Deriving Reconstruction Asymmetries in ATB by Means of Ellipsis

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## 1.	A Reconstruction Paradox in ATB

Even though reconstruction data can be found in previous work on ATB, it has gone unnoticed that reconstruction is partially symmetrical and partially asymmetrical. Symmetrical reconstruction targets both conjuncts while asymmetrical reconstruction only seems to affect the first conjunct. Reconstruction is symmetrical for Strong Crossover (Citko 2005: 492), (1), variable binding (Nissenbaum 2000: 44), (2), idiom interpretation (Citko 2005: 492), (3), and scope (Moltmann 1992: 107f.), (4):

(1)	a.	*[Whose$_i$ mother] did [he$_i$ never visit __] and [we talk to __]?
	b.	*[Whose$_i$ mother] did [we talk to __] and [he$_i$ never visit __]?

(2)	a.	[Which picture of his mother] did [you give __ to every Italian] and [sell __ to every Frenchman]?
	b.	?? [Which picture of his mother] did [you give __ to every Italian] and [sell __ to Mary]?
	c.	?? [Which picture of his mother] did [you give __ to Mary] and [sell __ to every Italian]?

(3)	a.	[Which picture] did [John *take* __] and [Bill pose for __]?
	b.	[Which picture] did [John pose for __] and [Bill *take* __]?

(4)	[How many books] did [every student like __] & [every professor dislike __]?
	a.	Five books (how many > & > every)
	b.	Student A liked 5 books, and Prof X. disliked 7 books, Student B liked 3 books and Prof. Y disliked 4 books (& > every > how many)
	c.	Every student liked 7 books and every professor disliked 3 books (& > how many > every)
	d.	# Student A liked 5 books, Student B liked 3 books and all professors disliked 4 books

Asymmetrical reconstruction is found for Principle A (Munn 1993: 52), (5), Principle C (Citko 2005: 494), (6), and Weak Crossover (Munn 2001: 374), (7):

(5)   a.   [Which pictures of himself$_i$] did [John$_i$ buy __] and [Mary paint __]?
        b.   *[Which pictures of herself$_j$] did [John$_i$ buy __] and [Mary$_j$ paint __]?

(6)   a.   *[Which picture of John$_i$] did [he$_i$ like __] and [Mary dislike __]?
        b.   [Which picture of John$_i$] did [Mary like __] and [he$_i$ dislike __]?

(7)   a.   *[Which man]$_i$ did [his$_i$ boss fire __] and [you hire __]?
        b.   [Which man]$_i$ did [you hire __] and [his$_i$ boss fire __]?

We will argue that reconstruction always targets both conjuncts. The apparent non-reconstruction into the second conjunct in (5)–(7) is instead the result of an ellipsis operation that links the ATB-ed elements in the second conjunct with those in the first: as in other instances of ellipsis, certain mismatches between antecedent and ellipsis site are tolerated. These mismatches then lead to the illusion that there is no reconstruction in (5)–(7). The paper is organized as follows: section 2 provides a detailed derivation of ATB, section 3 discusses the reconstruction facts, and section 4 concludes the paper.

2.   The derivation of ATB

2.1   The Implementation of Ellipsis in ATB

It has become standard to assume that ellipsis is triggered by an [E]-feature. Furthermore, for every elliptical construction, a specific [E]-feature is posited. These [E]-features differ in licensing requirements, selectional restrictions and phonological effects. I follow this practice and assume that ellipsis in ATB is also triggered by an [E]-feature, viz. [E]$_{atb}$. While in familiar cases of ellipsis the [E]-feature triggers phonological deletion of the complement of the head on which it is located, I will assume that [E]$_{atb}$ triggers deletion of the constituent on which it is located. This is non-standard but necessary under an ellipsis approach to ATB: if ellipsis were limited to complements of heads, one could no longer explain ATB-head-movement or instances of subject extraction in cases of non-parallel ATB – too much would be deleted if [E]$_{atb}$ were on *say* or *would*:

(8)   Who did [John support __] and [Mary say __ would win]?   Munn (1993: 43)

Just like the [E]-feature in sluicing can only occur on certain C-heads, [E]$_{atb}$ also cannot be freely assigned to any constituent. For reasons that will become clear presently, I propose that it can only be assigned to an element bearing an (unvalued) *u*F (such as the elements undergoing ATB-movement, i.e. operators, XPs with *u*Case, auxiliaries; we will further specify the selectional restrictions below). In most approaches to ellipsis, the [E]-feature is located on the ellipsis licensor (e.g. C in sluicing). In recent work, Aelbrecht (2010: 87ff.; 165ff.) has provided evidence that the ellipsis licensing head and the ellipsis site do not always stand in a head-complement relation to one another. In the following

example involving VP-ellipsis, the complement of the participle *been* is elided while the licensing head is *should*; ellipsis thus applies at a distance (Aelbrecht 2010: 91):

(9)   I hadn't been thinking about that. You **should** have been < [thinking about that]>!

