Compositionality, copy theory, and control[*]

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Abstract

Our ultimate concern is the mapping between representations in the Language of Thought (in the sense of Fodor 1975) and representations at LF in some version of the Minimalist Program (Chomsky 1995). We argue on a variety of grounds that such a mapping is direct and that both these levels of representation must meet the (same) condition of compositionality. We argue that Copy theory, in particular in the version exploited for 'control' phenomena by Hornstein (1999), is inimical to any such condition and must therefore be rejected. The evidence comes from the properties of quantified NPs in English and the Caucasian language Tsez. Specifically we suggest a reanalysis of 'backward control' in Tsez, as described by Polinsky & Potsdam (2001, 2002), thereby removing a major argument for copy theory. Our analysis does not however preclude an assimilation of canonical control to raising, and we provide an alternative to a Hornstein style analysis, giving some justification for the exploitation of the combinator R in Combinatorial Categorial Grammar.

1 Compositionality

Compositionality is the claim that the meaning of the whole is a function of the meaning of its parts; presumably a systematic and principled function of the meaning of the parts. The parts are standardly taken to be the syntactic elements of some representation, and meaning is then necessarily derived on a rule-to-rule basis.

It is frequently assumed that compositionality can apply only to a representation where truth conditions are applicable, and that this must be a pragmatic, post-syntactic level, since there is so much underdetermination in a linguistic representation *vis-à-vis* any representation of its meaning in context (its 'explicature' in the sense of Relevance Theory (Sperber & Wilson 1995. See in particular Carston 2002). Some of this underdetermination can be ascribed to the interpretation required of particular lexical items occurring in an utterance: examples are 'loose use', various strengthenings, and reference assignment to proper names. Other instances of

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underdetermination are syntactically motivated: for instance, the provision of appropriate arguments for entities such as *too* in *The problem is too hard*. Not all aspects of traditional theories of meaning are relevant for compositionality, however. The precise content of that part of the model (in the Montague-semantics sense) that gives the meanings of lexical items relative to the worlds is irrelevant to compositionality; and even the meaning of an ellipsed phrase, which must be recovered by the hearer, is irrelevant, since compositionality will hold with respect to whatever meaning it has ascribed to it in the utterance, provided only that it does have a meaning.

We assume that the explicature is a representation in the 'Language of Thought' (LoT) (Fodor 1975). This language has a syntax and a semantics: its wff can be generated by rule. It is clear that the relation between the LF and the LoT representation (LoTF – for 'Language of Thought Form', parallel to LF for 'Logical Form') for a particular utterance is not random, but must be constrained. It is also reasonably clear that Natural Language cannot allow very much language particular variation in the syntax of LF, if any. Given these two facts, the default assumption is that LF and LoT share the same syntax. It follows that in pragmatically simple cases, the LoTF should be a direct ('word for word') translation of LF. LF then will have a compositional semantics just like that of LoT. We argue in general that Copy Theory is intrinsically inimical to such a direct relation and, in particular, that Hornstein's (1999) use of it is incompatible with a simple view of the relation between LF and LoT. There is a sense in which what we are doing is making an attempt to extend 'the narrow study of mechanisms' (Chomsky 1995:227) to the relation between the syntax of NL and representations in the central system.

In the Minimalist Program framework, the only representations that contribute to interpretation are those reaching the Interfaces, i.e. PF, at the Articulatory/Perceptual (A-P) interface, and LF, at the Conceptual/Intentional (C-I) interface. These two are not linked directly, but only indirectly in that representations interpretable at both are derived from a Spell-Out (S-O) representation, which is itself generated by Merge and Move, where Move includes the Copy Theory. One of the usual properties of S–O, then, is that it includes MULTIPLE copies of items which are interpreted at the Interface levels only ONCE.[1] It seems reasonable to hope that a better version of S-O might avoid the postulation of multiple copies or any equivalent. In contrast, any evidence that these copies actually exist would militate against this wish being fulfilled.

[1] If it is assumed that LoT requires a format where quantifiers are associated with variables, then the 'crossed through' copies may independently require interpretation, e.g. as variables.

Our worry about copy theory can be illustrated by a consideration of Hornstein's theory of control as it applies to quantified noun phrases. In a Hornstein account of (1), theta roles are features on verbs, and accrue to the noun-phrase as it is successively merged with verbal phrases bearing θ-features which can be checked (Hornstein 1999: 78, (18)); (1 a, b) below is Hornstein's (19a, b).

