DIAGNOSING COVERT MOVEMENT WITH THE DUKE OF YORK AND RECONSTRUCTION[1]

Winfried Lechner, University of Athens
wlechner@gs.uoa.gr

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1. Introduction

One of the most intriguing features of natural language consists in the observation that surface representations of linguistic expressions may obfuscate or underdetermine properties that fix interpretation. The semantic scope of quantificational expressions is, for instance, usually not overtly marked, resulting in systematic mismatches between form and interpretation, illustrated by the object wide scope reading of (1):

(1) A (different) problem occupied every linguist.

Such misalignments can be either repaired in the semantic component, as is practice in lexicalized, categorial theories,[2] or by assuming enriched object language representations that possibly contain silent copies (Chomsky 1993) and structure which is not recoverable from phonological cues alone. Theories that follow the second tradition usually also admit an additional source of abstractness in the form of covert movement operations such as Quantifier Raising (QR).

Against this background, the present chapter pursues two objectives related to the study of covert movement. On the one side, it provides a synopsis of syntactic tests that have been developed in order to diagnose covert displacement operations.[3] In addition, two new diagnostics will be presented that aid in deciding whether a construction involves covert movement or not.

The first diagnostic emerges as a corollary of a so-called *Duke of York* argument in support of a derivational model of the grammar. Duke of York derivations, first discussed in Pullum (1976), characteristically follow the tripartite scheme A → B → A, a particular instantiation of which is made explicit in (2). In the initial step (2)a, representation A is mapped to B by movement of β. (For expository convenience, traces and copies will be treated as notational variants when no confusion is likely to arise.)

[1]I am grateful to the participants of the 2009 *Diagnosing Syntax* workshop at Utrecht and Leiden University, as well as to Elena Anagnostopoulou, and the members of the Athens Reading Group for comments and discussion. All errors are my own.

[2]See e.g. contributions in Barker and Jacobson (2007) for Categorial Grammar and Steedman (2000), Steedman and Baldrige (2007) for Combinatory Categorial Grammar.

[3]String-vacuous overt movement, as e.g. hypothesized for Right Node Raising (Sabbagh 2007) will be ignored. This type of displacement is similar to covert movement in not having any phonological consequences, but results - in contrast to regular covert movement - in spell-out of a higher copy.

(2) a. Step 1: Move β: $[\lceil_{\beta} \ldots \alpha \ldots \rceil \ldots [t_{\beta} \ldots]]$
b. Step 2: Move α: $[\alpha \ldots [[_{\beta} \ldots t_{\alpha} \ldots] \ldots [t_{\beta} \ldots]]]$
c. Step 3: Reconstruct β: $[\alpha \ldots [\lceil_{\beta} \ldots t_{\alpha} \ldots \rceil \ldots]]$

Next, the intermediate output B is modified, in the case at hand by subextraction of α in (2)b. Finally, the initial state A is restored by reconstruction of β in (2)c. Duke of York derivations of this kind will be exemplified by relative pronoun movement (valuing α in (2)) out of a pied-piped constituent (β).

The design of the second, qualitatively different test, is informed by a new generalization linking DP-reconstruction, silent pronoun movement (Percus 2000) and QR out of fronted nodes. In derivations that observe this pattern, subextraction of a situation pronoun (α in (2)b) out of a moved DP β will be shown to impose a lower bound on the interpretation of β, rendering unavailable the reconstruction step (2)c.

The two novel criteria outlined above share two common properties. First, both tests target configurations in which movement has taken place out of a category that itself has been displaced (see (2)a/b). Second, the operations to be studied - covert movement of relative pronouns and situation variables - do not manipulate nodes with descriptive content. Consequently, extraction of α out of β will be seen to result in semantically somewhat impoverished expressions, schematized in (3)a, in which the semantic contribution of movement is restricted to λ-abstraction. (3)a contrasts with the 'regular' movement configuration (3)b, where the derived λ-predicate is preceded by a higher, contentful occurrence of α (see Heim and Kratzer 1998):

(3) a. $[\lambda_1 \ [_{\beta} \ldots \ \alpha_1 \ldots]\ldots]$ (movement of α, where α has *no* descriptive content)
b. $\alpha \ [\lambda_1 \ [_{\beta} \ldots \ \alpha_1 \ldots]\ldots]$ (movement of α, where α *has* descriptive content)

This complicates detecting displacement, because movement sensitive diagnostics typically respond to properties of the descriptive content of the restrictor of α. In absence of a restrictor, displacement must therefore be inferred from other markers. In the two cases at hand, a suitable linguistic correlate is provided by the systematicity which governs the relative timing between movement of β and hypothesized movement of α. Thus, the fact that both criteria scan the dual movement configuration in (2) is not accidental, but due to the common property (3)a and the limitations inherent in the timing metric.

Finally, the diagnostics to be developed below are embedded in analyses that provide strong support for two larger theoretical claims, each of which has received a considerable amount of attention in the literature: syntactic objects are assembled derivationally (this follows from the *Duke of York* argument); and reconstruction may apply in syntax as well as in semantics.

The paper is structured as follows. In section 2, I explicate the relation between symptoms, syndromes and diagnostics in syntax. Section 3 surveys some standard tests for covert movement. Section 4 and 5 take up the development of the two new diagnostics. In order to substantiate the background assumptions underlying the analyses, section 5 also includes a discussion of different analytical strategies for capturing reconstruction phenomena.

2. Symptoms, syndromes and diagnostics

Movement is defined as change of location over time. To demonstrate that an object α has moved therefore minimally requires finding the signature of the symptom[4] triad (4) in the data.

(4) *Symptoms for movement*

a. α is located in position P_1 at time t_n (foot symptom)
b. α is located in position P_2 at time t_{n+m}, where $P_1 \neq P_2$ (head symptom)
c. $m > 0$ (temporal symptom)

For ease of reference, these three conditions will from now on also be referred to as the *foot,* the *head* and the *temporal symptom*, respectively (where *temporal* refers to relative sequencing of operations, not ordering on a time line). The convergence of the three properties in (4) can also be interpreted as a *syndrome*, that is a group of phenomena which typically cooccur with movement. Syndromes are identified by *diagnosis*, the latter being conceived of as the process of isolating a single syndrome to the exclusion of other logically possible options. The present section summarizes methods for diagnosing the syndrome of *(covert) syntactic movement.*

Applied to natural language phenomena, the symptoms in (4) react to the presence of syntactic dependencies which fit the general scheme in (5):

(5) a. t_n : $[_{P1}\ \alpha ...]$
b. t_{n+m}: $[_{P2}\ \alpha\ ...\ [_{P1}\ \alpha ...]...]$

More specifically, the foot symptom signals that a category α originates inside the foot of the chain P_1 at time t_n ((5)a). The head symptom picks out configurations in which α surfaces in the head of the chain P_2 at t_{n+m} ((5)b). Finally, the dependency also displays the temporal symptom if generating (5)a at t_n precedes the formation of (5)b at t_{n+m}.

But similar to other groups of symptoms, the triad in (4) in itself does not provide a conclusive diagnostic for movement yet. This is so because symptoms stand in a one-to-many relation to their probable causes. And in fact, the sum of the properties in (4) is also compatible with other syntactic configurations that are usually not thought to involve movement. For example, relations that match the profile of (4) are also characteristic of pronominal variable binding, (exhaustive) control, identification of e-type pronouns (*Few senators$_1$ admire Kennedy, and they$_1$ are junior*) and certain instances of resumption.

(4) can be turned into a proper diagnostic for movement, though, once the definitions are further restricted and related to specific features of the grammar. The standard procedure for doing so consists in devising *tests* for the location of α which rely on certain linguistic *markers*, among them phonological visibility and meaning related properties such as disjoint reference effects, anaphor and negative polarity item (NPI) licensing or idiom interpretation. For instance, the observation that in configurations involving variable binding and control, the descriptive content of the antecedent does not partake in interpretive processes affecting the lower link has

[4]In medicine, it is common to distinguish subjectively felt *symptoms* from intersubjectively verifiable *signs*. For present purposes, all symptoms will be treated as signs.

been taken as an argument for adding reconstruction effects as a criterial property to the definition of movement. One way to implement this refinement is to supplement the list of symptoms by (4)d:

(4) d. The descriptive content of α can be evaluated in P_1 at time t_{n+m}

Progressively selecting more precise and fine grained symptoms along these lines eventually yields a test for specific linguistic properties. Finally, if the sum of all tests associated with the foot and the head chain deliver consistent and sufficiently precise results, they serve as a *diagnostic* for the presence of a chain.

