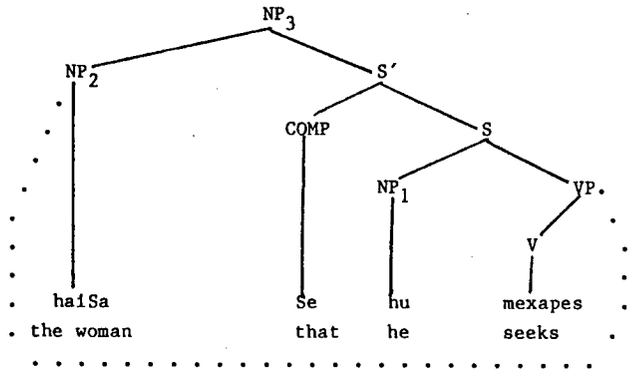
hNP_3' is the reading in 46.

3.2.3. Referentiality of the head NP of the relative clause

I will now show that the ways in which the binding of gaps differs from the binding of resumptive pronouns gives us the right scope results.

Consider the following NP:

(48)



NP_1' = $\langle \hat{P}P\{x\},0,0\rangle$
NP_2' = $\langle \wedge p_i, \{\langle \hat{P}E!y[woman'(y) \ \& \ R\{y\} \ \& \ P\{y\}], i\rangle\}, 0\rangle$
VP' = $\langle seek'(p_i), qsNP_2', 0\rangle$
S' = $\langle seek'(x,p_i), qsNP_2', 0\rangle$
NP_3' = $\langle \hat{P}[\hat{p}_i seek'(x,p_i)](\wedge \hat{R} qsNP_2'(P)), 0, 0\rangle$
= $\langle \hat{P}seek(x, \wedge \hat{R}E!y[woman'(y) \ \& \ R\{y\} \ \& \ P\{y\}]), 0, 0\rangle$

And indeed the following sentence has a de dicto reading:

(49) dani yimca et haiSa Se hu mexapes
Dani will-find ACC the woman that he seeks

which is the following (where dani' binds x):[12]

seek'(d,^RE!y[woman'(y) & willfind'(d,y) & R{y}])

The interesting point is that the sentence parallel to (49) but where the relative clause is formed with a resumptive pronoun does not have a de dicto reading:

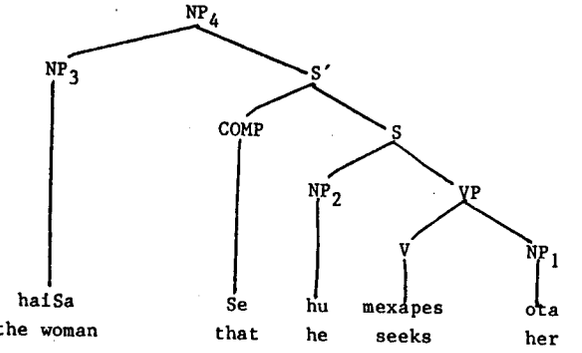
(50) dani yimca et haiSa Se hu mexapes ota
Dani will-find ACC the woman that he seeks her

[12] A treatment for tense is outside the scope of this paper. I use will-find' here rather than find' so that the reading does not sound contradictory.

The only meaning of this sentence can be paraphrased as follows: 'There is woman that Dani is seeking and he will find this woman.'

And indeed under my account, the NP that contains the relative clause has the following structure:

(51)



NP_1' = $\langle \hat{P}P\{x_i\},0,\{i\}\rangle$
VP' = $\langle seek'(\hat{P}P\{x_i\}),0,\{i\}\rangle$
NP_2' = $\langle \hat{P}P\{x_j\},0,0\rangle$
S' = $\langle seek'(x_j,\hat{P}P\{x_i\}),0,\{i\}\rangle$
NP_3' = $\langle PE!y[woman'(y) \ \& \ R\{y\} \ \& \ P\{y\}],0,0\rangle$
NP_4' = $\langle [\hat{R}hNP_3'](\wedge \hat{x}_i seek'(x_j,\hat{P}P\{x_i\})),0,0\rangle$
= $\langle \hat{P}E!y[woman'(y) \ \& \ seek'(x_j,\hat{P}P\{y\}) \ \& \ P\{y\}],0,0\rangle$

Therefore in the case where x_j gets bound by dani', the only meaning for (50) is the following:

E!y[woman'(y) & seek'(d,$\hat{P}$P{y}) & willfind'(d,y)]