(1) a. John hopes to leave

b. [$_{IP}$ John [$_{VP}$ John [hopes [$_{IP}$ John to [$_{VP}$ John leave]]]]]

In the discussion of this example, Hornstein writes 'Thus *John* (or the chain it heads) has two θ-roles, the leaver role and the hoper role', and 'The semantic form of the predication in (19) is equivalent to (21), ...' where his (21) is our (2):

(2) John λ*x* [*x* hopes *x* leaves]

Hornstein is clear that it is such forms that are semantically required: 'Movement then semantically forms a compound monadic predicate having one and the same expression satisfy two argument positions'. What is not made clear is the relation between the required semantics and the syntax of forms such as that in (1b). Consider in this regard sentences of the kind in (3), with partial representations as in (4) (irrelevant detail omitted). We concentrate on the relation between S-O, LF, and the initial LoT representation, LoTF;[2] we believe that the question of PF is relatively independent of this, and can be considered separately. We take the 'crossed through' forms in (4) b and d to be the PF and LF representations, which are 'interpreted' at the interfaces; that is, the interfaces act as transducers, translating one representation

[2] We assume that the output of the narrow syntax, an LF representation, is successively converted by a variety of pragmatic processes to representations in the LoT; the one closest to syntax is LoTF, and the final one depending directly on the utterance is the explicature of the utterance.

automatically into another: in other words they do not constitute levels of representation in their own right.[3]

(3) Every boy tried to win

[3] Chomsky (1995: 203) takes forms like (4e) to be produced by 'the LF component' from the S-O representation. Note that from one S-O representation, more than one LF interpretation may be derived (ibid: 203). This arises from operations like QR, and the possibility of partial reconstruction for *wh* questions. This suggests that something is wrong, since the MP is inimical to optionality. The obvious remedy would be to take the S-O representation as the input to the transducer, and to treat it either as a radically underdetermined representation to be manipulated by the Pragmatic system, or to allow the C-I transducer to output all possible LoT representations compatible with the S-O representation, for the Pragmatic system to choose between.

(4) a. Every boy [T [$_{VP}$ every boy [tried [every boy [to [$_{VP}$ every boy win]]]]] **S-O**

b. Every boy [T [~~every boy~~ [tried [~~every boy~~ [to [~~every boy~~ win]]]]] **PF**

c. *Every boy tried to win* **PF interpretation**

d. Every boy [T [$_{VP}$ ~~every boy~~ [tried [~~every boy~~ [to [$_{VP}$ ~~every boy~~ win]]]]] **LF**

e. EVERY BOY λ*x* [PAST [$_{VP}$ [*x* TRY [TO [$_{VP}$ *x* WIN]]]]]] **LF interpretation (LoTF)**

Suppose we are building the structure from the bottom up. In the representation (4), at Spell Out and at LF, the embedded VP [*every boy win*] appears to have a proper meaning. Crucially however, this meaning is not one that enters into the meaning of the whole: the meaning of (3) is not equivalent to (5):

(5) Every boy tried (to make it true that) [every boy win]

It follows that, for (4), we do not want the noun phrase 'every boy' to obtain the theta role assigned externally by 'win'. Rather, we need to construe the embedded subject in (4) as a variable BEFORE it is assigned its theta role. Contrary to the informal exposition of Hornstein (1999) for (1), there is no equivalence between what appears to be the meaning of the predicate and what is required in LoTF. That is, theta role construal needs to take place at some level subsequent to movement and chain construal, the level we refer to as LoTF. The crucial issue is then whether the non-compositionality at Spell Out in (4) matters.

There are two reasons to suppose that it does. First, as argued in Cormack (1989, 1999), phrases such as those in (6), each of which by older analyses contained an anaphor or np-trace, are manifestly interpretable in isolation, not just as parts of a larger vP.

(6) a. [trying to win]

b. [seeming isolated],

c. [pursued by the Furies]

d. [proud of himself]

Analyses like that offered in (4) can give no interpretation to these phrases, since there is no argument chain to licence the 'crossed through' item and its subsequent interpretation as a variable. Conversely, an analysis that can give a meaning to such phrases cannot include a copied argument in the embedded subject position in (6a). It is not sufficient that the VP or vP is sent from Spell-Out to the interfaces at the next higher phase if there IS no next phase. The absence of any copy of an argument is consistent with the fact that in the LoTF (4e), the argument EVERY BOY is only required once, wholly externally to the matrix VP. In fact, this constitutes an argument against any version of Copy Theory requiring the argument to be merged in a lower theta position of a chain. The only viable copy theory would be one where what is merged, copied, and then interpreted, is the lambda operator. As we show below, this would not be compatible with the Tsez data under a Hornstein-style version of Control.

Second, it seems reasonably clear that all of acquisition, production and parsing will be facilitated if NL is compositional. Any deviation from compositionality should be looked at with suspicion (though not necessarily rejected). Consider the compositionality of the Spell Out representation and LF from the point of view of the speaker. He has something to say, formulated, let us suppose, in LoT. How is this to be realised at PF for production? If the syntax of Spell Out is grossly distinct from that of LoT, it is hard to see how the speaker is to proceed. In particular, presupposing that the constituent lexical items of the LoTF have been selected in such a way that they can be translated into items of LF, there seems to be no reason why he should begin the Merge process by constructing the phrase [$_{VP}$ *every boy win*], as required by the derivation in (4a), as this has nothing to do with the meaning he wants to construct. Consider instead a procedure for deriving the LF and hence the S-O representation in (4) from the LoTF. In the example given, this would appear to be straightforward; and from an S–O representation, the PF representation can be derived, leading to articulation. Notice however that this bypasses the stage of the standard derivation which relates the numeration to Spell-Out. This has the further implication that grammaticality is not guaranteed (for instance, the copy-chains exhibited in the putative S-O form might not be capable of being licitly generated). The grammaticality could be checked by 'parsing' the form which has been constructed but, even if this were feasible, failure would lead to problems (tweaking the representation to obtain grammaticality would involve re-checking that the resulting LoTF was suitable, and an endless loop might result). Alternatively, the grammaticality of the putative S-O form could be a consequence of the status of the