The process of step-wise elimination of alternatives described above is an exact replica of what is familiar from the medical sciences. Fever and pain are indicators of a wide variety of probable causes, and do therefore not yet constitute a diagnostic. It is only by adding further qualifications (such as duration, precise location or type of the pain sensation) that it becomes possible to define a symptom which supplies one of the tests for a particular syndrome or condition.

Returning to movement, observe that it has not been specified yet whether the chain in (5)b has been formed representationally or derivationally, that is by sequential ordering of discrete representations. The decision between these two analytical alternatives is contingent on a sufficiently precise test for the temporal ordering, as expressed by the temporal symptom (4)c. However, given that linguistic explanation only provide a model for the language faculty, without carrying a binding ontological commitment as to the nature of linguistic reality, there is no independent extralinguistic reference frame for time that (4)c could refer to. Metalanguage usage of notions such as 'ordering of operations', or 'before' and 'after' as relations between steps in a derivation are purely artifacts of a specific computational theory of the mind. As a result, the timing of operations can only be determined relative to other linguistic invariants.

In principle, there are two strategies that have been pursued in search for such timing phenomena. The first potential diagnostic employs changes in linear order and/or c-command of a node α relative to a fixed point β as an index for displacement of α. Assume that α originates in position P_1 at stage t_n, as in (6)a, and that a second occurrence of α is merged above β in P_2 ((6)b). (7) provides a plausible natural language manifestation of (6)b:

(6) a. t_n: $[\beta \ldots [_{P1} \alpha \ldots] \ldots]$
b. t_{n+m}: $[_{P2} \alpha \ldots [\beta \ldots [_{P1} \alpha \ldots] \ldots]]$

(7) [[Pictures of each other$_\beta$]$_\alpha$ seemed to [them$_\beta$ [t_α to be on sale]]]

In this context, diagnosing movement of α in (6)b requires confirmation that (i) α (or a portion thereof) is evaluated in P_1 and that (ii) evaluation of α is delayed to t_{n+m} (where $m > 0$), barring a non-derivational reinterpretation. However, since representations can be enriched by copies (Chomsky 1993; see also fn. 9), constellations that unequivocally match these criteria have proved elusive so far. Similar conclusions have been reached for tests reacting to covert movement, which represent the central point of interest of the present chapter. Some results from

the literature in this domain will be reviewed in section 3.2.

From the above, it follows that the temporal signature does not reveal itself readily from inspecting simple word order permutation or changes in c-command. There is a second strategy for locating the temporal signature, though, on which movement is not inferred from positioning relative to a single node, as in (6), but by triangulation from a complete second movement chain, as in (8). The relevant environments include one attracting head (γ in (8)a) and at least two possible targets (α and β):

(8)	a.		[γ ... [β ... [α ...]]]	(where γ is an attracting head
	b.	Move β:	[*β* ... [γ ... [t_β ... [α ...]]]]	feature compatible
	c.	Move α:	[β ... [*α* ... [γ ... [t_β ... [t_α ...]]]]]	with both α and β)

The decision between moving α or β first is widely held to be controlled by economy principles such as the Minimal Link Condition (Chomsky 1995), Relativized Minimality (Rizzi 1990) or Shortest (Richards 2001). According to Richards (2001), for one, γ attracts the closer target β first, resulting in the intermediate stage (8)b. In a second step, the grammar chooses the shortest possible path for raising the lower node α into the checking domain of the attracting head γ. Consequently, the metric places α in between β and γ, yielding (8)c.

Crucially, the analysis outlined above cannot be translated into a representational framework. In non-derivational models, the evaluation metric Shortest needs to be reinterpreted as a condition that minimizes distance in binding relations. But the output representation (8)c fails to meet such a configurational closeness requirement. To begin with, α does not bind the closest possible variable in (8)c, because t_β intervenes between α and t_α. Moreover, variable t_β is not bound by its closest possible binder, either, given that t_β is separated from β by the intervening α. Thus, configurations of multiple order preserving dependencies as in (8) provide a strong argument for a derivational model of syntax, and, by extension, for the hypothesis that categories involved in these dependencies reach their derived positions by movement.

Movement diagnostics that employ multiple chains again subdivide into two groups, depending on the structural relations between the two foot positions α and β. Scheme (8) illustrates the case where β c-commands α. In an alternative scenario, represented by scheme (9), β initially contains α:

(9)	a.			[γ ...	[[$_\beta$ ...α ...]...]]
	b.	Move β:	[*[$_\beta$ ...α ...]*	[γ ...	[*[$_\beta$ ...α ...]*...]]]
	c.	Move α out of higher β:	[*α* ... [[$_\beta$ ...t_α ...]	[γ ...	[[$_\beta$ ...α ...]...]]]
	d.	Move α out of lower β:	[[$_\beta$ ...α ...]	[γ ... [*α* ...	[[$_\beta$ ...*α* ...]...]]]

(9) is just like (8) in that the first displacement operation targets β, resulting in (9)b. But (9) also differs from (8) in an interesting way, since movement of α in the next step leads to a more complex typology. Notably, while some contexts unpack the containment relation between α and β by locating α above the *higher* occurrence of β, as in (9)c, others opt for subextraction out of the *lower* copy, shown in (9)d. In section 4 and 5, it will moreover be seen that these two strategies are systematically anchored to two distinct syntactic environments - while (9)c is symptomatic of the Duke of York, (9)d codifies scope restrictions found with fronted DPs and

predicates. Thus, the two profiles (9)c and (9)d can be interpreted as two different symptoms of trees that have been created by multiple applications of movement, each of them providing a diagnostic for syntactic displacement.

3. Standard diagnostics for movement

Movement extends and reduces options for a category to interact with other nodes in the tree. These effects become detectable by examining independent properties - or *markers* - which systematically cooccur with movement. The majority of markers takes the shape of conditions on interpretation, determining legitimate binding relations, admissible coreference patterns, scope orders, the distribution of NPIs and the availability of idiomatic readings, among others.

In studying the interaction between displacement and markers, it is useful to conceive of a marker as a rule of general format *A → A iff X* that accepts a particular input only if the input satisfies the particular well-formedness requirement X expressed by the context of the rule - say, Principle A of Binding Theory. If this is the case, the rule simply passes on the input. Since movement is also defined as a rule, more precisely a mapping between representations (*A → B*), the combinatorics of movement and acceptance conditions can then be described in terms of Kiparsky's (1971) classic typology of rule interaction:

(10)

	a. *Feeding*	b. *Bleeding*	c. *Counterfeeding*	d. *Counterbleeding*
Rule 1:	A → B	A → B	B → B iff X	A → A iff X
Rule 2:	B → B iff X	A → A iff X	A → B	A → B
Reverse order results in:			*Feeding*	*Bleeding*
			Opacity	

To begin with, feeding ((10)a) characterizes configurations in which movement (Rule 1) creates the context for an interpretive principle (Rule 2) to apply. With positive conditions, among them Principle A, movement is a sufficient condition for the well-formedness of the output (see e.g. (11)b below). By contrast, having movement feed a negative condition such as Principle C results in ungrammaticality. Conversely, bleeding ((10)b) describes sequences of operations in which movement (Rule 1) removes the context of the interpretive rule (Rule 2). Thus, in bleeding configurations, positive conditions cannot be satisfied, leading to ill-formedness, while the effects of negative requirements are obviated (see (12)a below).

Of particular theoretical interest are the two opaque[5] rule orderings (10)c and (10)d. In derivations involving counterfeeding opacity (aka 'underapplication'; (10)c), Rule 1 does not apply even though its context is met by the surface representation; reversing the rule order would feed Rule 1. In counterbleeding opacity (aka 'overapplication'; (10)d), the context of Rule 1 has been removed by the later application of Rule 2; reversing the order would bleed Rule 1. In both cases, the grammar can retrieve information that was present in previous stages of the derivation

[5]McCarthy's (2008: 270) succinctly characterizes a rule as opaque "if the fact that it applied [counterfeeding] or the context that it determined [counterbleeding] are not visible in the surface form".

and which is no longer visible in the output. Thus, rule opacity entails the existence of informationally encapsulated, sequentially ordered representations, thereby providing one of the strongest arguments for a derivational and against a purely representational[6] model of the grammar (see section 4).

The next subsection takes up the task of matching the rule based taxonomy (10) with manifestations of overt movement. Discussion of covert operations will therefore be postponed to section 3.2. This move is motivated by two considerations. First, the logic of the arguments underlying tests for movement in general is founded on assumptions originally developed for overt movement. Second, the discussion of overt movement introduces an important analytical tool (Late Merger) that is also involved in markers of covert movement.