Aelbrecht concludes from this that ellipsis is licensed by means of Agree. She implements this as follows: In addition to selectional features, the [E]-feature bears an uninterpretable feature that corresponds to the category feature of the ellipsis licensor. For VPE as in (9), this would be uT, indicating that it can only be licensed by an element in T. Since the feature to be checked on the [E]-feature is an uninterpretable categorial feature, the corresponding feature on the licensor T must be interpretable. As it is normally assumed that interpretable features do not function as a probe, Aelbrecht (2010) is forced to assume that the directionality of Agree is reversed, i.e. applies bottom up instead of top-down. This may be unusual, but there is by now a sizable body of work suggesting that at least for certain phenomena (like Negative Concord) reversing the directionality of Agree may be fruitful. The fact that T has an interpretable categorial feature has an interesting side effect: it can license ellipsis of multiple ellipsis sites:

(10)   ? Has Ezra been thinking about it? — Well, he could have been <thinking> for the past few days and maybe even be <thinking> right know. (Aelbrecht 2010: 98)

Adapting Aelbrecht's proposal, I take the ellipsis licensor to be & as ATB-mvt is restricted to coordination. [E]$_{atb}$ will thus have an uF that can only be checked with &, viz. u&. Ellipsis occurs once the second conjunct is merged with &. It is restricted by the PIC and thus involves elements on the edge of vP or above. Since & bears an interpretable categorial feature, it can license ellipsis of several constituents as in (10). The following structure shows the operations in the 2nd conjunct of *Which book did John like and Mary dislike?*:[1]

(11)   [$_{\&P}$ &$_{[\&]}$ [$_{TP}$ Mary   <did> [$_{vP}$ <which book$_1$> dislike [which book]$_1$]]]
                               E[[~~u&~~]]   Agree
                                      [E[~~u&~~]]   Agree

Coming back to the selectional restrictions of [E]$_{atb}$: we want to restrict deletion to the elements that undergo ATB-movement. Restricting the assignment of [E]$_{atb}$ to constituents with an uF is too liberal as this would also wrongly include e.g. complementizers with uQ/uWh. Under an Attract-based view it is difficult to single out just the moving elements since the moving property is not encoded on the element that moves but on the attracting probe. We therefore opt for a Greed-based view on movement such that it is an imperfection of the target/goal itself that causes it to move. There are various ways of implementing this, what is needed for our purposes is that the moving element that is equipped with an uF additionally bears some movement diacritic

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[1] Note that since & only c-commands elements in its complement, ellipsis will always target elements in the non-initial conjunct. This implies that the vehicle change effects that we consider crucial for the analysis of the reconstruction facts are limited to the second conjunct, cf. section 3.

(e.g. an EPP-feature), e.g. as described (but rejected) in Boskovic (2007: 619). Lest this discussion take us too far afield, we will simply assume that $[E]_{atb}$ can only be assigned to elements that bear both an uF and a movement diacritic.