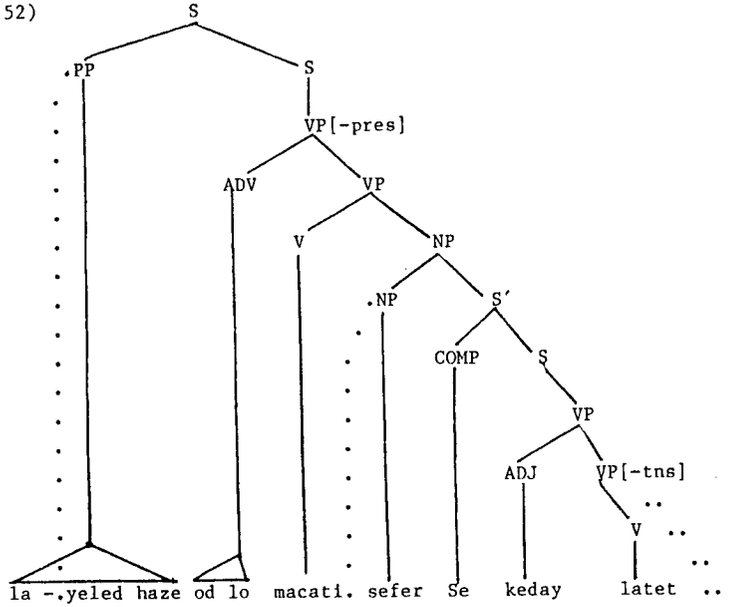
i.e. the only reading we get for (50) is de re, which is the right result.

3.2.4. Island Constraints

Next we turn to the differences between relative clauses with gaps and resumptive pronouns with respect to gaps bound from outside the clause.

Consider the following grammatical sentence of Hebrew:

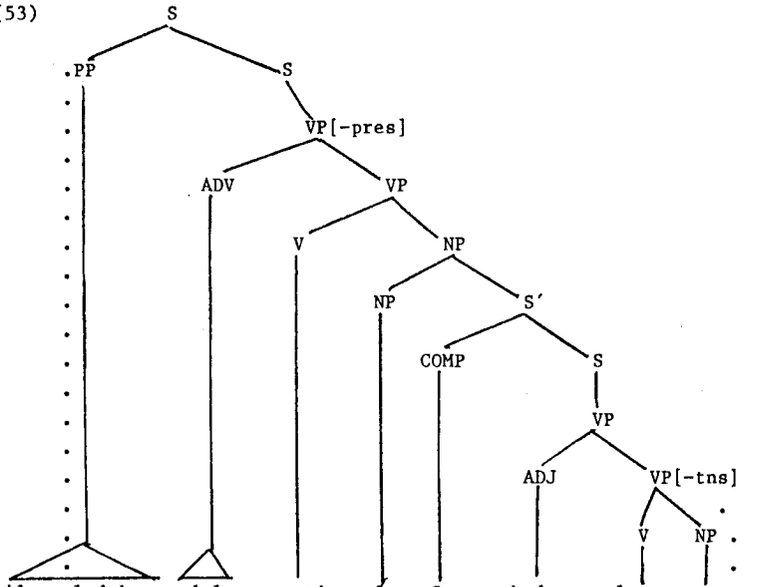
(52)



'I haven't yet found a book worth giving to this kid.'

Surprisingly, the corresponding sentence with a resumptive pronoun in the relative clause, i.e. with only one gap instead of the two in (52), is ungrammatical:

(53)



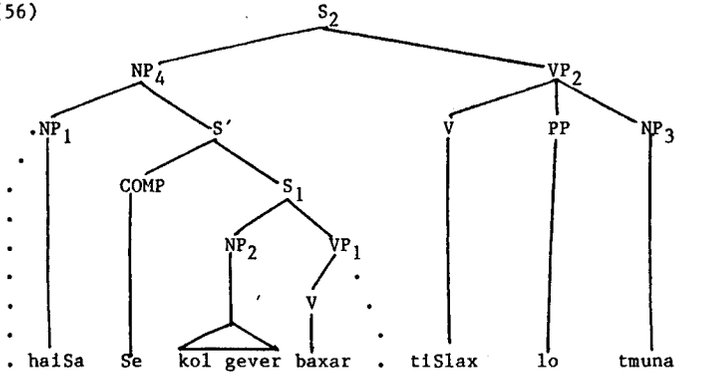
Yet the constraint that will star (53) cannot be syntactic, since the same phenomenon repeats itself when instead of a constituent dislocated from within the relative clause we have an NP that syntactically is inside the relative clause, but semantically is "quantified" into that clause. (54) has a reading where the pronoun lo is bound by kol gever, whereas (55) does not have such a reading:

(54) haiSa$_1$ Se kol gever$_2$ baxar ___$_1$ tiSlax lo$_2$
the woman$_1$ that every man$_2$ chose ___$_1$ will-send him$_2$
tmuna
a picture

(55) * haiSa$_1$ Se kol gever$_2$ baxar ota$_1$ tiSlax lo$_2$
the woman$_1$ that every man$_2$ chose her$_1$ will-send him$_2$
tmuna
a picture

The constraint that accounts for the unacceptability of both (53) and (55) will therefore be semantic. In my system, (53) does not get any readings, and (55) does not get a reading where kol gever binds lo. To exemplify how this works, we now show how we get the reading in (54), and how we don't get the reading in (55).