3.1. Diagnosing overt movement

Movement interacts with interpretation, and all four combinations in (10) are symptomatic of displacement. But not all correlations provide a valid *diagnostic* for movement, as some of them can also be accounted for in representational models that are enriched by copies. Still, such conspiracies provide useful tools if the objective consists in the more narrowly defined task of distinguishing movement from other dependencies such as variable binding and/or control. The present section surveys some of these interactions that are also relevant for covert displacement.

To begin with, the contrast in (11) demonstrates that overt movement extends the binding domain of an anaphor across a potential antecedent (in the binding theoretic sense), indicating that fronting *feeds* Condition A of Binding Theory in (11)b (Chomsky 1993).[7]

(11) a. *I asked the boys$_1$ which girl will buy [which picture of each other$_1$]
b. I asked the boys$_1$ [which picture of each other$_1$]$_2$ I should buy t$_2$

Feeding of this type is symptomatic of movement, but does not provide a diagnostic yet, as (11)b is equally amenable to a purely representational analysis, on which the *wh*-phrase is base generated in its surface position and binds a variable in the position of the foot of the chain.

It is common practice for Condition C to be interpreted as a negative requirement which, if its context is met, induces a disjoint reference effect. Hence, movement which feeds Condition C results in configurations with illicit coreference patterns. Conversely, movement that bleeds Condition C renders available coreference relations that would not have been possible in the pre-movement configurations. It follows that A'-movement in (12)a and A-movement in (12)c *bleed* Condition C. (12)a/c are also illustrative of *counter-feeding* because evaluating Condition C before movement would induce disjoint reference effects:

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[6]Representational models are defended in Brody (1995), Haider (1993) and Koster (1986), among others.

[7]Using object antecedents and reciprocals instead of reflexives guards against a logophoric construal of anaphors, which is known to be subject to less severe locality conditions (Zribi-Hertz 1989; see also Büring 2005; Fox and Nissenbaum 2004; Pollard and Sag 1992; Reinhart and Reuland 1993):
(i) John$_1$ was furious. The picture of himself$_1$ in the museum had been mutilated.

(12) a. [Which claim [<u>that offended Bill$_1$</u>]]$_2$ did he$_1$ repeat t$_2$?
b. *[Which claim [that Mary offended Bill$_1$]]$_2$ did he$_1$ repeat t$_2$?
c. [The claim [<u>that Mary offended Bill$_1$</u>]]$_2$ seems to him$_1$ to be correct.
(adapted from Chomsky 1993:37)

On the standard Late Merger account of the paradigm (12), the underlined constituent is combined with the common noun (*claim*) after the host has reached its surface position.[8] This analysis can also be recast representationally, e.g. by having nodes attach to higher copies only. Thus, Condition C obviation does not in itself decide between derivational and representational theories of displacement. Absence of disjoint reference effects is therefore only a symptom, and not a reliable diagnostic of movement in the narrow sense.

Anaphors embedded inside fronted nodes reconstruct for the evaluation of Condition A. In addition, reconstruction in (13) is forced by the requirement that downward entailing quantifiers (*noone*) surface c-command the variables they binds:

(13) [Which pictures of himself$_1$]$_2$ did noone$_1$ like t$_2$?

Prior to the advent of Copy Theory (Chomsky 1993), (13) represented a solid argument for movement and derivations, as anaphor licensing had to precede movement in the analysis of (13). Reversing the order destroys, i.e. bleeds, the contexts for Principle A. Thus, without multiple occurrences of nodes in the tree, (13) is an instance of counterbleeding opacity.

The argument for derivations is lost, though, once the representations are enriched with copies, which store all information relevant for anaphor resolution or a more expressive semantic model is adopted that permits variable binding without c-command, as for example Sternefeld (2001a, 2012)[9]. Principle A reconstruction is widely held to provide a reliable diagnostic for movement in the wider sense, though, in that it separates movement from control and other binding relations. This is reflected by the contrast (14)a vs. (14)b and (15)a vs. (15)b, which attest to the fact that anaphors inside raising subjects behave as if they are part of the lower clause, while control subjects are interpreted wherever they surface:

(14) a. [Only some friends of each other$_1$]$_2$ seemed to the applicants$_1$ t$_2$ to be supportive
b. *[Only some friends of each other$_1$]$_2$ promised the applicants$_1$ PRO$_2$ to be supportive

(15) a. [Friends of each other$_1$]$_2$ seemed t$_2$ to amuse the men$_1$ (Bailyn 2009: (4)a/b)
b. *[Friends of each other$_1$]$_2$ promised PRO$_2$ to amuse the men$_1$

[8]See Chomsky (1993), Lebeaux (1995) and Takahashi and Hulsey (2009), among others.

[9]Sternefeld (2001a; 2012) demonstrates that it is possible to undo movement for variable binding in semantics, without syntactic reconstruction. In a nutshell, the system has two key components: (i) denotations are dynamically modeled as functions from variable assignments to ordinary meanings (Bennett 1974). This move renders possible semantic reconstruction. (ii) β-reduction may - unlike in the standard λ-calculus - result in binding of previously free variables, accounting for variable binding after reconstruction.

To recapitulate, rule interactions, even if they result in opacity, exhibit the symptoms of displacement but can *prima facie* not be used as reliable diagnostics for the presence of a movement chain. This is so because all configurations visited so far can also be given a representational interpretation. The next section transposes the symptoms identified so far into the domain of covert movement.

3.2. Diagnosing covert movement

Covert movement parallels the behavior of overt displacement (cf. (11)) in that it *feeds* Principle A and provides new interpretive options, as can be inferred from the contrast in (16) (from Fox 2003). Assuming that QR is permitted only if it creates new interpretations (Fox 2000), object QR across the embedded subject is legitimate only in (16)b. As a result, covert movement extends the binding domain of the reciprocal in (16)b but not in (16)a:

(16) a. ??The two rivals$_1$ hoped that *Bill* would hurt [every one of each other$_1$'s operations]
b. The two rivals$_1$ hoped that *someone* would hurt [every one of each other$_1$'s operations] $*\exists \succ \forall / \forall \succ \exists$ (Fox 2003: 99, ex. (28))

Crucially, unlike what was seen to be characteristic of overt movement in (11), the observation that QR expands the binding domain of anaphors supplies a promising diagnostic for movement. This is so because in competing, surface oriented theories that do not employ QR (Barker and Shan 2006; Cooper 1983; Hendriks 1993; Sternefeld 2012 among others), the position of the restrictor does not co-vary with the semantic scope of the quantificational determiner, making it hard to express correlations between scope and binding. On these non-movement accounts, (16)a and (16)b are therefore expected to be on a par.

If QR takes along r-expressions instead of anaphors, as in (17)a on its inverse scope reading, Condition C is not computed in the higher scope position, but in the foot of the chain. Moreover, this disjoint reference effect is cancelled in environments such as (17)b, where the scope bearing category embeds an Antecedent Contained Deletion (ACD) site (Fiengo and May 1994).

(17) a. *Somebody showed him$_3$ every book [$_{CP}$ that Sam$_3$ wanted me to show him]
b. Somebody showed him$_3$ every book [$_{CP}$ that Sam$_3$ wanted me to ⌂]
⌂ = [$_{VP}$ show him] (Fiengo and May 1994: 274).

Thus, QR bleeds Condition C violations, but it does so just in case movement also feeds ACD.

Fox and Nissenbaum (1999) argue that the contrast (17)a vs. (17)b does not so much lie in different movement properties of the object quantifier, but reflects differences in the shape of the foot position of the chain. Specifically, QR strands a full copy of the object in the base position of (17)a, inducing a Condition C effect. By contrast, in (17)b, the object *every book* reaches its scope position by an extraposition-like process of *overt covert movement*, detailed in (18)a, which is followed by Late Merger of the relative clause in (18)b:

(18) a. [[Somebody showed him$_3$ t$_2$] every book$_2$]
b. [[Somebody showed him$_3$ t$_2$] [every book$_2$ [$_{CP}$ <u>that Sam$_3$ wanted me to ⌂</u>]]]

Consequently, the single occurrence of *Sam* in (18)b resides outside the c-command domain of

the coreferential pronoun.[10] Independent support for the analysis comes from the observation that Principle C obviation is attested with covert as well as with overt extraposition (Taraldsen 1981):

(19) a. *I showed him$_3$ a book [that Sam$_3$ wanted to read] yesterday
b. I showed him$_3$ a book t yesterday [<u>that Sam$_3$ wanted to read</u>]

(17)b illustrates counterfeeding opacity, similar in structure to (12)a/c, where displacement is visible. But in contrast to the overtly inverted variants (12)a/c, (17)b offers a dependable criterium for covert movement, because a better understanding of Principle C obviation in (17)b crucially relies on an assumption which surface representational theories explicitly reject - silent displacement of (object) quantifiers.