I also follow Aelbrecht (2010: 101ff.) with respect to the consequences of ellipsis: Ellipsis applies derivationally and immediately removes the elided constituent from narrow syntax and transfers it to the interfaces. Assuming a single-output syntax, this implies that the elided constituent is inaccessible for any further syntactic operations. As a consequence, the deleted elements do not reach their final landing site. This raises the question of whether uFs on these elements remain unchecked and could cause a crash. There is a sizable body of work that has argued that ellipsis functions as a repair, at least as far as PF is concerned: By eliding a constituent, any feature that may be offensive at PF is elided as well. This line of reasoning has e.g. been applied to the lack of overt V-movement in Pseudogapping (Lasnik 1999) or to the absence of island violations under sluicing (Merchant 2001). Importantly, since ellipsis rescues an otherwise ungrammatical structure, a number of features/constraints have been reinterpreted as PF-sensitive. While in the case of verb movement it may not be all that clear whether the feature that triggers V-movement is LF-sensitive (Lasnik 1999 argues that the lack of V-movement creates an illegitimate PF-object only), things are different in our case: With *wh*-movement it is difficult to argue that the features involved are only PF-sensitive: A *wh*-phase has an uWh that is not legible at the PF-interface (Chomsky 2001), but without valuation it is also not legible at LF. We therefore submit that derivational ellipsis in ATB not only repairs a structure with respect to PF-legibility, but also with respect to LF-legibility. By directly shipping off the constituent to the interfaces any offensive features are removed. While these assumptions may be somewhat non-standard at first sight, it seems to us that this is a natural consequence of a single-output syntax, especially one where both interfaces are periodically accessed as e.g. in Epstein and Seely (2002). In our system, there are thus two mechanisms that prevent illegibility at the interfaces: regular valuation and ellipsis.

2.2 Asymmetric Extraction

After ellipsis in the second conjunct, the first conjunct is merged in the specifier of &:

(12) $[_{\&P} [_{TP}$ John did $[_{VP}$ [which book]$_1$ like [which book]$_1$]]
  & $[_{TP}$ Mary <did> $[_{VP}$ <[which book]$_2$> dislike [which book]$_2$]]]

Then, the structure above & is merged, viz. the C-head. Since the ATB-elements in the non-initial conjunct have been shipped off to the interfaces, they cannot undergo movement; only the ATB-constituents in the first conjunct, viz. *did* and *which book* can, thereby checking their own uFs as well as those of the C-head:

(13) $[_{CP}$[Which book]$_1$ did$_3$ $[_{\&P} [_{TP}$ John did$_3$ $[_{VP}$ [which book]$_1$ like [which book]$_1$]]
  & $[_{TP}$ Mary <did> $[_{VP}$ <[which book]$_2$> dislike [which book]$_2$]]]]?

These instances of asymmetric extraction seem to violate the CSC. As we will see

in the next subsection, this is not the case under a representational definition because the extracted constituents bind variables in the second conjunct at LF.

2.3   PF- and LF-Chains in ATB

The chains in the first conjunct are treated like normal chains in a simple question (we continue using our example *Which book did John like and Mary dislike*): At PF, only the highest copy is realized, the lower copies of *did* and the *wh*-phrase are PF-deleted:

(14) $[_{CP}$[Which book$]_1$ did$_3$ $[_{\&P}$ $[_{TP}$ John ~~did$_3$~~ $[_{VP}$ ~~[which book]$_1$~~ like ~~[which book]$_1$~~]]

At LF the Preference Principle (Chomsky 1995) applies, leading to unrestricted quantification in Spec, CP while the restriction is interpreted in the bottom copy; intermediate copies are deleted. Furthermore, we assume that *did* is interpreted in T:

(15) $[_{CP}$[Which$_x$] $[_{\&P}$ $[_{TP}$ John did $[_{VP}$ like [x book]]] & …

The chains in the second conjunct require more care because they are only partial and are not directly linked to the ATB-constituents. As for PF, the highest copy is marked for deletion anyway (by the [E]-feature), and the lower copies of the *wh*-phrase (and, if applicable, of a moving head) undergo regular PF-deletion (via cyclic spell-out). This means that no link is phonetically realized in the second conjunct:

(16)   … & $[_{TP}$ Mary <did> $[_{VP}$ <[which book]$_2$> dislike ~~[which book]$_2$~~]]]]?

At first sight, this seems to be an instance of irrecoverable deletion, but since the elided constituents have an identical antecedent in the first conjunct (see the next subsection), deletion *is* recoverable.

The case of LF is more complicated: since the operator in the second conjunct does not reach a scope position but remains in an intermediate position, the chain as such is arguably not interpretable. What is even more important is the fact that ATB normally receives a single identity interpretation (Munn 1999): The sentence *Which book did John like and Mary dislike* can be paraphrased as *Which X, a book, is such that John likes it and Mary dislikes it*. Normally, only single answers are possible, suggesting that the same element is extracted from both conjuncts. Technically, this implies that the ATB-constituent not only binds a variable in the first conjunct, but also one in the second conjunct. But since the operator is not linked to the chain in the second conjunct via movement, it is not a priori clear how this should be possible. We submit that it is possible because a) at LF only the lowest copy is retained in the second conjunct and interpreted as a variable and b) the asymmetrically extracted operator is reduced according to the Preference Principle so that it can bind both variables:

(17) $[_{CP}$[Which$_x$] $[_{\&P}$ $[_{TP}$ John did $[_{VP}$ like [x book]]] & $[_{TP}$ Mary   did $[_{VP}$ dislike [x book]]]]]?