initial LoT representation.[4] In this case, the LF would simply be a notational variant of the LoTF. But the syntax of LoT should be universal, unaffected by NL (although arguably, its vocabulary may be so affected); then wff conditions on LF would simply reflect those of LoT. If this is so, there can be no real sense in which the lower positions in the chain are copies of the argument, and it should be impossible to find data requiring such copies. Their frequent neglect to the contrary notwithstanding, quantifiers matter.

We move on now to the Caucasus, where we find crucial relevant evidence in quantified noun phrase arguments of 'backward control' sentences.

2 Polinsky and Potsdam 'Backward control', and its implications

We draw on two interesting papers by Maria Polinsky and Eric Potsdam (P+P hereafter) on the Caucasian language Tsez (Polinsky and Potsdam 2001, 2002). Tsez is an SOV language with clause-bounded scrambling, *pro*-drop and a rich agreement system. Crucially, the tensed verb agrees (in Class, indicated I, II, III or IV) with the ABSOLUTIVE argument of its clause. The relevant core of their paper on 'Backward Control' (P+P 2002) presents an extensive, careful, and convincing argument that Tsez has constructions of the forms in (7) and (8). In (7), the verb *-oqa* 'begin' has no external theta-role (like the Raising version of the English verb *begin*), whereas in (8) it does have an agentive external theta role, like the Control version of the English verb *begin* (see Perlmutter 1970 for arguments distinguishing the two verbs *begin* in English):

(7) kid ziya b-išr-a y-oq-si
girl-II-**ABS** COW-III-ABS III-feed-INF II-begin-PAST-EVID
'the girl began to feed the cow' ('raising' construal)

(8) kid-ba ziya b-išr-a y-oq-si
girl-II-**ERG** COW-III-ABS III-feed-INF II-begin-PAST-EVID

[4] This 'grammaticality' would have to exclude elements of the lexicon such as c-selection which refer to items of the LF representation (e.g. categories) not present in LoT. There had better be very few of these. However, that c-selection is correctly accounted for can be ascertained by inspecting the LF representation. If there is failure here, relexicalisation may suffice (e.g. changing *probable* to *likely* to avoid the ungrammaticality of *John is probable to leave*); if not, the utterance will need rephrasing (in LoT).

'the girl began to feed the cow' ('control' construal)

Note that in (7) the verb does agree with the ABS NP 'kid', but that in (8) there is apparently no ABS class II argument to account for the agreement. P+P's account of (8) is based on Hornstein's (1999) analysis of Control, and they suggest that the structure for (8) is similar to that in (1) above, but that the movement from the embedded subject position to the matrix subject position is covert. The matrix subject may be left empty because the verb has special properties which remove EPP effects. Importantly, however, the empty category has ABS case. The Spell-Out/PF and LF structures they propose are given in (9) (adapted from their (76), and (64),[5] and with some change of notation; noun-class features are shown in LF instead of S-O, for clarity). At Spell-Out, the elements shown crossed through are present; but at PF— by default — only the highest element is pronounced.

(9) a. $[_{TP}\ [_{VP}\ \varnothing_{ABS}\ \ [_{TP}\ girl_{ERG}\ \ [[_{VP}\ \sout{girl_{ERG}}\ cow_{ABS}\ feed]\ T]]\ \sout{begin}]]\ T\text{-}begin]]$ **S-O**

ABS case and agree

ABS case and agree

ERG case

b. $[_{TP}\ girl_{II}\ [_{VP}\ \sout{girl_{II}}\ [_{TP}\ \sout{girl_{II}}\ [[_{VP}\ \sout{girl_{II}}\ cow_{III}\ \ feed_{III}]\ T]]\ \sout{begin_{II}}]]\ T\text{-}begin_{II}]]$ **LF**

P+P take their account as strong support for the Copy Theory of movement,[6] for Hornstein's 'movement' version of Control, and for a derivational as opposed to a

[5] This is not in fact the final analysis given by P+P. In order to avoid the complication of double case marking, they suggest in a later section that *–oqa* does not assign ABS case. However, we are unable to follow how the verb agreement is licensed under the latter suggestion, but our own solution as set out in section 3.3 draws on the later analysis. For the purposes of this paper, it does not matter which version is proposed. Double morphological case marking of the chain does not seem to be a serious problem (pace Landau 2001: §5.4), but if two positions have syntactic Case, then the 'freezing' effect of Case on A-movement (Chomsky 2000: 127) would have to be re-thought.