Finally, the absence of an inverse scope reading for (20) suggests that covert movement also creates constellations of counterbleeding opacity. In (20), the direct object (*every book about each other*) undergoes type driven QR to a position above vP, across the VP-internal antecedent (*us*). The fact that Principle A applied can therefore not be directly inferred from the LF output representation (where 'directly' means: 'without copies'). Hence, Principle A overapplies.

(20) She showed us$_3$ every book [about each other$_3$]

To summarize, feeding of Condition A ((16)) and bleeding of Condition C ((17)) strongly indicate that the domains in which Binding Theory and scope are computed match. Binding Theory can thereby be used as an index for covert movement. Discussion of various other diagnostics signaling covert displacement can be found in Fox (2000), Nissenbaum (2000), Pesetsky (2000) and Takahashi and Hulsey (2009), among many others.

The next section turns to the first of two new diagnostics for covert movement.

4. The Duke of York

The current section introduces a type of rule opacity, known since Pullum (1976) as *Duke of York* (DoY), which differs from contexts involving counter-feeding or counter-bleeding in that it combines operations in a way that renders a representational re-analysis impossible. Derivations that fall under the general DoY format proceed in three steps: (i) an input A is mapped to an intermediate representation B, (ii) some operation targets B, and (iii) the derivation returns to the initial state A. Crucially, the existence of the opaque intermediate stage B can be inferred from the observation that the output is subject to restrictions that can only be expressed in terms of conditions on B. Thus, DoY configurations supply one of the strongest known arguments for adopting derivations as a device for modeling syntactic displacement. In addition, the deliberations below will expose new criterial properties of covert movement that can be used as a tool for detecting its marks in syntactic representations.

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[10]The foot of the object chain t_2 does not contain a copy of the ellipsis site, avoiding endless regress in ellipsis resolution. It is unclear why the relative clause cannot also be Late Merged in (17)a; see Fox (2002: 73, fn. 21) for discussion.

Beck (1996) observed that quantifiers induce barriers for operations that connect *wh-in-situ* phrases with their scope positions (intervener **bold**, covertly moved nodes are marked by *italics*):

(21) a. Sie fragte, was wer wann verstanden hat
She asked, what who when understood has
"She asked, who understood what when"
b. *Sie fragte, was **niemand** *wann* verstanden hat
She asked, what nobody when understood has
"She asked, what understood nobody when"

The group of interveners restricting the distribution of *wh-in-situ* also includes degree particles such as *genau*/'exactly', as pointed out by Sauerland and Heck (2003):[11]

(22) a. *?Sie fragte, wer gestern **genau** *wann* angekommen ist (adapted from
She asked, who yesterday exactly when arrived is Sauerland and Heck 2003)
b. Sie fragte, wer gestern *wann* **genau** angekommen ist
She asked, who yesterday when exactly arrived is
"She asked, who arrived yesterday when exactly"

(23) a. *Sie fragte, wer gestern **genau** mit *wem* gesprochen hat
She asked, who yesterday exactly with whom spoken has
b. *?Sie fragte, wer gestern mit **genau** *wem* gesprochen hat
She asked, who yesterday with exactly whom spoken has
c. (?)Sie fragte, wer gestern mit *wem* **genau** gesprochen hat
She asked, who yesterday with whom exactly spoken has
"She asked, who yesterday with exactly whom spoken has"

Moreover, Sauerland and Heck notice that intervention effects are not restricted to *wh-in-situ* contexts, but are also attested with relative pronouns that pied-pipe PPs (cf. (24)b vs. (24)c).[12]

(24) a. Maria sprach [$_{PP}$ über **genau** zwei Freunde]
Mary talked about exactly two friends
b. die Freunde, [$_{PP}$ über *die*] Maria sprach
the friends, about who Mary talked
c. *die Freunde, [$_{PP}$ über **genau** *die*] Maria sprach
the friends, about exactly who Mary talked
"the friends (exactly) who Mary talked about"

A unified explanation for these observations is provided by the analysis of pied-piping by von Stechow (1996), schematized in (25)a, on which the pied-piper undergoes LF-movement to its scope position (or, to be precise, to the scope position of the λ-binder that translates as the index on the pied-piper). According to Sauerland and Heck, (24)c fails to satisfy the same principle that is responsible for generating intervention effects in contexts involving *wh-in-situ*:

[11]See Beck (2006), Pesetsky (2000) and Tomioka (2007) for recent discussion of intervention effects and further references. On pied-piping see also Sternefeld (2001b).

[12]The order *über die genau* /'about the exactly' is also excluded, presumably due to independent restrictions on the order of *genau* /'exactly'. Thanks to a reviewer for drawing my attention to this issue.

(25) a. LF: the friends [*who* **λ₁** [$_{PP}$ about t_1] Mary talked]
b. LF: the friends [*who* **λ₁** [$_{PP}$ **exactly** about t_1] Mary talked]

These ingredients provide the basis for a DoY argument in support of derivations. The evidence comes from German examples such as (26) in which a relative pronoun (*das*/'which') has pied-piped a PP inside an infinitival, which itself has been pied-piped to the clause initial position.[13] Adding the intervener *genau* /'exactly' above das_3 in the control (27) confirms that relative pronoun movement out of the derived position is indeed sensitive to intervention effects.

(26) etwas [[$_{CP}$ [$_{PP}$ über das_3]$_4$ auch nur mit einem seiner$_1$ Freunde t_4 zu sprechen]$_2$
something about which even only with a single of his$_1$friends to speak
wohl **keiner$_1$** $t_{CP,2}$ wagen würde]
particle nobody dare would
"something OP_3 that nobody$_1$ would dare to talk about t_3 [to even a single one of his$_1$ friends]$_{NPI}$"

(27) *etwas [[$_{CP}$ [$_{PP}$ über **genau** das_3]$_4$ auch nur mit einem seiner$_1$ Freunde t_4 zu sprechen]$_2$
something about exactly which even only with a single of his$_1$friends to speak
wohl **keiner$_1$** $t_{CP,2}$ wagen würde]
particle nobody dare would

The scheme in (28) tracks how the relevant steps of the derivation unfold. (As above, bold face is reserved for interveners, and covertly moved nodes are marked by italics.)

(28) a. [**intervener$_1$** [[$_{CP}$ r-pron$_3$ pron$_1$]]
b. *r-pron [λ_3 [**intervener$_1$** [[$_{CP}$ t_3 pron$_1$]]]
c. [[$_{CP}$ r-pron$_3$ pron$_1$] [**intervener$_1$** [[$_{CP}$ r-pron$_3$ pron$_1$]]]
d. r-pron [λ_3 [[$_{CP}$ t_3 pron$_1$] [**intervener$_1$** [[$_{CP}$ r-pron$_3$ pron$_1$]]]]
e. r-pron [λ_3 [[$_{CP}$ t_3 pron$_1$] [**intervener$_1$** [[$_{CP}$ t_3 pron$_1$]]]]

The DoY argument for derivations is based on the grammatical (26) and proceeds in two steps. To begin with, since (26) does not display the signature of an intervention effect, the relative pronoun (r-$pron_3$) could not have reached its LF-location by the illicit movement step in (28)b. However, as documented in (28)c, it is possible to evacuate r-$pron_3$ from the c-command domain of the intervener by left-ward shift of the CP which contains the pronoun.[14] Importantly, the pronoun may now legitimately move to the left periphery, as see in (28)d. Thus, to capture the interaction between pronoun movement and intervention effects in (26), it appears necessary to assume that the pronoun has moved out of the higher CP.

[13]On infinitival pied-piping in relative clauses see e.g. Haider (1985) and van Riemsdijk (1985).

[14]This step is what Collins (2005) calls *smuggling*.

The second ingredient for the DoY argument is provided by two safe guards which ensure that the lower copy of CP is interpreted. These come in shape of a pronominal variable (*pron*$_1$ in (28)) bound by the intervener, and a strong NPI (*even a single* in (26); suppressed in (28)) which needs to be licensed by the negative intervener. It follows that CP must reconstruct into a position below the intervener at LF, as in (28)e.

