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Briefs

Reconstruction and the New Minimalism

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Abstract

In this brief note, I discuss a problem that arises within the theoretical framework for natural language syntax based on Hopf algebra (Marcolli et al., 2025). The framework does not capture reconstruction effects that are the main empirical motivation for the copy theory of movement, and a cornerstone of minimalist syntax.

Keywords

reconstruction, internal Merge, copies, No Tampering Condition

1 Introduction

Marcolli et al. (2025, henceforth MCB2025) introduce what they call the 'New Minimalism', which is a framework for syntactic analysis based on Hopf algebra (developed in part on the basis of the framework presented in Chomsky et al., 2023). The terminology 'New Minimalism' is meant to draw a contrast between the framework of MCB2025, and Stabler's (2010) 'computational minimalism' which has quite different syntactic properties. In contrast to the 'Old Minimalism', the 'New Minimalism' has the following two properties (see page 8 for discussion):

(1) a. Trees are non-planar (terminals are not ordered).
b. The existence of workspaces.

These are also core properties of the framework worked out in Collins and Stabler (2016), the standard formalization of minimalist syntax. As noted in MCB2025, p. 187,

the formalization of workspace that they adopt comes from Collins and Stabler (2016, reference [44] in the quote below):

(2) "In New Minimalism, Merge acts on workspaces, consisting of material (lexical items and syntactic objects) available for computation. The Merge operation updates the workspace for the next step of structure formation. This notion of workspace is formalized in [44]."

As a result, we can ask whether there are any empirical differences between the formalization in Collins and Stabler (2016) and MCB2025. In the remainder of this note, I will show how MCB2025 is unable to account for reconstruction effects, because the derivations violate the No Tampering Condition, which is not violated in the framework of Collins and Stabler (2016).

2 Internal Merge in the New Minimalism

Suppose that in a tree T, β undergoes internal Merge to the root of T. Internal Merge is implemented by MCB2025 in the following way. Starting with a tree T in a workspace W, T is replaced in the workspace by a constituent β and the contraction quotient $T/^{c}\beta$, then those two are externally Merged (p. 50). The sequence of steps is shown below:

(3)

a.	{T}	T in workspace
b.	{β, $T/^{c}\beta$}	β and $T/^{c}\beta$ in workspace
c.	{{β, $T/^{c}\beta$}}	{β, $T/^{c}\beta$} in workspace

The contraction quotient is defined as follows:

(4) "The usual way of defining the quotient of T by T_v … is to contract (shrink) the entire tree T_v to a single vertex, so the root of T_v becomes a leaf." (p. 30)

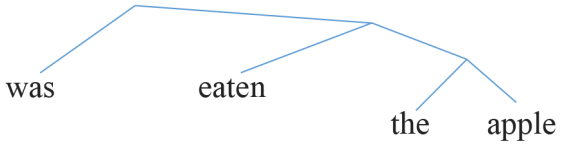
MCB2025 (p. 53) remark that "..the quotient notation $T/^{c}T_2$ reminds us that T_2 is a copy, and it is the deeper copy that gets deleted." Furthermore, the resulting leaf has the label ~~Tv~~ (called 'the trace of T_v').

MCB2025 states clearly that the contraction quotient is the form that "goes to the Conceptual-Intentional (semantic) interface for interpretation…" (p. 33).

(5) "…$T/^{c}T_v$ with the explicit remaining leaf with label T_v represents the form that the Conceptual-Intentional interface receives for interpretation…" (p. 82)

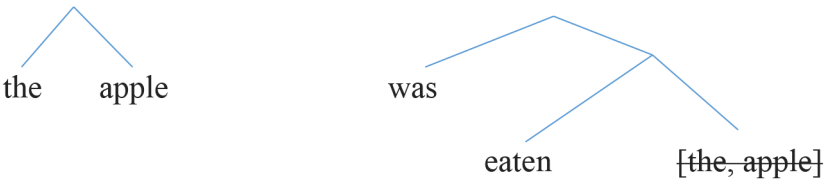
An example from MCB2025 (pp. 52–53) illustrates the derivation of the passive sentence 'The apple was eaten.'. First, the workspace contains the following tree:

(6)



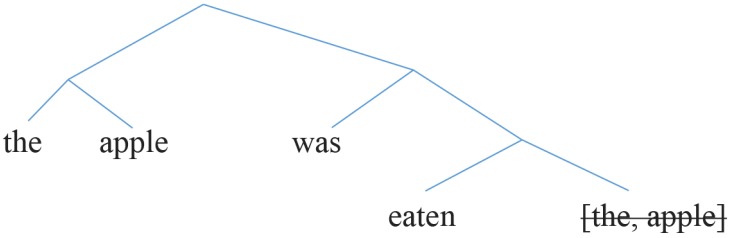
This tree is replaced in the workspace by the constituent {the, apple} and the contraction quotient of T/^{c}{the, apple}, forming the workspace in (7).