[6] Copy Theory was (re)introduced by Chomsky (1995: 202) in order to avoid the 'curious operation' of syntactic reconstruction. Chomsky (2001: 39-41) suggests alternative ways of conceiving of Copy Theory with the same effect but without multiple merge. Since it is still the case that at LF and PF any element of the chain can in principle be realised, this does not affect the issue here, and we show multiple merge chains, as do Hornstein and P+P.

declarative monostratal version of UG (Chomsky 1987: 193-7, 2001). Since all of these three ideas are controversial and important, their analysis needs to be taken seriously.

We think that when a wider range of data are taken into account; in particular when one looks at the distribution of quantified Noun Phrases, the apparent virtues of a copy theory analysis dissolve. The P+P papers in fact have little to say about quantification, but an earlier version of their (2002) included such data and Maria Polinsky has patiently answered our many questions, and has provided us with the crucial example given below in (10). We see P+P's data and argument as important for the following reason. We are committed to a position in which the constructs and mechanisms that we deploy are not simply instrumentalist descriptive devices, but are 'psychologically real' (see Smith 1999, ch.3). As Chomsky (2001: 39) put it: '... we want to be careful to distinguish terminological artifacts from what may be substantive matters. The question commonly arises with regard to the status of entities introduced in linguistic description and theoretical exposition ...'.

It would be possible to regard Copy Theory accounts of well-formedness conditions on 'movement' and devices like Hornstein's account of Control as mere descriptive devices which are easy for the linguist to manipulate, and which can in most cases be translated into other formalisms without loss of descriptive power. Similarly, post-Spell-Out LF movement, such as QR and reconstruction, is amenable to alternative descriptions, because the elements involved, such as traces or copies or LF-moved quantifiers or sundry empty categories do not appear overtly in the phonological forms of the language, and we have no direct and overt evidence as to the form of their lexical entries, if any. However, the case that P+P discuss seems not to be of this sort: it apparently does distinguish sharply between an interpretive model like the standard inverted Y model of Chomsky's Principles and Parameters grammar and the Minimalist Program, and more surface-driven and compositionally-motivated grammars such as HPSG and CCG.[7]

There are alternative analyses of Control, such as those offered by Manzini and Roussou (2000), and by Cormack and Smith (2001b), that are like Hornstein's in assimilating Control to Raising, but do not postulate the merger of the full noun phrase in the subject position of the embedded clause. These crucially cannot account for the Tsez data in the way suggested by Polinsky and Potsdam. For this reason, it is equally crucial that the occurrence of quantified noun phrases in structures like (8) is discussed. The essential data is absent from P+P 2002, although from P+P 2001, we

[7] Reconstruction and binding are dealt with separately in these grammars, none the less.

can at least be sure that the language does have quantified noun phrases. If quantified noun phrases occur in structures like (8), then compositionality in the sense we understand it is at risk.[8] If they do not, then we would still hope to explain the data involving control readings with referential noun phrases in some other way: the presence of a referential argument in the embedded subject position is not precluded in a compositional account.

The fact of the matter is that it is NOT possible for noun phrases with distributive quantifiers to occur as the subject in structures like that in (8), in Tsez, as we see in the ungrammaticality of (10).

(10)	*šibaw/kinnaw	už-a	t'ek	t'et'r-a	∅-oq-si
	every/each	boy-ERG	book-ABS	read-INF	I-begin-PSTEV
	'every boy began to read a/the book'				

We take this as evidence that Copy Theory has not been shown to be essential, that a monostratal grammar is not ruled out, and that our pursuit of an alternative, compositional, account is endorsed. It is equally clear that P+P have produced an interesting structure which is permitted just for referential subjects, and is in need of analysis. It follows that we predict that no language will permit cases of 'backward control' with essentially non-referential arguments in the embedded clause position. We invite putative counter-examples.

At this point, there are two routes to pursue: the Hornstein route, and one that rejects this line. We offer an analysis of the latter kind, involving non-canonical control structures. In a canonical control structure, the subject of the embedded clause is PRO (Principles and Parameters and Minimalist Program analysis) or is an A-movement trace (Hornstein 1999). In the non-canonical control structures we offer below, the embedded subject is overt, and stands in a syntactic Case position. Since P+P (2002: §2.4.2) have already argued that in Tsez, infinitival clauses can have subjects, we take the Case property required for non-canonical control as given.

[8] The only alternative to Copy Theory that would account for the presence of an overt quantified subject in the embedded clause where it is not semantically viable would be 'lowering' at PF within a movement chain. It is hard to see how this could be reconciled with the ergative morphological case exhibited by the embedded subject, together with the verbal agreement facts for Tsez. Moreover, it is quite unclear what could motivate such lowering.

3 Non-Canonical Control
3.1 Alternatives

In order to offer an alternative non-Copy-Theory account of the Tsez structure in (8), we pursue a line that P+P consider, but reject. We require an LF representation where there is an empty subject, and also an argument taking the external role of the embedded verb inside the embedded clause. We take the embedded clause to be a TP, where the T case-licenses the subject (alternatively, the clause might be headed by a null C). Suppose first that the LF representation is relevantly as in (11) (English words have been substituted for Tsez):

(11) $[_{TP}\ [_{DNP}\ pro_j]\ [_{TP}\ [\ John_j\ [_{VP}$ the dog to feed]] began] T]
arg$_2$ arg$_1$ lexical head

Polinsky and Potsdam reject this analysis (*ibid*, footnote 17) on three grounds. First, it fails to account for the controller-controllee relation in a Control sentence (shown by the coindexing in (11)); second, it fails to explain why there cannot be an overt subject in the matrix clause in the position of *pro*; and third, there is an unexplained Principle C violation. We will argue that there are nevertheless viable variants of such an analysis. We begin with the 'control' element, since this is essential to any analysis.