Given the deliberations above, it seems as if the derivation (28) imposes two contradictory requirements on CP: reconstruction is obligatory for the computation of binding relations, but prohibited for purposes of relative pronoun movement. The conflict can be resolved, though, if intervention effects are evaluated derivationally, and if the derivation proceeds as follows. CP is pied-piped across the intervener in an initial step ((28)c). Next, the relative pronoun moves covertly out of the higher CP ((28)d). Finally, CP reconstructs, with the effect that pronominal variable binding and NPI licensing can be read off the lower copy of CP ((28)e). It is exactly this type of conspiracy of upward movement, application of an operation in the upper position, followed by recycling of a lower copy which is characteristic of DoY derivations.[15]

Note at this point that the particular manifestation of the DoY does not lend itself to a representational reinterpretation because representational theories reduce relativization to variable binding, which renders the conclusion that (26) is assigned the parse (28)b virtually inescapable. However, (28)b includes an illegitimate binding relation across an intervening negative quantifier, and it is far from obvious how representational approaches could proceed in exempting (26) from the intervention effects which were found to be symptomatic of pied-piping relative pronouns by Sauerland and Heck (2003). As long as these challenges for representational alternatives persist, the DoY derivation of (26) supplies a strong argument in support of a derivational model of the grammar.

Finally, the DoY analysis of (26) also generate a first new diagnostic for covert movement. The specific test which can be extracted from (26) is applicable to configurations which are isomorphic to (26) except for that they involve an relation R instead of relativization. If, in such contexts, R can be shown to display all relevant characteristics of the *Duke of York* derivation, it can be inferred that R has been produced by a movement operation, and not by binding.

5. Reconstruction

The syntactic opacity effects discussed in section 3, among them (29) (repeated from above), arose from having movement destroy the context for an interpretive principle:

(29) [Which pictures of himself$_1$]$_2$ did noone$_1$ like t$_2$?

Such level ordering conflicts are repaired by a class of operations referred to as reconstruction (Chomsky 1993; Fox 1999). These operations may affect at least three distinct components of

[15]The two occurrences of CP in (28)d are not strictly identical in that the higher copy contains a variable (t_3) in a position where the lower copy holds a pronoun. This might pose a general problem for all theories that adopt smuggling (Collins 2005), at least if this difference matters semantically.

the fronted category[16]. First, the restrictor argument of the quantificational determiner may reconstruct for the evaluation of c-command sensitive conditions such as Principle A in (29) (but see fn. 9), or the calculation of admissible coreference patterns. Relations that are restored by members of this group will also be referred to as *e-binding,* as the interpretive markers for reconstruction characteristically involve (properties of) individuals.

Second, reconstruction serves as a device to place categories back into the scope of intensional operators they have overtly crossed over. Consider the ambiguity of (30):

(30) A unicorn seemed to be in the garden.

On its semantically opaque, *de dicto* interpretation, (30) expresses a proposition that lacks existential import and is accordingly evaluated as true only if the speaker misidentifies some other creature as a unicorn. By contrast, the transparent *de re* interpretation truthfully describes only counterfactual situations in which there are unicorns. Extensional systems that permit explicit quantification over worlds (Ty2, Gallin 1975) or situations (Percus 2000) can explain this difference by the assumption that the restrictor *unicorn* contains a phonetically empty world/situation argument which is either locally bound by the intensional operator or a silent λ-binder in the matrix clause. The latter configuration produces the transparent *de re* construal for the restrictor, rendered in more detail in (31)a, while the former results in a notional *de dicto* ascription of 'unicornhood' ((31)b; R_{seem} represents the accessibility relation encoded by *seem*):

(31) a. *de re*: $\lambda\underline{s}\exists x[\text{unicorn}(x)(\underline{s}) \wedge \forall s'[R_{seem}(s)(s') \rightarrow \text{in\_the\_garden}(x)(s')]]$

b. *de dicto*: $\lambda s\forall\underline{\underline{s'}}[R_{seem}(s)(s') \rightarrow [\exists x.\text{unicorn}(x)(\underline{\underline{s'}}) \wedge \text{in\_the\_garden}(x)(s')]$

Variable binding is commonly held to be contingent on LF c-command (see caveat in fn. 9). In the surface LF-representation for (30), a fragment of which is given in (32)a, the situation argument of the subject can therefore only be bound by the sentence level operator λ_1, yielding the transparent *de re* construal.

(32) a. Surface representation: $[\lambda_1 \ldots \ [[_{DP} \ldots s_{1/*2} \ldots]_3 \ldots \ [\textit{seem}\ [\lambda_2 \ldots \ t_3 \ldots]]]]$

b. Reconstruction: $[\lambda_1 \ldots \ [\textit{seem}\ [\lambda_2 \ldots \ [_{DP} \ldots s_{1/2} \ldots]_3]]]$

If the subject is on the other hand to be assigned the *de dicto* interpretation (31)b, the subject accordingly needs to reconstruct into the scope of *seem*, as in (32)b, such that the situation variable (s) can be captured by the lower binder λ_2. On this conception, *de dicto* readings for raising subjects are contingent on reconstruction. (For details see also appendix.) As the configurations in this second group of phenomena implicate situation variables, they will henceforth also be referred to as contexts of *s-binding.*

Finally, a third ingredient of DP interpretation which is sensitive to syntactic structure regulates the scope of the quantificational determiner relative to other scope bearing categories. For categories that have been moved, scope can also be computed in a lower chain position, resulting in scope reconstruction. Scope reconstruction is e.g. responsible for the contrast in (33).

[16]For details of the compositional semantics see e.g. von Fintel and Heim (2005).

(33) a. Mary seems to two women [to have danced with every senator] ($\exists_2 \succ \forall$/*$\forall \succ \exists_2$)
b. Two women$_1$ seem [t_1 to dance with every senator] ($\exists_2 \succ \forall$/$\forall \succ \exists_2$)
(paradigm adapted from Lebeaux 1995)

As documented by (33)a, raising complements are scope islands. From this, it can be inferred that the distributive, wide scope reading of *every senator* in (33)b must be the product of subject reconstruction into the lower clause followed by object QR across the subject:

To summarize, DP reconstruction has the potential of restoring the configuration for three interpretive properties: (i) the evaluation of *e-binding* relations (Binding Theory, variable binding, among others); (ii) referential opacity, expressed in terms of *s-binding*; and (iii) the *scope* of the quantificational determiner.

5.1. Types of reconstruction

On the standard analysis of reconstruction in terms of Copy Theory (Chomsky 1993), all three properties are systematically correlated in that all three are read off the same occurrence of an expression. But there are various observations indicating that this consistency is not entirely pervasive, as expressed by the generalization in (34):

(34) There are contexts in which a DP reconstructs for scope but not for (s/e-)binding.

Before turning to the theoretical consequences of (34), I will briefly address two of these mismatches between binding and scope.

First, the behavior of short scrambling in (35) demonstrates that scope reconstruction is independent from e-binding reconstruction (Lechner 1998):

(35) a. weil wir$_3$ [einige Freunde von *einander*$_{*2/3}$]$_{1,\,DO}$ *allen Gästen*$_{2,\,IO}$ t_1 vorstellen wollten
since we some friends of each other to all guests introduce wanted
"since we wanted to introduced some friends of each other to all the guests"
($\exists \succ \forall$ / $\forall \succ \exists$)

b. *?weil ich$_3$ [einige Freunde von *einander*$_{2/*3}$]$_{1,\,DO}$ *allen Gästen*$_{2,\,IO}$ t_1 vorstellen wollte
since I some friends of each other to all guests introduce wanted
"since I wanted to introduced some friends of each other to all the guests"

German is a scope rigid language in which non-surface scope is contingent upon overt inversion of the scope bearing expressions. A direct object that has moved to the left of a dative may consequently be construed with inverse scope. At the same time, the scrambled accusative DP in (35)a does not reconstruct for Condition A. As a result, the reciprocal can only be understood as being bound by the subject ((35)a). Furthermore, removing this binder, as in (35)b, yields strongly marked results. Thus, short scrambling reconstructs for scope, but not for e-binding.

Second, Sharvit (1998) observed that scope can be computed below the node in which e-binding is evaluated on the condition that the positions for s-binding and e-binding match. In amount questions such as (36), the degree predicate *n-many* is most naturally understood within the scope of *hope.*

(36) How [[many students] who hate Anton$_1$] does he$_1$ hope will buy him$_1$ a beer?

a. *Narrow scope *n-many*, opaque *de dicto* restrictor: (**de dicto*/√*de re*)
"For what number n and for all bouletic situation alternatives of Anton s': there are n-many students who hate Anton in s' which will buy him a beer in s'."

b. Narrow scope *n-many*, transparent *de re* restrictor:
"For what number n, and in all bouletic situation alternatives of Anton s': there are n-many students who hate Anton in the actual situation that will buy him a beer in s'."