Of course, the asymmetrically extracted operator can bind the variable in the second conjunct only if the operator in the second conjunct, which has left this variable behind, has the same index. This follows from the recoverability requirement on ellipsis to be discussed in the next subsection.

We now need to come back to the observation made at the end of the last subsection that asymmetric extraction in ATB seems to violate the CSC. This is correct under a derivational interpretation of the CSC. However, there tends to be a certain consensus that the CSC should rather be interpreted as a representational LF-constraint that requires conjuncts to be identical in semantic type (cf. e.g. Munn 1993). If one conjunct contains a question (and thus a variable) while the other one does not, the CSC is violated (such examples can also be analyzed as cases of vacuous quantification, cf. e.g. Fox 2000: 50):

(18) a. *[Which car]$_1$ did [John sell __$_1$] and [Mary buy the bicycle]?
      b. *[Which car]$_1$ did [John sell the bicycle] and [Mary buy__$_1$]?

In the case of ATB things are different because on our analysis, the extracted operator binds a variable in both conjuncts so that they are identical in semantic type (and no vacuous quantification obtains either). For more cases where asymmetric extraction does not violate the CSC see Ruys (1992: 36f.) and Fox (2000: 52ff.) on asymmetric LF-movement, Salzmann (to appear) on coordinations of relative clauses with resumptives, and Lin (2002: 73ff.) on asymmetric A-movement.

2.4   Recoverability

The fact that ellipsis is licensed in a particular structural environment does not yet guarantee that ellipsis is also grammatical. Ellipsis is only recoverable if it has an identical antecedent. What is meant by 'identical' has been subject to quite some controversy (see Merchant 2001 for an overview). Some approaches are based on identity of meaning and some on identity of structure. What has become clear over the years is that strict syntactic identity cannot be at stake because of the possibility of systematic mismatches between antecedent and ellipsis site, cf. e.g. Merchant (2001). Such mismatches are also found in ATB and will be crucial in the analysis of the reconstruction facts in section three below. What is important in the present context is that the operators in the two conjuncts count as identical. This we take to be the case if they bear the same index (and thus leave behind the same variable). To what extent structural identity is involved will be left open here.[2] We will now discuss a case where recoverability is satisfied, but ellipsis is still not possible. Consider the following pair: (19a) must not be derived from (19b):

(19) a.   Which books about films does John like and Mary hate?
      b.   [Which books about films]$_1$ does [John [__$_1$ like __$_1$]] and
            [Mary [<which> <films> <about> <books>]$_2$ dislike __$_2$]?

If single constituents can be deleted as proposed here, one has to rule out (19b) as a source for (19a). The selectional restrictions on [E]-feature assignment rule out assigning an [E]-feature to *films, about, books* since they do not move. An [E]-feature can only be assigned to *which*. The question that remains is why ellipsis can and in fact has to involve the entire *wh*-phrase and not just the operator, as in the following derivation (we assume that the restriction of the *wh*-phrase in the second conjunct undergoes PF-deletion via cyclic Spell-out as it does not occupy the landing site):

(20)   Which books about films did [J. like] and [M. hate <which> ~~films~~ ~~about books~~]?

Note that at LF such a structure would arguably be well-formed:

(21)   Which$_x$ J. did like [x, books about films] and M. did hate [x, films about books]?