All NL lexical heads select for arguments which can, as a first approximation, be given the types <e> (entity) or <t> (proposition, fact, action, state, etc. subsumed under the general description of 'event'; of course, intentionality has to be accounted for in a more detailed exposition). It follows that the semantics of the control verb in both this case and the usual control case is as follows:

(12) $\lambda s\ \lambda x$ (BEGIN. s). x
where s has type <t>, x has type <e>, and the item BEGIN has type <<t, <e, t>>.

In the standard version of Control, the subject of the embedded clause is forced to be an anaphor, PRO, so that the external argument of BEGIN binds the external role of both BEGIN and the verb of the internal clause. However, this is not sufficient for the semantic well-formedness of a Control sentence. The PRO subject must take on an agentive role in the embedded clause, as we see from the anomaly of (13) and the explicature of (14):

(13) #John tried PRO to be conceived in Peru

(14) John tried to be seen by Alice
'John tried to make it the case that Alice saw him by acting in a suitable manner'

We can state this requirement as a Meaning Postulate on the LoT TRY, and mutatis mutandis for other control verbs.[9] We need an MP something like (15):

(15) Meaning Postulate 1: $\forall s\ \forall x$ [TRY.s.x => x is agent in the event given by s]
where type x = <e> and type s = <t>.

Note that such an MP is only possible if the verb is such that there must be matching of the matrix subject with some identifiable role in the embedded clause. The cross-linguistic totality of verbs participating in 'backward control' listed in Polinsky and Potsdam (2002: 278) have meanings: 'begin', 'continue', 'stop', 'set out to', 'hurry', 'intend/want'; 'come/arrive', 'go', 'pass'; 'fear', 'enjoy', 'be amused', plus *–eru* (potential suffix) verbs in Japanese.[10] The verbs in this group are fairly clearly consistent with the MP in (15), at least for some reading of the English gloss. We predict that all the verbs involved in genuine Backward Control do comport with (15), and that it is not possible for any language to have Backward Control with meanings like 'expect'.[11] We have not yet checked whether our prediction can be substantiated cross-linguistically. In Tsez, only the verbs corresponding to 'begin' and 'continue' show Backward Control; there are canonical ('forward control') Control verbs including 'forget', 'threaten' and 'stop'.

There is then no problem with the semantics. The next question concerns the empty matrix subject. We see two possibilities here. The first assumes a *pro* subject, but the subject and the embedded clause are scrambled, where scrambling changes c-

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[9] We take Meaning Postulates to function as Inference Rules. For a discussion and more accurate characterisation of Meaning Postulates relating to control, see Dowty (1985: 297-303).

[10] The languages exhibiting 'Backward Control' include two other Nakh-Daghestanian languages, and Malagasy, Japanese, Jacaltec, and Jemez.

[11] As Anderson (2001:78) points out, verbs like EXPECT impose no constraint on the role of the controllee in the embedded clause, so that it would be impossible to set up a Meaning Postulate like that for TRY given in (15). Further, Landau (2001), following Chierchia (1990) and Higginbotham (1992), points out that there is a difference in available readings between the control and full clause versions of sentences with EXPECT and related verbs. The *de se* reading for control clauses cannot be accounted for under the Non-Canonical Control structure that we offer, but needs a canonical Control structure (which allows a suitable Meaning Postulate to be added).

command relations. The second assumes an existentially quantified subject, but no syntactic co-indexing. We discuss these in turn.

3.2 Non-Canonical Control version 1

Mahajan (1990) argues that Hindi has scrambling which is similar to A-movement. Examples are given which show that when an object is scrambled over a subject, but not when the object is in its usual position to the right of the subject:[12]

(i) a quantified object may bind a bound-variable pronoun subject (*ibid* examples (24) and (26))

(ii) an object may be the antecedent of a reflexive subject (*ibid* examples (39) and (40))

Similarly, when an indirect object is scrambled over a direct object, but not when the indirect object is in its usual position to the right of the direct object, Principle C effects change:

(iii) an object pronoun may be coreferential with an indirect object full noun phrase (*ibid* examples (49) and (50))

Suppose that in some language where scrambling affects c-command as it does in Hindi, it is also possible to scramble clauses over the subject (in Hindi, it is not possible to scramble tensed clauses over the subject). In Tsez, non-finite clauses with subjects may at least scramble rightwards over verbs (P+P 2002: 254, example (25b)); we have no data about the effect of scrambling on c-command. Then instead of (11), we postulate that the order of arguments for 'backward control' examples is as in (16):