Moreover, the restrictor *students who hate Anton* can be construed *de dicto*, paraphrased in (36)a, or *de re*. But only the latter, referentially transparent reading (36)b is compatible with coreference between *Anton* and *him*. Hence, (36) attests to the existence of scope diminishment without reconstruction for e-binding or s-binding.

A similar conclusion based on qualitatively different judgements can be drawn from an inspection of the A-movement configuration in (37), which is modeled on Russell's *yacht*-sentences (Russell 1905).

(37) [John's height]$_1$ seemed to us [t$_1$ to exceed his actual height]

a. [John's height]$_{\text{de dicto}}$ seemed to us to exceed his actual height$_{\text{de re}}$. (consistent)
b. #[John's height]$_{\text{de re}}$ seemed to us to exceed his actual height$_{\text{de re}}$. (contradictory)
c. #It seemed to us that John's actual height exceeds his actual height. (contradictory)

As detailed by (37)a, raising subjects may reconstruct into the scope of *seem*, resulting in a consistent *de dicto* reading. On this interpretation, (37) compares the degree of John's height in the evaluation situation to the height he holds according to our knowledge state. By contrast, construing the subject *de re*, as in (37)b, yields the inconsistent proposition (37)c which attributes to us contradictory beliefs.

Interestingly, it appears to be possible to demonstrate that just like with Sharvit's paradigm (36), s-binding reconstruction entails e-binding reconstruction in contexts involving A-movement. The evidence derives from the contrast in (38):

(38) a. ??[John$_1$'s height]$_{\text{de dicto}}$ seemed to him$_1$ to exceed his actual height. (consistent)
b. [His$_1$'s height]$_{\text{de dicto}}$ seemed to him$_1$ to exceed his actual height. (consistent)

On the consistent reading of (38)a, the subject needs to be understood *de dicto*, hence is interpreted below *seem*. But this requirement conflicts with the demands imposed on the structural relation between *John$_1$* and *him$_1$* by Condition C, resulting in a disjoint reference effect.[17] Furthermore, if the r-expression is substituted by a pronoun, as shown by the control in (38)b, coreference and logical consistency are no longer mutually exclusive. To the extent that the paradigm is representative, the contrast between (38)a and (38)b provides a strong argument for the view that reconstruction for the purposes of s-binding implies e-binding reconstruction.

[17]Similar to double object constructions, where the verb starts below its arguments, I assume that *seem* originates below the PP *to him* and moves to the left. Thus, reconstruction of the subject into the scope of the interpretive position of *seem* also places the name into the c-command domain of the PP.

Russell ambiguities also supply a test for the other direction of the entailment relation between s-binding and e-binding, suggesting that DPs which reconstruct for e-binding also need to do so for s-binding. In (39)a, a subject internal reciprocal is bound by an antecedent below the intensional operator *seem*, forcing e-binding reconstruction. Moreover, (39)a may characterize consistent *de dicto* scenarios, but can - at least not naturally - be construed as a *de re* proposition. There is a systematic contrast between (39)a and examples without anaphors like (39)b, in that only the latter admits a contradictory *de re* interpretation.[18]

(39) a. [Each others$_1$'s height] seemed to them$_1$ to exceed their actual height.
(consistent *de dicto*/*contradictory *de re*)
b. [Their$_1$ height] seemed to them$_1$ to exceed their actual height.
(consistent *de dicto*/contradictory *de re*)

If the assessment of the data is correct, it follows that e-binding reconstruction results in *de dicto* readings. More generally, the relation between e-binding and s-binding can now be captured by the conjecture (40), where 'evaluated in the same position' is to be understood as specified in the two clauses (40)a and (40)b:[19]

(40) *Conjecture*
e-binding and s-binding relations are evaluated in the same position of the tree.
a. *Referential opacity entails e-binding reconstruction:*
DPs that are construed *de dicto* reconstruct for e-binding.
b. *e-binding reconstruction entails referential opacity:*
DPs that reconstruct for e-binding only admit *de dicto* readings.

(34) There are contexts in which a DP reconstructs for scope but not for (s/e-)binding.

In combination with (34), repeated from above, conjecture (40) also defines the desiderata for an adequate theory of (DP-) reconstruction. Concretely, (34) indicates that not all instances of scope reconstruction are reducible to reconstruction in course of the syntactic derivation, and that the grammar therefore has to include a strategy for post-syntactic scope diminishment. Such a device is provided by Semantic Reconstruction (SemR), a family of operations that make it possible to postpone scope reconstruction into the semantic component.[20] What is of particular significance for present purposes is the fact that SemR does not restore e-binding relations, given that all e-binding is evaluated at LF. (On SemR and s-binding see below). Applied to (35), this

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[18]Another paradigm that displays the same property as (39) is (i). Again, it appears that only (i)b can be understood as a contradiction:
(i) a. [The picture of himself$_1$] seemed to him$_1$ to be better than it was. (*de dicto*/**de re*)
b. [His$_1$ picture] seemed to him$_1$ to be better than it was. (*de dicto*/*de re*)

[19]This qualification is necessary because strictly speaking, reconstruction for s-binding does not entail *de dicto* readings. The s-variable could in principle also be bound long distance.

[20]On SemR see Hendriks (1993); Romero (1998); von Stechow (1991); Cresti (1995) and Rullmann (1995). Similar proposals can be found in Jacobson (1999) and Sternefeld (2001a). For discussion of the relation between e-binding and s-binding see also Romero (1998).

has for instance the consequence that the direct object can be interpreted with narrow scope, while binding relations are left unaffected at LF (Lechner 1996, 1998).

In combination with the Copy Theory of movement, SemR provides the basic ingredients for what will be referred to as the *hybrid theory of reconstruction* (Lechner 1996, 1998; Sharvit 1998). But the hybrid theory must also guard against overgeneration by weeding out illegitimate configurations that fail to satisfy (40). As detailed by the table in (41) out of the six logically possible ways of dissociating scope, e-binding and s-binding in a two-member movement chain, only a single one - (41)f - is empirically attested.[21]

(41)

	Reconstruction of α w.r.t.:			*Is the combination empirically attested (and if not, why not)?*
	Scope	*Binding*	*Opacity*	
a.	–	+	+	no (since SynR entails SemR)
b.	–	+	–	no (SynR entails SemR)
c.	–	–	+	no (neither SynR nor SemR)
d.	+	–	+	no (≈ (40)a; condition on type of trace in 5.2)
e.	+	+	–	no (≈ (40)b; condition on s-variable binding in 5.2)
f.	+	–	–	yes ((35) and (36); see also fn.21)

The principles regulating DP-interpretation accordingly have to be supplied by suitable mechanisms blocking the remaining five illicit combinations.

To begin with, the two cells in (41)a and (41)b are excluded without further assumptions because (total) reconstruction in syntax implies scope reconstruction. Next, irrespective whether reconstruction proceeds in syntax or semantics or in both components, it is detectable either by narrow scope or by binding reconstruction. It follows that (41)c, which involves neither operation, cannot be generated by any standardly sanctioned lowering operation. Finally, (41)d and (41)e fail to observe the empirical generalization (40), which posits that e-binding and s-binding are both evaluated in the same copy. The next section specifies how generalization (40) can be derived from three independently motivated assumptions. Moreover, the principles that will be used to contain overgeneration of type (41)e will be seen to yield a second new diagnostic

[21]The Scope Trapping environment in (i)b (Lebeaux 1995; example from Fox 1999), in which a fronted DP serves as binder, represents a sixth configuration that needs to be excluded. (i)b illustrates that scope reconstruction entails reconstruction for e-binding. Consequently, categories that bind in their surface position must not be targeted by SemR.

(i) a. One soldier$_1$ seems (to Napoleon) t_1 to be likely to die in every battle. ($\forall \succ \exists$)

b. #One soldier$_1$ seems to himself$_1$ t_1 to be likely to die in every battle. (*$\forall \succ \exists$)

This restriction can arguably be derived from the incompatibility of the type requirements on binders for anaphors and on SemR. While anaphors denote individual variables (or a diagonalization function of type <<e,et>,<et>>), SemR achieves scope diminishment by Generalized Quantifier type traces (<et,t>, modulo situation variables). Such traces are not suitable binders for anaphors. Moreover, scope is fixed by the lowest higher type trace. It follows that DPs which undergo SemR cannot bind anaphors above their scope positions.

for covert movement.