Since the *wh*-operator has an identical antecedent, ellipsis is licensed and since the ATB-ed operator binds both variables, no CSC violation obtains. Consequently, derivation (20) and LF (21) should be possible for (19a), contrary to fact. Furtunately, derivation (20) can be independently ruled out: since [E]$_{atb}$ with its *u&* is assigned to the head just like any other *u*F (e.g. *u*Wh), it is expected to behave like those *u*Fs. In the case of *wh*-movement (but also in A-relations involving *u*Case), it is often assumed that the *u*Wh feature is visible on the maximal projection. This is a way of accounting for intervention effects (e.g. superiority) and pied-piping. If *u*Fs are visible on the maximal projection, and since [E]$_{atb}$ bears an *u*F, we expect the same to hold for it as well. I will not discuss the possible mechanisms that ensure that the features are visible on the maximal projection as this is orthogonal to the goals pursued here. All that is relevant is that [E]$_{atb}$ with its *u&* behaves like a regular *u*F with respect to visibility on higher projections. This ensures that (20) is not possible: Since [E]$_{atb}$ is visible on the maximal projection of the *wh*-phrase, the entire XP will be elided. Recoverability requires an identical antecedent, but there is none in (20). Note that deletion of heads like *did* implies that in that case the relevant movement-triggering *u*F is not visible on the maximal projection. If it were, the entire TP would be attracted and deleted, contrary to fact. This raises a number of intricate questions, especially concerning the status of head movement in Minimalism, but for our purposes, it is sufficient that [E]$_{atb}$ behaves like regular *u*Fs. A concrete proposal that works for us is the reprojection mechanism adopted in Georgi and Müller (2010) where the *u*F triggering reprojective head-movement is not visible on higher projections

2.5   A Constraint on [E]-Feature Valuation

There is one gap in our analysis we need to address: it seems to allow deletion without ATB, i.e., without asymmetric extraction and binding into the second conjunct. The following a-example does not have the b-interpretation, but given the structure in c, it seems that our approach allows the a-example to be derived from c with the meaning in b:

(22)   a.   What did Peter read and Mary write? ≠
          b.   What did Peter read and   What did Mary write?
          c.   [$_{CP}$ What did Peter read] and [$_{CP}$ <What> <did> Mary write]?

& c-commands the deleted elements, there are identical antecedents in the first conjunct for them and the chains also seem to be well-formed. Consequently, ellipsis should be licensed. These structures differ from those we have discussed so far in that the moving elements have reached their final landing sites. In other words, abstracting away from the [E]-feature, they have no unvalued features left and thus are no longer visible for syntactic operations. I therefore postulate a condition which states that the [E]-feature (with its subfeature $u\&$) can no longer be valued/checked if the constituent on which it is located does not have any unvalued uFs left:

(23)   Constraint on [E]$_{atb}$-checking
        [E]$_{atb}$ on X can only enter Agree operations if X has an unchecked/unvalued uF.

The intuition behind the condition is that the [E]-feature, which is parasitic on other uFs, is trapped once they are all valued. The effects of the condition follow independently under a strongly derivational model as in Epstein and Seely (2002) where spell-out applies after each derivational step. Given that all uFs (apart from $u\&$ on [E]$_{atb}$) are valued in the derivation (22c), the constituent is transferred to the interfaces; since $u\&$ on [E]$_{atb}$ remains unchecked, a crash ensues. The grammatical derivation for (22) instead involves ATB-movement: there is TP-coordination so that the moving elements do not reach their final landing site in the second conjunct and can be elided.

3.   Accounting for the Reconstruction Facts

The symmetrical reconstruction facts in (1)–(4) are expected under the present account: as shown in (17), there is an instance of the ATB-ed constituent in each conjunct and because of the recoverability requirement on ellipsis, the operators, and thus the traces, will bear the same index. For a symmetrical case like (3), the LFs will be as follows:

(24)   a.   [Which$_x$] [John did *take* [x picture]] and [Bill did pose for [x picture]]?
        b.   [Which$_x$] [John did pose for [x picture]] and [Bill did *take* [x picture]]?

The variable binding (2) and scope case (4) work essentially the same, SCO (1) will be addressed in 3.3. What is unexpected, though, given (17), is the lack of reconstruction into the second conjunct in (5)–(7).

3.1   Principle C

Recall that reconstruction for Principle C apparently only affects the first conjunct:

(25)   a.   *[Which picture of John$_i$] did [he$_i$ like __] and [Mary dislike __]?
        b.   [Which picture of John$_i$] did [Mary like __] and [he$_i$ dislike __]?