(7)



Lastly, these two syntactic objects are externally merged, forming the tree in (8).

(8)



3 Reconstruction

Principle A of the Binding Theory determines the relation between an anaphor and its antecedent. It is stated below (see Sportiche et al., 2014, Chapter 7, amongst many other sources):

(9) Principle A: An anaphor must be bound in its local domain.

In this definition A binds B if A and B are co-indexed, and A c-commands B. The definition of c-command is as follows:

(10) A c-commands B iff (a) A and B are sisters, or (b) the sister of A dominates B.

For example, in the following sentence the subject c-commands and binds the reflexive, which satisfies Principle A of the Binding Theory.

(11) John$_1$ loves pictures of himself$_1$.

But now consider the following movement structures:

(12) a. Pictures of himself, John loves.
b. Only pictures of himself does John love.
c. It is pictures of himself that John loves.
d. Which pictures of himself does John love?
e. the pictures of himself that John loves

In all cases, the antecedent of the reflexive pronoun is *John*, but *John* does not c-command the reflexive pronoun. So the acceptability of the sentences in (12) poses a problem for Principle A. The acceptability of the sentences in (12) is referred to as a reconstruction effect, because as far as the Binding Theory goes, it is as if the *DP pictures of himself* has been put back (reconstructed into) in its theta-position, as in (11).

In minimalist syntax, such examples are analyzed in terms of the copy theory of movement (see Chomsky, 1995). For example, the structure of (12a) is:

(13) Pictures of himself, John loves <pictures of himself>

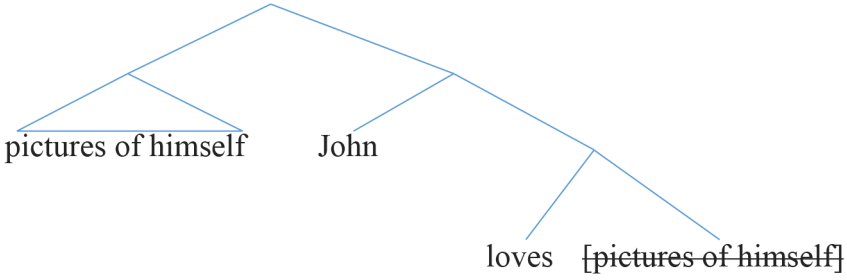
In this structure, the DP *pictures of himself* occupies two different positions via internal Merge. It is externally merged as the complement of *love*, and then undergoes internal Merge to the specifier of FocP (in the left periphery). We say that *pictures of himself* has two copies or two occurrences in (13). Since the anaphor (in one of the occurrences of the moved DP) is bound by *John*, it counts as satisfying Principle A of the Binding Theory.

There are many different kinds of reconstruction effects. There are reconstruction effects for Principles A, B, C. There are also scope reconstruction effects, where a quantifier phrase that has undergone A-movement is interpreted in a position lower than its visible surface position. It is safe to say that reconstruction is one of the empirical cornerstones of minimalist syntax, which provides an elegant theoretical account of a large range of data. For more discussion of reconstruction, see Barss (2001), Fox (2003), and Sportiche (2017).

4 No Hopf for Reconstruction

Combining the results from the last two sections, we see that in the Hopf algebra framework of MCB2025, the partial structure of the sentence in (12a) will be as follows (suppressing many irrelevant details):

(14)



In this example, there is only a vertex (node) in the place of *pictures of himself*, and that vertex is labeled [~~pictures of himself~~]. Therefore, in this structure *John* no longer c-commands the anaphor.