Before proceeding to the details, note that pattern (41)e needs to be excluded not only by the hybrid approach, but also by purely syntactic accounts of reconstruction. As the validity of the diagnostic for movement to be extracted depends on the proper treatment of (41)e only, it is accordingly not aversely affected even if the hybrid theory of reconstruction eventually turned out to be untenable.

5.2. Containing overgeneration

The hybrid theory of reconstruction admits scope diminishment in syntax (by copies) as well as in semantics. For such an approach to deliver accurate results, it must - as was shown above - be ensured that configurations in which a DP has undergone scope diminishment obey the two conditions in (40), repeated in slightly different wording as (42). Clause (42)a blocks (41)d, while (42)b eliminates (41)e.

(42) a. *de dicto* interpretations entail reconstruction for e-binding.
b. *de re* readings correlate with non-reconstructed wide e-binding scope

In what follows, I will explicate how these conditions are to be derived, in turn.

The first condition can be accounted for by adopting the assumption that the denotation of movement traces is limited to expressions of extensional type.[22] Thus, <e>, <e,t> and <et,t> are possible types for traces, while e.g. <s,<et,t>> and <<e,st>,st>> are not. Such a type restriction implies an important consequence for configurations schematically depicted by (43), in which a DP moves across an intensional operator (*seem*), binds a higher type trace (T) below the operator and reconstructs into that trace in the semantic component (see von Fintel and Heim 2005). Since higher type traces - by assumption - lack an argument slot for situations, the s-variable inside DP cannot be bound by the lower binder λ_2 subsequent to SemR into T:

(43) $[\lambda_1 \ldots \ [[_{DP} \ldots s_{1/*2} \ldots]_3 \ldots [seem\ [\lambda_2 \ldots T_{3,\,<et,t>} \ldots]]]]$ (**de dicto*/*de re*)

As a result, SemR undoes movement for scope, but not for s-binding. DP can therefore only be assigned a *de re* interpretation with respect to *seem*. Given that SemR invariantly generates *de re* interpretations, it follows as a corollary that narrow scope *de dicto* readings must be the product of the alternative strategy of syntactic reconstruction by copies. Hence, referential opacity entails reconstruction for e-binding, as expressed by conjecture (42)a. (For details of the semantic computation see appendix.)

The requirement that higher type traces be extensional derives the first of the two conditions which were defined as *desiderata* for a successful theory of reconstruction. The second component of the theory needs to exclude environments in which a lower movement copy is interpreted *de re*, with wide s-binding scope, as in pattern (41)e. This prohibition on (41)e falls out from the intersection of a particular view on how situation variables are bound and a new generalization about covert movement.

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[22]Keshet (2007, chap. 3) suggests a similar restriction in a different context.

To begin with, Percus (2000) and Percus and Sauerland (2003) observe that s-variable binding is regulated by principles which resemble the ones known from overt syntactic displacement. This correlation supports the hypothesis, also to be adopted here, that s-binding consists in movement of silent situation pronouns to the positions of their binders. As will be seen shortly, qualitatively new evidence in support of Percus and Sauerland's conjecture comes from its ability to account for the absence of (41)e once it is combined with the final ingredient of the analysis, viz. a hitherto unrecognized locality condition on movement. In what follows, I will motivate this new descriptive generalization first, turning from there to its effect on (41)e.

The new descriptive generalization is given in (44). (44) essentially demands that covert movement out of silent categories proceeds as local as possible:

(44) For any α, β and γ, α cannot extend its scope over γ if
  a. β contains α and
  b. β moves across γ and
  c. β is interpreted below the overt position of γ

As schematically depicted by (45), condition (44) targets contexts in which a category β has moved ((45)a; see (9)b) and states that further subextraction of α out of lower copies of β may proceed locally, as in (45)b, but must not cross an intervening binder γ, as in (45)c. (44) can therefore also be thought of as a relativized version of the Minimal Link Condition (Chomsky 1995) which is restricted to movement out of reconstructed nodes.

(45)

a.	Move β:		$[\lceil_{\beta} \ldots\alpha \ldots\rceil$	[γ ...		$[\lceil_{\beta} \ldots\alpha \ldots\rceil \ldots]]]$
b.	Move α locally:		$[[_{\beta} \ldots\alpha \ldots]$	[γ ...	[α ...	$[[_{\beta} \ldots t_{\alpha} \ldots]\ldots]]]]$
c.	Move α non-locally:	*[α ...	$[[_{\beta} \ldots t_{\alpha} \ldots]$	[γ ...		$[[_{\beta} \ldots t_{\alpha} \ldots]\ldots]]]]$

Empirical support for (44) comes from the observation that it provides a unified analysis of three at first sight unrelated restrictions on λ-binding.

A first manifestation of (44) is instantiated by predicate fronting. It is well-known that VP-topicalization as in (46)b systematically bleeds inverse scope readings (Barss 1986; Huang 1993).

(46) a. .... and $[_{VP}$ teach every student$_{\alpha}]_{\beta}$, noone$_{\gamma}$ will t_{β} ($\neg\exists \succ \forall$ / $*\forall \succ \neg\exists$)
  b. .... and noone$_{\gamma}$ will $[_{VP}$ teach every student$_{\alpha}]_{\beta}$ (subsequent to reconstruction)

In order to render the structure interpretable, the topicalized VP of (46)a needs to reconstruct[23], restoring the base word order, as indicated by the fragmentary LF-representation (46)b. Scope freezing follows now as a consequence of the descriptive generalization in (44).[24] More specifically, (46)b matches the profile of (45), with *every student* valuing α, VP instantiating β and *noone* standing in for γ. Thus, (44) states that movement of VP-movement renders ineligible

[23]The alternative view that the predicate reconstructs by SemR cannot be correct, because names inside fronted predicates trigger disjoint reference effects (Heycock 1995; Takano 1995). If Condition C is taken to be indicative of c-command at LF, the predicate must have reconstructed in syntax.
(i) *....and $[t_2$ proud of John$_2]_{\beta}$ I think that he$_2$ said [Mary$_3$ is t_{β}]

[24]In addition, any theory of scope freezing must ensure that the subject does not reconstruct. See Lechner (to appear) for discussion.

the object *every student* (α) for long QR across the subject *noone* (γ), deriving the desired effect of scope freezing.

A similar restriction applies to Inverse Linking, where the two quantifiers affected are in a dominance instead of a c-command relation, and where all movements proceed covertly. In (47), the direct object *someone from every city* needs to cross the (VP-internal trace of the) subject in order to resolve a type mismatch. At the same time, *every city* may be inversely linked across its container *someone* ((47)a,b). However, the subject must not scopally interfere between the inversely linked node *every city* and the container ((47)c), as first noted in Larson (1985) (see also Heim and Kratzer 1998; Lechner 2009; May and Bale 2005; Sauerland 2005):

(47) [$_{\gamma}$ Two policemen] spy on [$_{\beta}$ someone from [$_{\alpha}$ every city]]

a. $2 \succ \forall \succ \exists$ (inverse linking, wide scope for subject)
b. $\forall \succ \exists \succ 2$ (inverse linking, narrow scope for subject)
c. *$\forall \succ 2 \succ \exists$ (inverse linking, intermediate scope for subject)

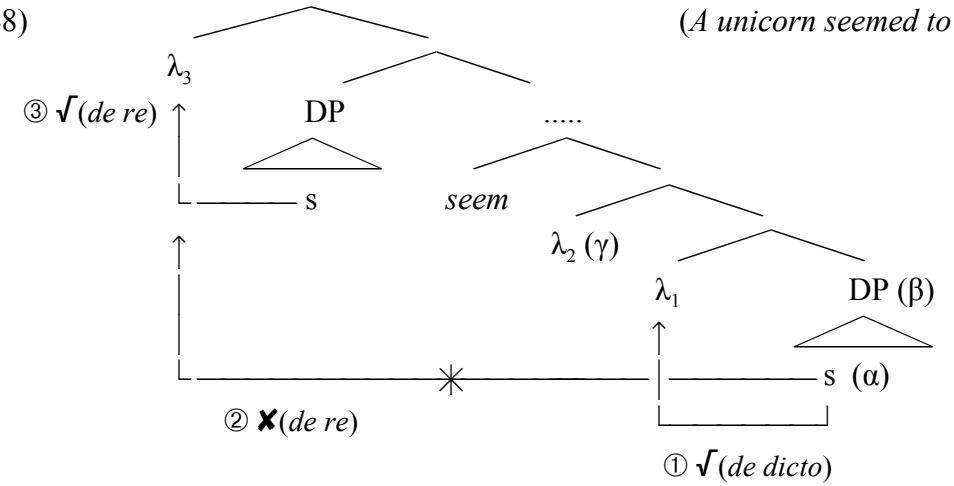
Just like (46), the structure in (47) bears the signature of (44), the only difference being that in (47), β moves covertly and not overtly. In (47), the object quantifier *someone from every city* (β) contains *every city* (α) and undergoes type driven QR. Moreover, in the relevant reading (47)c, β is interpreted below the position the subject (γ) resides in. Condition (44) therefore prohibits *every city* from obtaining scope over the subject. This effectively excludes reading (47)c. Thus, scope restrictions on VP-fronting and inverse linking both fall out from the descriptive generalization (44).