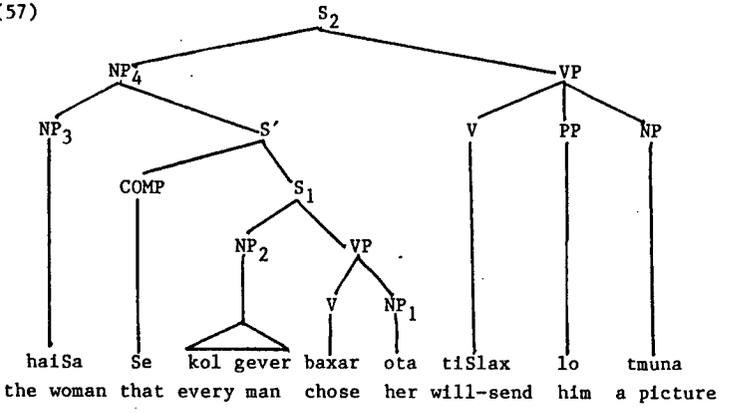
(56)



NP_1' = $\langle \check{}p_1,\{\langle\widehat{P}E!y[woman'(y)\ \&\ R\{y\}\ \&\ P\{y\}],i\rangle\},0\rangle$
NP_2' = $\langle \check{}p_j,\{\langle\widehat{P}Ax[man'(x)\text{-->}P\{x\}],j\rangle\},0\rangle$
VP_1' = $\langle choose'(p_i),qsNP_1',0\rangle$
S_1' = $\langle p_j\{\hat{}choose'(p_i)\},qsNP_1'UqsNP_2',0\rangle$
NP_4' = $\langle\widehat{P}[\widehat{p}_i hS_1'](\hat{}RqsNP_1'(P)),qsNP_2',0\rangle$
= $\langle\widehat{P}[\widehat{p}_i p_j\{\hat{}choose'(p_i)\}](\hat{}\widehat{R}[PE!y[woman'(y)\ \&\ R\{y\}\ \&\ P\{y\}]](P)),qsNP_2',0\rangle$
= $\langle\widehat{P}p_j\{\hat{}choose'(\hat{}\widehat{R}E!y[woman'(y)\ \&\ R\{y\}\ \&\ P\{y\}])\},qsNP_2',0\rangle$
NP_3' = $\langle\widehat{P}Ez[picture'(z)\ \&\ P\{z\}],0,0\rangle$
PP' = $\langle\widehat{P}P\{x_j\},0,0\rangle$
VP_2' = $\langle send'(\hat{}hNP_3',\hat{}\widehat{P}P\{x_j\}),0,0\rangle$
S_2' = $\langle qsNP_2'(\hat{}\widehat{x}_j[\widehat{p}_j hNP_4'(\hat{}send'(\hat{}hNP_3',\hat{}\widehat{P}P\{x_j\}))](\hat{}\widehat{P}P\{x_j\})),0,0\rangle$
= $\langle qsNP_2'(\hat{}\widehat{x}_j E!y[woman'(y)\ \&\ choose_*'(x_j,y)\ \&\ send'(y,\hat{}hNP_3',\widehat{P}P\{x_j\})]),0,0\rangle$
= $\langle qsNP_2'(\hat{}\widehat{x}_j E!y[woman'(y)\ \&\ choose_*'(x_j,y)\ \&\ Ez[picture'(z)\ \&\ send_*'(y,z,x_j)]]),0,0\rangle$
= $\langle Ax[man'(x)\text{-->}E!y[woman'(y)\ \&\ choose_*'(x,y)\ \&\ Ez[picture'(z)\ \&\ send_*'(y,z,x)]]],0,0\rangle$

This indeed is the reading where kol gever has scope over the whole sentence. To show that (55) does not have this reading, we give its structure in (57):

(57)



NP_1' = $\langle\widehat{P}P\{x_i\},0,\{i\}\rangle$
NP_2' = $\langle \check{}p_j,\{\langle\widehat{P}Ax[man'(x)\text{-->}P\{x\}],j\rangle\},0\rangle$
S_1' = $\langle p_j\{choose'(\hat{}\widehat{P}P\{x_i\})\},qsNP_2',\{i\}\rangle$
NP_3' = $\langle\widehat{P}E!y[woman'(y)\ \&\ R\{y\}\ \&\ P\{y\}],0,0\rangle$

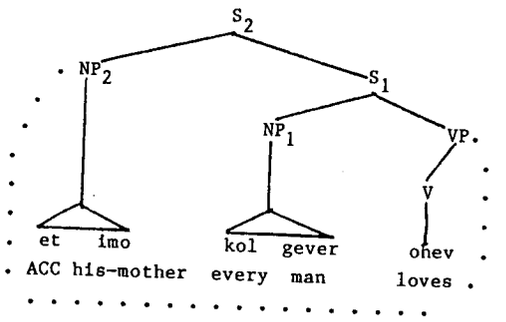
To combine NP_3' with S_1' to get NP_4' we cannot apply A in the definition of T6 since $qsNP_3'$ is empty, and we cannot apply B since qsS_1' is not empty. Therefore S_2 in (57) does not get a meaning where kol gever has scope over the whole sentence.

The same difference shows up between topicalization with and without resumptive pronoun (cf. rule S7 in Appendix A):

(58) a. et imo, kol gever ohev
ACC his$_1$ mother, every man$_1$ loves
b. * imo, kol gever ohev ota
his$_1$ mother, every man$_1$ loves her

The structures for (58a and b) are shown in (59a and b) respectively:

(59) a.