(16) $[_{TP}\ [_{TP}$ John$_j$ $[_{VP}$ the dog to feed$]]_k$ $[_{DNP}$ *pro*$_j$$]$ began T$]$
arg$_2$ arg$_1$ lexical head

In this structure, by hypothesis, *pro* does not c-command *John*, so that the coreference required by the Meaning Postulate is not ruled out by Principle C. This would explain the apparent possibility of 'backward control'. Further, it will not be possible to substitute a non-referring expression such as *each boy* for *John*, in (16), because the

[12] The judgements are not as sharp as implied here: some of those we have said are ungrammatical are given as '???/*', and some of those we have said are acceptable are given as '?'.

pronoun would not be bound. However, we would need to rule out a structure like that in (11) in order to account fully for the impossibility of subjects with distributed quantifiers; and we also need the verbs like *–oqa*, but not canonical control verbs, to have a lexical property that permits (16). We suggest that such verbs have the order in (16) as the unmarked order in the lexicon, as indicated. Hence our Non-Canonical Control_1 hypothesis is embodied in the hypothetical lexical entry for *–oqa* as in (17) (compare this with (12)):

(17) *-oqa* c-selection : V/D/T meaning: $\text{BEGIN}_1 = \lambda x \lambda s\ [\text{BEGIN}_C\ s\ x]$
where *s* has type <t>, *x* has type <e> , and the item BEGIN_1 has type <<e, <t, t>>.

Here, BEGIN_C is the basic LoT item for the control 'begin'; a Meaning Postulate similar to that given in (15) applies to this, so that it will apply derivatively to BEGIN_1.

When the 'control' subject is referential, the unmarked order of constituents will not yield any c-command relation between the matrix and embedded instantiations of the two syntactic subject positions, so that the one which is first at PF will be spelled out in full, and the second one will be realised as a pronoun *pro*. This gives the form in (16). But if the 'control' subject is quantificational, *pro* needs to be a bound variable pronoun, so that there must be scrambling, which by hypothesis gives the required c-command effect. We obtain a structure like that in (18):

(18) $[_{TP}\ [_{DNP}\ \textit{everyone}_j]_k\ [_{TP}\ [\ \text{pro}_j\ [_{VP}$ the dog to feed]] t_k began] T]
arg_2 arg_1 lexical head

Since the overt subject is now in the matrix clause, we expect it to show ABS case-marking in Tsez. This is indeed the case-marking that is manifest when there is a distributed universal quantifier subject: (19a) is the grammatical counterpart of the ungrammatical (10) above, and (19b) is the Non-Canonical Control analysis.

(19) a. šibaw/kinnaw uži t'ek t'et'r-a ∅-oq-si (Polinsky, p.c.)

b. $[[_{DP}$ šibaw/kinnaw uži$]_j$ $[_{TP}$ *pro*$_j$ t'ek t'et'r-a] ∅-oq-si
every/each boy-ABS book-ABS read-INF II-begin-PSTEV
'every boy began to read a book' ('control' reading)

We conclude that 'backward control' can be satisfactorily explained as Non-Canonical Control$_1$, provided that the language in question has the appropriate scrambling properties.

3.3 Non-Canonical Control version 2

Our second version of Non-Canonical Control sidesteps Principle C by introducing at LF (and LoTF) an argument with independent reference for the external subject. As a first approximation, consider the LF given in (20).

(20) [$_{TP}$ [$_{DNP}$ *someone*$_k$] [$_{TP}$ JOHN$_J$ [$_{VP}$ THE DOG TO FEED]] BEGAN$_1$] T]
arg$_2$ arg$_1$ lexical head

It is only the Meaning Postulate, rather than any syntactic condition, which requires coreference. Applying the MP to the LoT form in (20) yields something like (21), which gives the required 'control' effect:

(21) [∃x; PERSON x : [∃y; John = y :[x [y FIDO FEED] BEGAN] ∧ [x = y]]]

That is, we claim that syntactic coreference is no more required in (20) than it is in (22):

(22) Dr Jekyll$_j$ is the same person as Mr Hyde$_k$

Such a move solves the Principle C problem which would arise from coindexed *pro*, but we seem to have an unknown null subject: an indefinite existential, which is in need of justification. We trade here on P+P's explanation for the absence of an EPP effect: they suggest that the verb *–oqa* (unusually) has a D-feature, and so checks the EPP feature of the matrix T by moving into T. In their section §5.2, they give independent justification for this V to T movement. We suggest that the reason the verb seems to have a D-feature is that it incorporates this subject DP at PF — that is, the existential is a null clitic, which, presumably for historical reasons, can only cliticise to one of the two 'backward control' verbs of Tsez. The analysis will be as in (23), where the verb *–oqa* has the standard type and meaning for a canonical Control verb, as in (12), and is subject to a Meaning Postulate like that in (15). What permits this analysis is the lexical entry for the clitic existential.