It might be proposed that *John* c-commands *himself*, because the anaphor is part of the label. But labels play no role in the definition of c-command, which only refers to the relationship between syntactic objects in a tree. In effect, as part of the label, *himself* is no longer accessible for any syntactic operation or condition, including Binding Theory. Under the implementation of internal Merge in MCB2025, no reconstruction effect can be accounted for in terms of the copy theory of movement.

As another example, consider the classical case of quantifier scope reconstruction (McCloskey, 1997, p. 207; see also Sportiche, 2017, p. 18):

(15) Every player didn't score.

Perhaps the most accessible interpretation of this sentence is that it is not the case that every play scored, with the negation taking scope over the universal quantifier. McCloskey notes: "It is, in turn, a well-known property of the relation established by A-Movement that the moved nominal phrase may make its semantic contribution either at the head or at the tail of the A-Chain so formed…" (p. 207).

On the copy theory of movement, the syntactic structure formed is:

(16) Every player didn't <every player> score.

The quantifier phrase is interpreted at the LF (Conceptual Intentional) interface in its in-situ position (Spec vP). At the PF (Sensorimotor) interface, the quantifier phrase is

spelled-out overtly in in Spec TP. It is not easy to see how this explanation would go through in the approach of MCB2025, since at the LF interface, nothing except a labeled vertex (which is not an actual quantifier phrase) remains under negation.

About reconstruction MCB2025, p. 206 offers the following comment:

(17) "The intermediate construction $T/^{P}T_{v}$ maintains an unlabeled nonbranching vertex marking the cancellation of the deeper copy T_{v}. This provides so-called *trace*s, the empty categories left behind by movement implemented by Internal Merge. As is familiar from the long historical discussion of what is called "reconstruction", such traces are needed for semantic parsing."

The quote notes that an unlabeled nonbranching vertex provides an empty category left behind by movement. Because this vertex lacks syntactic structure, it cannot host a reflexive pronoun such as *himself*. Therefore, it is geometrically impossible for an antecedent to bind the reflexive, as required by Principle A.

One of the main theoretical innovations of minimalist syntax (see Chomsky, 1995) has been to replace such traces by copies (occurrences), which then play a role in accounting for reconstruction phenomena (such as the examples discussed above).

It remains to be seen whether all reconstruction phenomena pose similar problems for MCB2025 (for a summary of such effects see Sportiche, 2017).

5 No Tampering Condition

As noted in Chomsky (2005, p. 13), there is close connection between internal Merge, the copy theory of movement, the No Tampering Condition and reconstruction effects. Some of this is discussed in the quote below:

(18) "The no-tampering condition also entails the so-called copy theory of movement, which leaves unmodified the objects to which it applies, forming an extended object…Neither indexing nor the notion of traces is required if we adopt the simplest assumptions: the copy theory. An important additional gain is that rules of reconstruction can be eliminated, and the phenomena can be accounted for more effectively, as has been shown in a great deal of recent work."

The No Tampering Condition is defined by Chomsky (2007, p. 8) below:

(19) "Suppose X and Y are merged. Evidently, efficient computation will leave X and Y unchanged (the No-Tampering Condition [NTC]). We therefore assume that NTC holds unless empirical evidence requires a departure from SMT [strong minimalist thesis] in this regard, hence increasing the complexity of UG. Accordingly, we can take Merge(X, Y) = {X,Y}."

Here is the argument laid out in more detail:

(20) a. If X dominates Y, Internal Merge creates the structure {X, Y}.
b. By the NTC, neither X nor Y have been modified.
c. Therefore, there are two occurrences ("copies") of Y.
d. As a result, there are no "traces" (empty elements) created by Internal Merge.
e. The lower copy of Y plays a key role in explaining reconstruction effects.

From this point of view, the reason that the implementation of internal Merge of MCB2025 presented in Section 2 above does not work is that it involves massive violations of the No Tampering Condition. In particular, the formation of the contraction quotient tampers with one of the two objects that are being merged together. This violation of the No Tampering Condition gives rise to the failure to account for reconstruction effects in terms of the copy theory of movement.

6 Conclusion

In this short note, I have shown how the Hopf algebra framework presented in MCB2025 involves massive violations of the No Tampering Condition, and as a result is incapable of accounting for reconstruction effects in terms of the copy theory of movement.

In comparison, the formalization in Collins and Stabler (2016) does not involve violations of the No Tampering Condition. In fact, Collins and Stabler (2016) state that the No Tampering Condition is a theorem of their system.

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