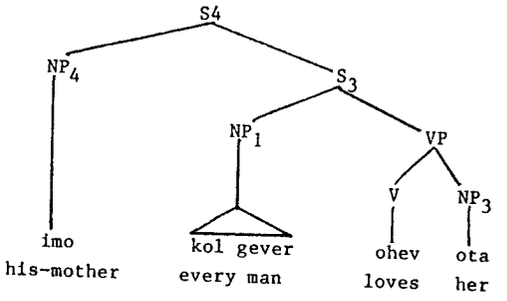


$NP_1' = \langle {}^{\vee}p_i, \{\langle \hat{P}Ax[man'(x) \rightarrow P\{x\}], i\rangle\}, 0\rangle$

$NP_2' = \langle {}^{\vee}p_j, \{\langle \hat{P}E!y[mother'(y) \ \& \ possess'_{\star}(x_i,y) \ \& \ P\{y\}], j\rangle\}, 0\rangle$

$S_1' = \langle p_i\{love'(p_j)\}, qsNP_1' U qsNP_2', 0\rangle$

b.



$NP_1' = \langle {}^{\vee}p_i, \{\langle \hat{P}Ax[man'(x) \rightarrow P\{x\}], i\rangle\}, 0\rangle$

$NP_4' = \langle \hat{P}E!y[mother'(y) \ \& \ possess'_{\star}(x_i,y)) \ \& \ P\{y\}], 0, 0\rangle$ (cf. fn9)

$NP_3' = \langle \hat{P}P\{x_j\}, 0, \{j\}\rangle$

$S_3' = \langle p_i\{love'(p_j)\}, qsNP_1', \{j\}\rangle$

Notice that we should be allowed to use the same variable x_i both in the translation of NP_1 and NP_2 (and NP_4), since we would have to do the same to get the following reading of (60):

(60) kol gever ohev et imo
every man$_1$ loves ACC his$_1$-mother

Any element in qsS_1' can be retrieved at this point. If the

first one is, kol gever won't have wide scope over imo. If the second one is, we won't be able to combine NP_2 with S_1, because we will be missing the right element in store. So to get the reading we want, no element is retrieved from store at this point, and the translation for S_2 is:

$S_2' = \langle [\hat{p}_j hS_1'](qsNP_2'), qsNP_1', 0\rangle$

After retrieving $qsNP_1'$, I get the reading we wanted for (58a):

$hS_2' = Ax[man'(x) \rightarrow E!y[mother'(y) \ \& \ possess'(x,y) \ \& \ love'(x,y)]$

S_3' on the other hand cannot be combined to the dislocated element NP_4'. Clause A of T8 does not apply since $qsS_3' \cap qsNP_4' = 0$. Clause B of T8 does not apply since $qsS_3' \neq 0$. So we cannot get a reading for S_4 where kol gever has wide scope over imo. The only meaning we get for S_4 is when we store nothing for NP_1, and that reading would be:

$E!y[mother'(y) \ \& \ possess'(x,y) \ \& \ Ax[man'(x) \rightarrow love'(x,y)]]$

(i.e. where imo is outside of the scope of kol gever.)

To summarize section 3.2, I have shown several differences in the meanings of relative clause with and without resumptive pronouns. These differences have to do with the fact that the antecedent of a resumptive pronoun always has wider scope than any other quantifier in the same clause with the pronoun and than the antecedent of any gap in the same clause with the pronoun. The same differences appeared in the meanings of sentences topicalized with and without resumptive pronouns. My system captures these differences by ensuring that pronouns are not treated as resumptive as long as there still is unretrieved quantifier storage, i.e. as long as there still are gaps in the clause that have not been bound, or NP meanings that have not been quantified in. Treatments that conflate gaps and resumptive pronouns would be hard pressed to account for these differences.

4. The distribution of resumptive pronouns

I now turn to show how my system captures the patterns of gaps and resumptive pronouns distribution in multiple extractions noted by Engdahl(1980) and Maling and Zaenen (1980). The same patterns basically hold for Hebrew, so I will start with Hebrew examples:

(61) a. hamaamarim haele$_1$, dani xoSev Se et haorex haxadaS$_2$
these articles$_1$ Dani thinks that ACC the new editor$_2$
efSar leSaxnea ___$_2$ levater alehem$_1$
it's possible to convince ___$_2$ to give up on them$_1$

b. *al hamaamarim haele$_1$ dani xoSev Se haorex haxadaS$_2$
on these articles$_1$ Dani thinks that the new editor$_2$
efSar leSaxnea oto$_2$ levater ___$_1$
it's possible to convince him$_2$ to give up ___$_1$