(23) [[$_{DP}$ ∃$_k$] [$_{TP}$ [kid-ba]$_j$ ziya b-išr-a] y-oq-si **LF**

∃-II-ABS girl-II-ERG cow feed-INF II-begin-PAST-EVID
'the girl began to feed the cow' ('control' construal)

Because of the Meaning Postulate, the existential must refer to a singular female entity, matching the number and gender of the embedded subject. This allows a straightforward account of the verbal agreement.

Under this version of Non-Canonical control, distributed quantifier embedded subjects are ruled out because a form like (21) would not give the required meaning under the Meaning Postulate given. Rather, with *each boy* for *John*, we would obtain a meaning asserting *inter alia* that each boy was identical to a fixed person. Yet a control construal of *–oqa* is possible in Tsez, as we saw from (19a) above. We suggest that this is obtained by using Raising *–oqa*. One would expect on general pragmatic grounds that the Raising verb could be used where the subject did in fact have a causative role in ensuring the event given in the embedded clause. We can see this with English raising *seems*: there is nothing wrong with (24),

(24) John deliberately seemed to drop the plate
'It seemed that John dropped the plate, and John deliberately acted in such a way as to make it seem that he dropped the plate'

although it requires a certain amount of coercion to obtain the explicature indicated, as with (14) above. In the absence of cues like 'deliberately', such a reading may be obtained by strengthening the Raising reading, on the basis of required pragmatic effects in context. Under Non-Canonical Control$_2$, the analysis of (19a) will be as shown in (25).

(25) a. šibaw/kinnaw uži t'ek t'et'r-a ∅-oq-si (Polinsky, p.c.)

b. [[$_{DP}$ šibaw/kinnaw uži]$_j$ [$_{TP}$ t_j t'ek t'et'r-a] ∅-oq-si
every/each boy-ABS book-ABS read-INF II-begin-PSTEV
'every boy began to read a book' ('control' reading)

How is this compatible with the fact that with referential subjects, no control reading is available where the subject has ABS agreement (examples (7) and (8) of section 1)? The answer is that for a referential subject, there is a choice of lexical entries — Raising or Non-Canonical Control. Since only the latter is associated with BEGIN$_C$, and hence with a control Meaning Postulate, this will always be used, for pragmatic

reasons. For a quantified subject, there is no choice, the entry corresponding to $\text{BEGIN}_{\text{RAISING}}$ must be used.

We conclude that Non-Canonical Control_2 is also capable of explaining 'backward control', and in particular, the Tsez data exhibited in P+P (2002).

Which of these hypotheses (if either) is correct for Tsez? Although data capable of discriminating between these alternatives is not available at present, so that the question remains open, we favour the second account, because of the interaction with V to T movement in Tsez, and the preservation of the standard selection order by the head. We turn next to a CCG (Combinatorial Categorial Grammar) treatment of the relevant structures.[13]

4 A combinatorial alternative to Copy Theory

We have used compositionality to argue against Copy Theory, especially as instantiated in Hornstein's (1999) analysis of Control, and implicitly also against Manzini and Roussou's (2000) account of control. However, we believe that at least part of the attempt to eliminate PRO and assimilate obligatory control to raising is correct, and we give here the essentials of our alternative account.[14] Our account is immune to at least the major criticisms raised by Landau (2001) against Hornstein's account, and we believe that the remaining problems are soluble.

We add to the repertoire of phonologically empty heads a number of Combinators, taken in the main from CCG. However, we see these as present in the syntax of a Minimalist grammar. For present purposes, they replace A-movement and control; and we assume some equivalent of head-movement to reconcile the LF order we obtain with the PF order observed in NL (see Cormack and Smith 2001b).

We consider first, canonical control verbs. Problems with canonical control arise from two apparently conflicting desiderata. First, the internal selection of the control verb is clausal (type <t>), as noted above. Second, the verb and its clause should be

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[13] For an introduction to CCG, see Steedman (1993) or (2000). For use in a Minimalist framework, see Cormack and Smith (2001b).

[14] Hornstein also takes control into adjuncts to be obtained by movement, basing his analysis on Nunes' (1995) 'sidewards movement'. In CCG, once we have an account of saturated adjuncts, the usual combinators **A**, **B**, and **S** automatically provide for non-saturated adjuncts such as one-place predicates. The equivalent of 'control into adjuncts' in Minimalist CCG is therefore unrelated to A-movement or chains or Copy Theory. See Steedman (1985), Cormack (1999), and Cormack and Smith (2001a).

combined by taking a clause of type <t> to discharge the selection of the verb, i.e. implicitly using function-argument application (**A**) to combine the control verb and its complement. But the clause does not appear to be saturated, and any attempt to make it saturated by proposing a trace or PRO in the subject position leads to problems. Grammars like HPSG propose that the selection is not for a clause but for a predicate. However, CCG can offer an alternative, by rejecting the second premise above. Jacobson (1990, 1992) argues that Raising should be accounted for semantically by using function composition (**B**) to combine the matrix verb of (extensional) type <t/t> with its complement verb phrase of type <e, t>. We argue rather that a raising verb has type <t, <nil, t>>, where the 'nil' is an undetermined type, and corresponds to the null external argument of an unaccusative verb. Suppose **seem**¢ (unaccusative, bivalent) is the LF representation of our PF *seem*, and (monovalent) SEEM is the LoT equivalent.