The absence of Condition C effects with *wh*-movement is surprising, given that they normally obtain in regular *wh*-movement (if the R-expression is contained in an argument

and certain additional factors are controlled for, cf. Salzmann 2006 for detailed discussion). The second conjunct thus behaves more like relativization where Condition C effects are often taken to be absent (cf. Salzmann 2006 for detailed discussion):

(26)   the picture of John$_i$ that he$_i$ likes best

In fact, the parallel is even stronger in that in both cases Principle C effects re-emerge with idiomatic expressions:

(27)   a.   * Which picture of John$_i$ did Susi arrange and he$_i$ take?
         b.   * the picture of John$_i$ that he$_i$ took

In Salzmann (2006) I explained the relativization facts with the Matching Analysis, where the external head and the relative operator are related to each other via ellipsis. The operator phrase thus contains an instance of the external head:

(28)   the [book]$_j$ [$_{CP}$ [Op [<book>]$_j$]$_1$ that Peter likes best __$_1$]

Despite the recoverability requirement, ellipsis operations have been shown to tolerate certain mismatches between antecedent and ellipsis site. Fiengo & May (1994: 218ff.) have argued in favor of an operation vehicle change that makes minimal adjustments to nominals in the ellipsis site. For instance, an R-expression in the antecedent can correspond to a pronoun in the ellipsis site:

(29)   Mary loves John$_i$, and he$_i$ thinks Sally does too <love him$_i$>.

I will not adopt an explicit operation "vehicle change"; instead, I will assume that these minimal mismatches are already present in syntax and are licensed by a semantic identity condition on ellipsis (Merchant 2001). The mismatch between the nominals is licensed if they refer to the same individual. I will therefore refer to such asymmetries as "vehicle change effects". Importantly, since ellipsis is involved in the formation of relatives, vehicle change effects obtain: The R-expression inside the external head corresponds to a pronoun in the copy inside the relative clause:

(30)   the [picture of Peter$_i$]$_j$, [$_{CP}$ [Op [~~picture of him$_i$~~]$_j$]$_1$ that he$_i$ likes
         [x picture of him$_i$]$_1$ best]

Since coreferential pronouns within picture NPs are possible (see Salzmann 2006 for details), the relative in (30) is parallel to the following simple sentence:

(31)   He$_i$ likes [that picture of him$_i$] best.

The mismatch in (30) thus prevents a Condition C violation. In the idiomatic case (27b) the Principle C effect emerges because of a coreferential implicit PRO:

(32) * the [PRO$_i$ picture of Peter$_i$] [$_{CP}$ [Op [~~PRO$_i$ picture of him$_i$~~]]$_1$ that he$_i$
took [x [PRO$_i$ picture of him$_i$]]$_1$]   (Salzmann 2006: 134ff.)

Vehicle change effects are not sufficient because the Binding Theory violation obtains within the picture NP: Even if the external head is LF-deleted (cf. Salzmann 2006: 126-139), there will still be a Principle B violation within the relative clause. Reconstruction is necessary to control the PRO (Salzmann 2006: 59f.) so that the violation really is due to the lower copy within the relative clause. As the following sentence shows, coreferential pronouns inside idiomatic picture NPs are ungrammatical:

(33) * He$_i$ took a [PRO$_i$ picture of him$_i$].

The ATB facts in (6)/(25) follow straightforwardly under the current analysis: An R-expression in the first conjunct, i.e. the antecedent, can correspond to a coreferential pronoun in the second conjunct, i.e. in the ellipsis site:

(34)   a.   [$_{CP}$ [Op NP] C [$_{\&P}$ [$_{XP}$ [Op NP]] & [$_{XP}$ <[Op NP]>]]]
        b.   [$_{CP}$ [Op picture of Peter] C
                [$_{\&P}$ [$_{XP}$ [Op picture of Peter]] & [$_{XP}$ <[Op picture of him]>]]]

Since the first conjunct contains a full copy of the *wh*-phrase, reconstruction leads to a Principle C violation. The LF for (6a)/(25a) looks as follows:

(35)   [$_{CP}$ [Which ~~picture of John$_i$~~]$_1$ did he$_i$ like [x picture of John$_i$]$_1$ & …

Ellipsis + vehicle change, however, void the Condition C effect in the second conjunct. This is the LF for (6b)/(25b):

(36)   [$_{CP}$ [Which ~~picture of John$_i$~~]$_1$ ~~did$_2$~~ [$_{\&P}$ [$_{TP}$ Mary did$_2$ [$_{vP}$ [~~which picture of John$_i$~~]$_1$
like [x picture of John$_i$]$_1$]] and [$_{TP}$ **he$_i$** <did$_4$> [$_{vP}$ <[~~which picture of him$_i$~~]$_3$>
dislike [x picture of **him$_i$**]$_3$]]]]?