(62) a. haorex haxadaS$_1$, dani xoSev Se al hamaamarim haele$_2$
the new editor$_1$ Dani thinks that on these articles$_2$
efSar leSaxnea oto$_1$ levater ___$_2$
it's possible to convince him$_1$ to give up ___$_2$

b. *et haorex haxadaS$_1$ dani xoSev Se hamaamarim haele$_2$
ACC the new editor$_1$ Dani thinks that these articles$_2$
efSar leSaxnea ___$_1$ levater alehem$_2$
it's possible to convince ___$_1$ to give up on them$_2$

Using Fodor's (1978) terminology of fillers (F) and gaps (G) to refer to "preposed" constituents and "extraction" sites, the distributions of Fs, Gs and Ps (pronouns) in (61) and (62) are summarized in (63) and (64) respectively:

(63) a. F_1 F_2 G_2 P
b. *F_1 F_2 P G_1

(64) a. F_1 F_2 P G_2
b. *F_1 F_2 G_1 P

Notice that this pattern is exactly what our system here predicts: F_2 cannot bind P as long as there is an unbound gap G_1, i.e. as long as there is still an unretrieved quantifier-store. Therefore a sentence which has a distribution of gaps and pronouns as in (63b) or (64b) will only get an interpretation where P is a free pronoun. This would leave us with one filler too many, which

explains the unacceptability of such a sentence. Notice that the explanation does not rely on left-right precedence, and indeed any order of G_1 and P results in a starred configuration. (63a) and (64a) are acceptable configurations, since G_2 gets bound by F_2 before P has to be bound by F_1. By the time P has to get bound the quantifier-store is empty and F_1 can bind P. Again in this case any order of G_2 and P is acceptable.

Engdahl (1979) has the following examples from Swedish:

(65) a. Haar ar flickorna$_1$ som jag inte minns vilka pojkar$_2$
lararen bad dem$_1$ dansa med ___$_2$.
b. *Haar ar flickorna$_1$ som jag inte minns vilka pojkar$_2$
lararen bad dem$_2$ dansa med ___$_1$.
'Here are the girls that I don't remember which boys
the teacher asked them to dance with.'(Engdahl's (13))

(65a and b) exemplify the distribution in (63a) and (64b) respectively. Neither Engdahl nor Maling and Zaenen have examples for (64b) or (63a). The only things mentioned about these cases are that in Swedish "the resumptive pronoun always precedes the gap" (Maling and Zaenen (1980) p.51) and "if the bindings are nested, a pronoun may not occur" (Engdahl (1979) p.80). I conclude from these remarks that in Swedish not only (64b) is starred, but so is (63a). The fact that (63a) is starred in Swedish requires an additional stipulation in my account, (which shouldn't be surprising since this a language specific phenomenon), and so it does in Engdahl's account.

Engdahl (1979) proposes a general parsing principle to account for (63b) and (64a-b). She restates Fodor's (1978) Nested Dependency Constraint (NDC) as a general parsing strategy: "Associate the most recent filler with the next gap."(Engdahl's (22)). When the parser encounters a structure F_1-F_2-P-G..., the parsing strategy results in automatically assigning it F_1-F_2-P-G_2, i.e. the parser does not have to make a decision about which filler to associate with the gap.

> "...the NDC reduces the momentary processing load by only allowing the parser to make one assignment. Notice that the NDC enables the parser to resolve a pending filler-gap assignment locally and immediately. The closest filler is always associated with the next encountered gap. Most likely this 'local decision

principle' will be highly valued by a parser engaged in real time processing." (Engdahl (1979) p.84)

First notice that nothing about the NDC accounts for the fact that (63a) is starred in Swedish, since it is true of (63a) that the closest filler is associated with the gap. Secondly, as Engdahl herself notices, it is so far not at all clear whether this system is able to get all the semantic bindings right with only local decisions:

> "When the parser reaches a pronoun in a structure F_1-F_2-P..., it ... has the option either to assume that it is a freely referring pronoun, or that it is a resumptive pronoun, controlled by a preceding filler. At this stage in the processing, either choice may cause considerable reanalysis when more of the sentence is available." (Engdahl (1979) p.85)

Thirdly, the NDC doesn't always make the right predictions in cases of multiple gaps. Engdahl (1980) has the following examples from Norwegian:

(66) a. Det var Eva$_1$ laereren spurte hvilken$_2$ gutt vi trodde ___$_2$ var spint pa ___$_1$

b. Det var Eva$_1$ laereren spurte hvilken$_2$ gutt vi trodde ___$_1$ var spint pa ___$_2$

"It was Eva that the teacher asked which boy we thought ___ was mad at ___." (Engdahl's (83))

The pattern of fillers-gaps exemplified in (66a and b) are shown in (67a and b) respectively:

(67) a. F_1 F_2 G_2 G_1
b. F_1 F_2 G_1 G_2

According to the NDC (66b) and (67b) should be starred, since it involves crossing dependencies, i.e. binding of the second gap rather than the first to the last filler.

Other acceptable crossing dependencies occur in Icelandic:

(68) Pessum krakka$_1$ herua geturdu aldrei imyndad per hvada
this boy$_1$ here you can never guess what
gjof$_2$ eg gaf ___$_1$ ___$_2$
gift$_2$ I gave ___$_1$ ___$_2$
(Maling and Zaenen (1980) (13)c)

There are probably additional factors that influence the interpretation of crossing dependencies. Engdahl reports that nested readings, e.g. (66a) are strongly preferred in most contexts. But dependence upon context could hardly be accounted for by a principle about internal parsing of sentences.