(26) PF: *seem* c-selection V/D/V LF: seem′

seem′ $\Leftrightarrow$ $\underline{\mathbf{Nil}}_1$ [SEEM] = $\lambda s\ \lambda w$ [SEEM. s]

where '$\Rightarrow$' means 'translates from NL into LoT', $\underline{\mathbf{Nil}}_1$ is a one-place operator in LoT that turns a monovalent item into an unaccusative one, and where s is of type <t> and w of any type.

Given this, in order to accomplish Raising in a way parallel to that argued for by Jacobson, we require that Raising use not **B**, but another related combinator **R**, whose meaning is given in (27).

(27) ($\underline{\mathbf{R}}$. f). g $=_{df}$ λx [f. (g. x). x]

What this does is to stipulate that the external role of the bivalent function f, and the external role of the monovalent function g will be bound by whatever argument is supplied to the new composite function $\mathbf{R}fg$. This not only gives the right results for unaccusative verbs like *seems*, as indicated in (28), but extends automatically to any verb, whether unaccusative or not, which licenses the use of **R** in merging with its internal argument. In other words, it can give a simple account of canonical control, as exemplified in (29). Further, it does so by giving a proper compositional semantics to comprehensible fragments such as those in (6 a, b).

(28) **R** seem′ [happy′] ⇔ **R** [**Nil**$_1$ SEEM] HAPPY

$= \lambda x\ [(\lambda s\ \lambda w\ [\text{SEEM}.\ s].\ (\textit{HAPPY}\ .x)).\ x]$

$= \lambda x\ [\lambda w\ [\text{SEEM}.(\textit{HAPPY}\ .x)].\ x] \quad = \lambda x\ [\text{SEEM}.(\textit{HAPPY}\ .x)]$

(29) **R** try′ [to-dance′] ⇔ **R** [TRY] TO-DANCE

$= \lambda x\ [(\lambda s\ \lambda w\ [\text{TRY}.\ s.w].\ (\textit{TO-DANCE}\ .x)).\ x]$

$= \lambda x\ [\lambda w\ [\text{TRY}.(\textit{TO-DANCE}\ .x).w).\ x] \quad = \lambda x\ [\text{TRY}.(\textit{TO-DANCE}\ .x).\ x]$

We take the use of **R** to be licensed by the syntactic Case system, and specifically by the assignment by the selecting head of the case feature [–Case] to its complement. The complement will need to be monovalent, and will usually be a VP (i.e. some projection of V, probably including an inflectional head, but not including a subject), but may be some other lexical projection such as AP.

For canonical control, Cormack and Smith (2001b) argue that NL uses the Combinator **R**, as in (29) above. This device is comparable in semantic effect to the forcing of anaphoric PRO, and in as much as agents are canonically associated with the subject position, may tend to ensure that the Meaning Postulate in (15) is satisfied. However, this is only a tendency, so there is no reason to expect all languages to use this device. The Combinator **R** is licensed by a [–Case] feature in the selection for the propositional <t> argument of the control verb; if the device is not used, the type <t> argument will have a [+Case] feature and combine by simple function-argument application **A**. Thus which of the two structures is realised is controlled by the Case properties and c-selection of the head. To a first approximation, raising and control heads with verbal complements will be differentiated as shown in (30). In the case of Tsez, the selection X in non-canonical control is T[–finite]. For another language, it might be finite T, or C.

(30)

Raising head:	c-selection: V/D/V	type <$t_{[-\text{Case}]}$, <nil, t>>
Canonical Control head:	c-selection: V/D/V	type <$t_{[-\text{Case}]}$, <e, t>>
Non-Canonical Control$_1$:	c-selection: V/X/D	type <e , <$t_{[+\text{Case}]}$, t>>

Non-Canonical Control$_2$: c-selection: V/D/X type <$t_{[+Case]}$, <e, t>>

The associated meanings for Raising verbs differ from those of Control verbs in having only a 'nil' external argument selection, and in not being subject to the Meaning Postulate for Control. If we put aside the argument switch for Non-canonical Control$_1$, we observe the following. The two kinds of Control verbs have the same lexical semantics. There are no syntactic differences between Raising and Canonical Control verbs; Canonical and Non-Canonical Control verbs differ just by c-selection and Case feature. The crucial difference between Raising and Canonical Control on the one hand and Non-Canonical Control on the other lies in the [+/– Case] feature, which determines how the complement and head combine semantically when they are merged. Whether Non-Canonical Control comes out looking superficially like 'backward control' for referential subjects depends on other properties of the grammar and lexicon, as discussed in section 3.

5 Conclusions

We took Polinsky and Potsdam (2002) on 'backward control' to provide a serious challenge to the possibility of a compositional account of natural language. Our alternative accounts of the Tsez data, including data on quantified noun phrases provided by Maria Polinsky, suggest that NL compositionality has not yet been compromised. However, in the course of our argument, we were forced to make a number of claims for whose factuality we do not have evidence. To this extent, the question with regard to 'backward control' and compositionality remains open.

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