The mismatch between an R-expression and a pronoun is allowed because identity is determined semantically, *picture of John* counts as identical to *picture of him* (as long as *him* and *John* refer to the same individual). With idiomatic expressions like (27a) the mismatch is insufficient because of the implicit PRO (note that PRO is only found in the second conjunct, another mismatch licensed under ellipsis):

(37) * [$_{CP}$ [Which ~~picture of John$_i$~~]$_1$ ~~did$_2$~~ [$_{\&P}$ [$_{TP}$ Susi did$_2$ [$_{vP}$ [~~which picture of John$_i$~~]$_1$
arrange [x picture of John$_i$]$_1$]] & [$_{TP}$ **he$_i$** <did$_4$> [$_{vP}$<[~~which PRO$_i$ picture of
him$_i$~~]$_3$> take [x PRO$_i$ picture of **him$_i$**]$_3$]]]]?

There is additional evidence for ellipsis: Condition C effects with idiomatic expressions vanish under embedding in relatives (Salzmann 2006: 134):

(38)   the [picture of Peter$_i$] that he$_i$ thinks that Mary took __

      Such cases do not involve implicit PROs (Salzmann 2006: 88ff.) so that vehicle change effects can rescue the example (with *Peter* corresponding to *him*). Crucially, the same can be observed in ATB *wh*-movement. Consider the contrast with (27a):

(39)   [Which picture of Al$_i$] [did S. arrange __] and [does he$_i$ think that you took __]?

      The idiomatic facts are parallel to data discussed in Ha (2008: 264ff.) where reconstruction for Principle C seems to be symmetrical:

(40)   a.   *President Bush$_i$, every Democrat criticizes __, but he$_i$ admires __.
         b.   *President Bush$_i$, he$_i$ admires __, but every Democrat criticizes __.

      Such examples unambiguously show that there is an instance of the ATB-ed constituent in the second conjunct. They rule out alternative explanations of the alleviation of Condition C effects in ATB based on different types of binding conditions (cf. Salzmann 2006: 126ff.): While variable binding is a positive condition and thus would force reconstruction, Condition C as a negative condition does not. On the approach pursued here, the facts follow: Even if ellipsis licenses a mismatch between an R-expression in the antecedent and a pronoun in the second conjunct, there will still be a Principle B violation in (40a) since the pronoun is locally c-commanded by *he*, i.e. the second conjunct will correspond to *he$_i$ admires him$_i$*. Crucially, if we add a level of embedding, the example improves to full grammaticality:

(41)   President Bush$_i$, every Democrat criticizes __, but he$_i$ thinks that every member
         of congress should admire __.

      The second conjunct now corresponds to *he$_i$ thinks that every member of congress should admire him$_i$* and is correctly predicted to be grammatical. This concludes the discussion of the (absence of) Condition C effects in the second conjunct.

3.2   Principle A

Recall that reconstruction for Principle A also seems to target only the first conjunct:

(42)   a.   [Which pictures of himself$_i$] did [John$_i$ buy __] and [Mary paint __]?
         b.   * [Which pictures of herself$_i$] did [John buy __] and [Mary$_i$ paint __]?

      The reconstruction pattern in the first conjunct is unsurprising since we have been assuming that there is always a full copy of the extracted constituent in the first conjunct. In (42a) *John* is a proper binder while in (42b) it is not. Consequently, (42b) does not show that there is no reconstruction into the second conjunct, the example is ungrammatical for independent reasons. What is more interesting is the pattern in the second conjunct. I would like to argue that vehicle change effects are again crucial. Consider the mismatch noticed by Fiengo & May (1994: 206ff.) in VP-ellipsis:

(43)   John$_i$ believes himself$_i$ to be heroic, and he$_i$ said that Mary does, too <believe **him$_i$** to be heroic>.