Consider the following Hebrew examples from Reinhart (1980):

(69) a. 'al ha-nose ha-ze$_1$ ulay tuxal lomar li eize
on this topic$_1$ perhaps you could tell me which
sfarim$_2$ ata xoSev Se keday li likro ___$_2$ ___$_1$
books$_2$ you think that it's worth to-me to-read ___$_2$ ___$_1$
(Reinhart's 14a)

b. hine sifri ha-riSon Se oto$_1$ ani yodea 'al eize
here is my first book that it$_1$ I know on which
nose$_2$ ata xoSev Se katavti ___$_1$ ___$_2$
topic$_2$ you think that I wrote ___$_1$ ___$_2$
(Reinhart's 14b)

The sentences in (69a and b) are both equally acceptable to me, but Reinhart reports that "this is the area where I found most disagreement in judgment among the speakers I checked with."(p. 14) The disagreement though is about the status of what Reinhart calls "extraction across two S' nodes", not about any difference in acceptability between (69a and b). And indeed examples where there is "extraction across one S' node only" are cited as acceptable by Reinhart, even when they involve crossing dependencies:

(70) et ha-xavila ha-zot$_1$ hayiti roce la-daat im mi$_2$
ACC this package$_1$ I would like to know with whom$_2$
dan Salax ___1 le-rosa ___2
Dan sent ___1 to Rosa ___2

Since word order in Hebrew VPs is sometimes relaxed (cf. note 7), we should look at examples where the two gaps are not daughters of the same VP. Reinhart gives the examples in (71), and finds (71b), the one with crossing dependencies, unacceptable. For me both are acceptable:

(71) a. et ha-sefer ha-ze$_1$, lo taamin et mi$_2$
ACC this book$_1$ you would'nt believe ACC who$_2$
Sixnati ___2 lisxov ___1 me-ha-sifriya
I convinced ___2 to steal ___1 from the library

b. et ha-'iS ha-ze$_1$, lo taamin eyze sefer$_2$
ACC this man$_1$ you wouldn't believe what book$_2$
Sixnati ___1 lisxov ___2 me-ha-sifriya
I convinced ___1 to steal ___2 from the library
(Reinhart's (44) a and b; she stars b)

Where the two dislocated XPs do not share the same preposition or case marking, I do find the examples with crossing dependencies less acceptable:

(72) a. 'al ha-maamarim ha-ele$_1$ dani xoSev Se 'et ha-'orex
on these articles$_1$ Dani thinks that ACC the new
ha-xadaS$_2$ 'efSar le-Saxnea ___2 le-vater ___1
editor$_2$ it's possible to convince ___2 to give up ___1

b.?'et ha-'orex ha-xadaS$_1$, dani xoSev Se 'al ha-maamarim
ACC the new editor$_1$ Dani thinks that on these
ha-'ele$_2$ 'efSar le-Saxnea ___1 le-vater ___2
articles$_2$ it's possible to convince ___1 to give up ___2

The only thing we can conclude from this discussion of crossing

dependencies is that their acceptability depends upon the language, the context, the speaker, and other structural properties of the sentences themselves. In any case they seem to be a different phenomenon from the distribution of resumptive pronouns, for which this paper accounts.

We have seen problems that Engdahl's processing account for the distribution of resumptive pronouns runs into. Maling and Zaenen advocate a similar processing account, though they do not emphasize the NDC as an absolute principle. Rather they suggest that whereas a gap increases "processing load" (cf. Wanner and Maratsos (1978)), a resumptive pronoun does not. In other words, gaps interrupt the processing of a clause, since they have to be immediately paired with an antecedent on hold, whereas pronouns (resumptive or others) are not. In this respect, a resumptive pronoun is "preferable",, specially in constructions involving crossing dependencies. This account as it stands does not make specific predictions as to what distributions of gaps and resumptive pronouns are acceptable. It also leaves open, just as Engdahl's did, the question of how resumptive pronouns are assigned to their antecedents.

Maling and Zaenen also propose an alternative syntactic solution. Their framework is basically that of Gazdar's plus allowing for multiply slashed categories. They propose the following metarule:

(73) A/B/C ---> A/C/B,,
(Maling and Zaenen's (80))

where X/$\underline{X}$,, is a resumptive pronoun.

We have already seen one problem in Maling and Zaenen's syntactic account, when we saw that it excluded crossing dependencies with gaps only (cf. (13)).

We will now test each of the three falsifiable accounts at hand: Engdahl's processing account, Maling and Zaenen's syntactic account, and my semantic account, for their predictions to the case of sentences with three fillers. We first look for a case where each account makes a different prediction. Consider the following distribution:

(74) F_1 F_2 F_3 X_2 X_3 X_1

What are the permissible values for X in (74)?

The processing account predicts that the only permissible distribution of gaps and pronouns in (74) is:

(75) $F_1\ F_2\ F_3\ P_2\ G_3\ P_1$

since if we allowed G_2, it would get bound to F_3, and if allowed G_1 to follow P_2-G_3, it would get bound to F_2.

The syntactic account predicts that the only permissible distribution of gaps and pronouns is the following:

(76) $F_1\ F_2\ F_3\ P_2\ G_3\ G_1$

since under this account we get a resumptive pronoun if and only if it replaces the first gap in a crossing dependency.

The semantic account that I have presented in this paper allows for the following distribution:

(77) $F_1\ F_2\ F_3\ G_2\ G_3\ P_1$

since by the time P_1 has to be bound by F_1, the quantifier-store will be empty, G_2 and G_3 having already been bound. Notice that (77) is not the only distribution I predict; (75) would be acceptable as well. But in order to show the superiority of my account, it is enough to find an example that exhibits the distribution in (77), and here it is:

(78) ze haiS$_1$ Se od lo xatamta al-hamixtavim$_2$
this-is the man$_1$ that not yet you signed the letters$_2$
Se etmol hexlatnu le- mi$_3$ anaxnu omdim
that yesterday we decided to whom$_3$ we are going
liSloax ___2 ___3 ito$_1$
to send ___2 ___3 with-him$_1$

(I have not yet been able to check whether this example is grammatical in Norwegian.)

5. Conclusion

This paper has shown that a treatment of the syntax and semantics of resumptive pronouns as distinct from the syntax and semantics of gaps has many advantages over non-distinct treatments. Syntactically, resumptive pronouns do not behave as

gaps where the "Coordinate Structure Constraint" is concerned. Semantically, the antecedent of a resumptive pronoun has widest scope in the clause that contains the resumptive pronoun, whereas the antecedent of a gap does not. Another thing that the treatment in this paper accounts for is the distribution of resumptive pronouns in cases of multiple extractions.

APPENDIX A

S1 a. $[_S$ NP VP[+pres]]

b. $[_S$ (NP) VP[-pres]]

S2 $[_{VP}$ V $(XP_1 \ldots XP_n)]$
where XP_1 is NP or PP and XP_1=PP for $1<i<=n$

S3 a. $[_{VP}$ V S′]

b. $[_{VP}$ V VP[-tns]]

S4 $[_{S'}$ COMP S]

S5 $[_{PP}$ P NP]

S6 $[_{NP}$ NP S′]

S7 $[_{NP}$ NP XP S] (where XP is NP or PP)

S8 $[_S$ XP S]

Definition of "linked trees": (informal version)

A "linked tree" is a tree with zero or more edges of a new kind (called "links") added to it so that every node which is a link child, i.e. is at the bottom of a link, c-commands (with respect to the tree structure) its link parent(s). (from Peters (1981))[1]

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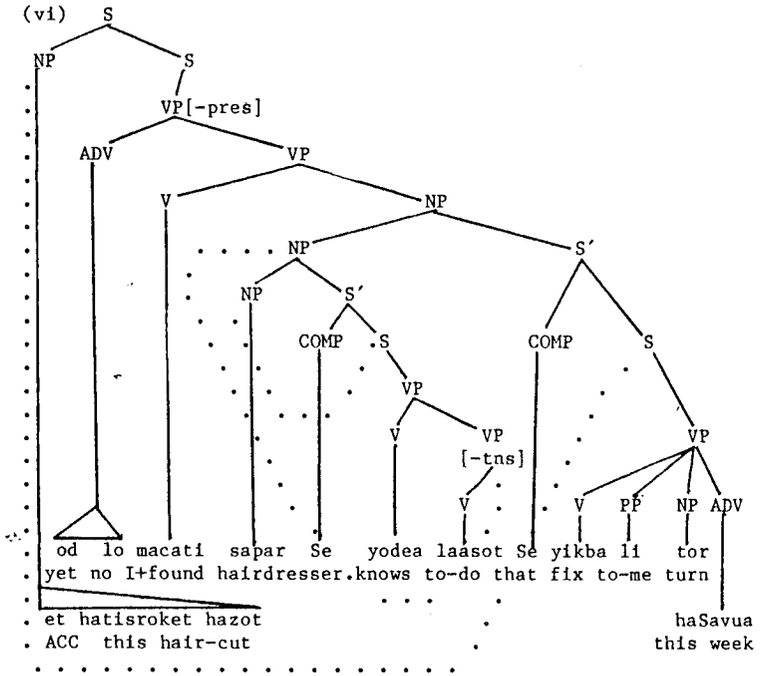
[1]Peters actually has an additional condition: "Every link child dominates (with respect to the tree structure) the link child(ren) of any link parent it dominates." The motivation for this condition is not clear to me, and at least for Hebrew it seems to be wrong, since the following is grammatical:

(vi)



'I have not yet found a hair-dresser who can do this hair-cut who will give me an appointment for this week.'

Specification of "dislocated" constituents for Hebrew:

A. An XP left sister of S or S′ is a "dislocated" constituent. A dislocated NP may be, and a dislocated PP necessarily is, a link child whose parent(s) are dominated (with respect to the tree structure) by the S or S′ node to its right.