The possibility that *him* counts as identical to *himself* accounts for (42a), the second conjunct now contains the copy *picture of him*, and *Mary painted a picture of him* is, of course, well-formed. (42b) is unrescuable even if it contains a full copy of the ATB-ed constituent in the second conjunct since the reflexive remains unbound in the first conjunct where vehicle change is not available. Anaphor binding in German provides additional evidence for ellipsis: Here, the anaphor is invariant *sich*. Crucially, reconstruction is possible into both conjuncts:

(44)   [Welches Gerücht über sich$_{i/j}$] hat [Ulf$_i$__ gehört], aber [Susi$_j$__ ignoriert]?
        which   rumor   about self   has Ulf   heard   but Susi   ignored

The sentence thus allows for both strict identity, i.e. Susi heard rumors about Ulf, and sloppy identity, i.e. Susi heard rumors about herself. In the strict reading, the copy in the second conjunct contains a pronoun as in (42a), *Gerücht über ihn* 'rumor about him', another vehicle change effect. In the sloppy reading, the reflexive has a different index. Given that sloppy readings are a hallmark of ellipsis, the data in (44) provide additional evidence for an ellipsis approach.

3.3   Why Symmetrical Strong Crossover Effects?

Recall from above that we find symmetrical SCO effects in ATB:

(45)   a.   * [Whose$_i$ mother] did [we talk to __] and [he$_i$ never visit __]?
        b.   * [Whose$_i$ mother] did [he$_i$ never visit __] and [we talk to __]?

This seems surprising given that SCO is often subsumed under Principle C and such effects are absent in the second conjunct. Furthermore, it has been shown that a variable can correspond to a pronoun in the ellipsis site (Merchant 2001: 206):

(46)   Which suspect$_i$ did Abby call __$_i$ and when <did she call **him$_i$**>?

If the trace of the operator phrase *whose mother* could correspond to something like *his mother* we would expect an alleviation of the SCO effects in the second conjunct, contrary to fact. Given the derivational implementation of ellipsis here, the difference w.r.t. sluicing finds an easy explanation: In ATB, it is the operator itself that undergoes ellipsis, not its trace. Schematically:

(47)   a.   Op$_2$ [Op$_2$ ... __$_2$] and [<Op$_1$> ... __$_1$]   ATB
        b.   Op$_i$ ... __$_i$ and ...< it$_i$ >   sluicing

Since in ATB vehicle change effects are tied to the ellipsis operation that targets elements on the edge of vP, they can only affect the operator in Spec, vP, but not its copy in the argument position, which is responsible for the SCO effects. To avoid an SCO effect, there would have to be a pronoun instead of an operator from the beginning; but an ellipsis operation between an operator and a pronoun would violate recoverability. Consequently, the only possibility is that there is an operator that moves to Spec, vP and leaves behind a full copy of itself, leading to an SCO effect:

(48) Op_i … he_i visits [the mother of x_i]

This distinction also explains the grammaticality of the following ATB-example with VP-ellipsis where at first sight it seems that the operator undergoes vehicle change (Fiengo & May 1994: 226):

(49) Who_i did Mary see __, and does he_i think Sally did, too <see him_i> ?

Again, what is different here is that the trace position is part of the ellipsis so that vehicle change effects become possible. In ATB without VP-ellipsis, however, the trace, which is responsible for the SCO effect, is unaffected by ellipsis and therefore cannot show vehicle change effects. Consequently, the equivalent of (49) without VP-ellipsis is correctly predicted to be ungrammatical:[3]

(50)   a.   *Who_i [did Mary see __] but [does he_i think that only Sally saw __]?
         b.   *Op_i [did Mary see [x_i]] but [does he_i think that only Sally saw [x_i]]?

4.   Conclusion

We have argued for a new approach to ATB involving asymmetric extraction from the first conjunct and an ellipsis operation that links the operator in the second conjunct with that in the first. The evidence comes from an intricate reconstruction pattern that shows consistent reconstruction into the first conjunct, but only partial reconstruction into the second conjunct. In the latter case, apparent non-reconstruction is the result of mismatches that are generally tolerated under ellipsis, viz. vehicle change effects.

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[3] I will have nothing to say about the Weak Crossover facts in (7). Ha (2008: 267) notes that similar WCO contrasts obtain in non-ATB contexts. If the pronoun occurs in the matrix clause, the effects are much stronger than when it occurs in the subordinate clause:
i) ?$Which employee_i$ did Mary think that his_i boss would fire __ next week?
ii)*$Which man_i$ did his_i boss think that Mary would love __ very much?
This suggests that the WCO facts in ATB-contexts may require a different explanation altogether.

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