B. Only dislocated constituents may be link children.

APPENDIX B

Translation Convention:

Let X be a syntactic category.

A. A "translation" of X is a triplet X′ = ⟨hX′,qsX′,rpsX′⟩, where:
   i. hX′ ("head" of X′) is the familiar Montague translation of X.
   ii. qsX′ ("quantifier store" of X′) is a set of pairs ⟨a,i⟩ where a is of type ⟨⟨s,⟨e,t⟩⟩,t⟩ (i.e. the type of familiar translations of NPs) and i is a natural number.
   iii. rpsX′ ("resumptive-pronoun store" of X′) is a set of natural numbers.

B. ⟨hX′,0,0⟩ is a translation of X. Moreover, the only meanings of S are mappings of ⟨hS′,0,0⟩.

NP Storage Convention:

A. If NP′ is a translation of NP, then so is ⟨$^{\vee}p_i$,qsNP′ U {⟨hNP′,i⟩},rpsNP′⟩.

B. Moreover, if ⟨$\widehat{PP}\{x_i\}$,0,0⟩ is a translation of NP , then so are ⟨$\widehat{PP}\{x_i\}$,0,{i}⟩ and ⟨$^{\vee}p_i$, $\widehat{PP}\{x_i\}$,i⟩,{i}⟩.

Store Retrieval Convention:

Let ⟨hS′,qsS′,rpsS′⟩ be a translation of S.

If ⟨α,i⟩EqsS′ then ⟨α($\widehat{x}_i$[$\widehat{p}_i$hS′]($\widehat{PP}\{x_i\}$)),

qsS′-{⟨α,i⟩},rpsS′⟩ is also a translation of S.

Translation rules:

T1 a. $\langle hNP'(\hat{}hVP'),qsNP' U qsVP', rpsNP' U rpsVP'\rangle$

b. $\langle \hat{P}P\{x_i\}(\hat{}hVP'),qsVP',rpsVP'\rangle$

T2 $\langle hV'(\hat{}hXP_1', \ldots, \hat{}hXPn'), U\ qsXPi', U\ rpsXPi'\rangle$

T3 a. $\langle hV'(\hat{}hS\backslash'),qsS\backslash',rpsS\backslash'\rangle$

b. $\langle hV'(\hat{}hVP')),qsVP',rpsVP'\rangle$

T4 S'

T5 NP'

Let XP denote the immediate left sister of S or S' in S6, S7 and S8, and NP - the leftmost constituent in S7.

A. If $hXP' = \check{p}_i$ and $\langle \alpha,i\rangle \in qsXP' \cap qsS'$, then

T6 $\langle \hat{P}[\hat{p}_i hS'](\hat{R}\alpha(P)),qsS'-\{\langle \alpha,i\rangle\},rpsS'\rangle$

T8 $\langle [\hat{p}_i hS'](\hat{}\alpha),qsS'-\{\langle \alpha,i\rangle\},rpsS'\rangle$

and if moreover $\alpha = PP\{x_i\}$, then

T7 $\langle [RhNP'](\hat{x}_i[\hat{p}_i hS'](\hat{}\alpha)),qsNP' U qsS'-\{\langle \alpha,i\rangle\}$, $rpsNP' U rpsS'-\{i\}\rangle$

B. If $hXP' \neq \check{p}_i$, $qsS' = 0$ and $i \in rpsS'$ then

T6 $\langle [\hat{R}hXP'](\hat{x}_i hS'),qsXP',rpsXP' U rpsS'-\{i\}\rangle$

T8 $\langle hXP'(\hat{x}_i hS'),qsXP',rpsXP' U rpsS'-\{i\}\rangle$

C. Otherwise T6, T7, and T8 are not defined.
(R in T6 and T7 is the variable introduced in Bach and Cooper (1978).)

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ON THE SYNTAX AND SEMANTICS OF RESUMPTIVE PRONOUNS

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1. Introduction

Relative clauses in many languages have resumptive pronouns where English would have a gap. Hebrew is one such language. A conceivable way of approaching resumptive pronouns is to say that they are syntactically of the same category as gaps, and that they get the same semantic translation.[0] The only difference would be that certain gaps get "spelled out" as pronouns. Approaches along these lines can be found in Borer (1979), Engdahl (1979) and Maling and Zaenen (1980). The same is also suggested in Gazdar (1980) and Peters (1980).

According to the analysis I will propose here, resumptive pronouns are syntactically and semantically pronouns, and they differ in both these respects from gaps. One very simple piece of evidence in favour of my approach is that languages that make use of resumptive pronouns use the same inventory available to them for other pronouns. Another simple fact is the following sentence (from Maling and Zaenen (1980) ftn. 20):

(1) This is the woman that John said that she and Bill are having an affair.

According to Maling and Zaenen, the corresponding sentences in Scandinavian languages and in Irish are good sentences. The corresponding sentence in Hebrew is also perfectly good.

The pronoun <u>she</u> in (1) is a resumptive pronoun. If it were

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