Returning at this point to s-variable binding into DPs, it can be shown that (44) has the additional virtue of blocking the illicit paradigm (41)e, which combines e-binding reconstruction with a referentially transparent interpretation. The tree (48) below graphically depicts the relevant relations between a raised DP and the s-variable it embeds.

In principle, an s-variable may be bound in three different ways in a two member chain, two of which are empirically attested. First, local s-movement out of the lower copy (①) results in the attested reconstructed *de dicto* reading. Second, long distance s-movement across an intervening binder out of the lower copy (②) yields the illegitimate combination of e-binding reconstruction and the restrictor being interpreted *de re*. Finally, local movement out of the higher copy generates a possible reading on which the DP is interpreted in its surface position *de re* (③).[25]

[25]In addition, there is an unattested Duke of York derivation in which DP moves, s-binding takes place from the higher copy, but the lower copy is recycled for the evaluation of e-binding. See section 5.3 for some speculations on the absence of this derivation.

(48) (*A unicorn seemed to be in the garden*)



In the same way as was seen with VP-fronting and inverse linking, the unattested configuration ② is eliminated by generalization (44). More precisely, if the derivation proceeds as in ②, a situation pronoun (α) is extracted out of a node that itself has been moved (β). But this pronoun crosses the potential binder λ_2 (γ), and therefore fails to choose the closest possible landing site, in violation of (44). Furthermore, from the fact that generalization (44) applies to configurations generated by movement it also follows now that s-variable binding (at least in the present contexts) is afforded by covert movement of the situation pronoun (Percus and Sauerland 2003).

To recapitulate, (49) repeats the two corollaries of the system which are responsible for keeping the hybrid theory of reconstruction from overgeneration. (49)a blocks (41)d, and (49)b excludes (41)e:

(49) a. Narrow scope *de dicto* readings of DPs that have moved across an intensional operator are derived by syntactic reconstruction (Copy Theory).

b. Narrow scope *de re* readings of DPs that have moved across an intensional operator are derived by SemR.

These results were derived from an independent restriction on the logical type of higher type traces for clause (49)a, and the assumptions in (50) which account for (49)b:

(50) a. Natural language expressions are translated into an extensional formal language which permits binding of s-variables (Percus 2000).

b. s-binding is the result of movement (Percus and Sauerland 2003).

c. Covert movement out of silent categories observes locality condition (44).

While (50)a is part of the standard repertoire, and (50)b represents an axiom of the interpretation procedure that finds independent support, the new empirical generalization (44) (= (50)c) was seen to render possible a common analysis of three previously unrelated phenomena: two scope restrictions on predicate fronting and inverse linking, respectively, and the condition on s-variable binding that excludes option (49)b. The question whether it is possible to derive (44) from other, related principles such as the cycle, the extension condition or the Minimal Link Condition has to await another occassion.

Central to the objectives of the present study, which consist in the identification of tests for covert movement, is the observation that the novel generalization (44) also provides a second, new diagnostic for covert displacement. Specifically, the account for restriction (49)b rests on the assumption that s-binding is the product of movement, as posited by (50)b. (49)b could not have been derived on the alternative view that s-binding is expressed purely representationally. If the distribution of referential opacity effects were exclusively determined by binding, it would be hard to explain how to capture the parallelism between configurations that are assembled by movement (VP-fronting and inverse linking) on the one side and s-variable binding on the other side. Thus, the fact that the interpretation of s-variables is subject to conditions which are not attested with homomorphic configurations which involve binding strongly suggests that the target configurations are indeed the result of covert movement.

This finding in turn supports the more general hypothesis that all configurations of λ-binding which display sensitivity to (44) have been generated by covert movement. On this conception, (44) not only offers a common explanation for three previously unrelated restrictions (on DP-reconstruction, VP-fronting and inverse linking), but also provides a new diagnostic which reacts to covert movement.

5.3. Synthesis: Duke of York vs. reconstruction

In section 4, it was observed that pied-piped relative pronouns enter into a Duke of York (DoY) derivation, relevant parts of which are repeated in (51)a:

(51) a. Step I: $[\alpha \ldots [[_\beta \ldots t_\alpha \ldots]$ [intervener $[[_\beta \ldots \alpha \ldots]\ldots]]]]$ (Duke of York)
Step II: $[\alpha \ldots$ [intervener $[[_\beta \ldots t_\alpha \ldots]\ldots]]]]$

b. $*[\alpha \ldots [[_\beta \ldots t_\alpha \ldots]$ [intervener $[[_\beta \ldots t_\alpha \ldots]\ldots]]]]$ (scope restrictions)

In step I (51)a, the relative pronoun covertly moves out of a node that itself has been fronted (β). Subsequently, the container β reconstructs into a position below an intervener, yielding the signature movement - subextraction - reconstruction characteristic of DoY derivations. As a result, the pronoun ends up being bound in a lower occurrence of the moved node β in step II, even though derivationally, in step I, it had moved out of the higher one.

As the discussion of scope restrictions and reconstruction in the current section revealed, analogous derivations that legitimate binding across an intervener are absent from predicate fronting and DP-movement, as shown in (51)b.[26] If it were possible to bind a variable inside the lower occurrence of β across an intervening quantifier or intensional operator, one would incorrectly predict the existence of inverse scope readings for VP-topicalization and reconstructed *de re* interpretations for fronted DPs, respectively. (52) summarizes these results:

[26]For inverse linking, the question does not arise, because the quantifier containing the inversely linked QP cannot be interpreted *in-situ*, rendering the last defining step of the DoY unavailable.

(52)	*Duke of York*	*DP-Reconstruction/VP-fronting*
a.	β contains α	β contains α
b.	β moves	β moves
c.	α moves out of *higher* occurrence of β	α must *not* move out of higher occurrence of β

This leads to the question of why DoY derivations are restricted to pied-piped relative clauses and do not show up more pervasively. Why is such a conspiracy absent from contexts that involve situation pronoun movement and DP-movement instead of relative pronouns and fronted CPs (see fn. 25)? The concluding part of this paper adds a speculative remark on the puzzling imbalance (52).

One possible response to the asymmetry in (52) resides in exploiting the specific interpretive properties of DoY. The DoY derivation involves relativization, and this operation is unambiguously mapped to a single LF-representation, relative pronoun movement always turns the root node of the relative clause into a derived λ-abstract. Consequently, the position of the λ-binder is fixed in a single position. By contrast, both VP-fronting and DP-reconstruction result in two potentially truth conditionally distinct representations, one of which is barred by the locality condition (44). Thus, what seems to distinguish the two types of contexts is that structures which display DoY effects are fixed in interpretation while those which observe (44) are at least in principle ambiguous. This generalization, if correct, suggests that DoY derivations represent a last resort strategy for rendering configurations interpretable.

Finally, it is noteworthy that the locality condition (44) is not a principle which is calculated relative to an interpretation, but applies to all possible meanings that can be generated by a movement operation. It differs in this respect from other constraints, notably Scope Economy and restrictions on wh-interrogatives, which are widely held to choose the most economical candidate from a set of synonymous derivations (Fox 2000; Golan 1993; interface economy of Reinhart 2006). Whether and how (44) can be connected to the hypothesized meta-condition on the distribution of the DoY awaits to be seen.

6. Conclusion

The present contribution pursued two larger goals. On the one side, the chapter aimed at surveying diagnostic strategies which have been employed in testing symptoms of covert displacement (section 2 and 3). The second objective consisted in the development of two new criteria which aid in identifying covert movement operations. The two new tests are related in that both involve covert movement of categories that lack descriptive content.

The first diagnostic followed as a corollary from a Duke of York analysis of pied-piping in relative clauses. While the diagnostic itself is more of theoretical value, as it might be hard to locate other contexts that match the structural properties of the specific DoY presented here, the analysis implies an important consequence. Notably, if the DoY account advocated in section 4 is correct, it supplies a solid argument for a derivational model of the grammar, and against a representational reinterpretation of movement dependencies (Brody 1995; Haider 1993; Koster 1986).

A discussion of the hybrid theory of reconstruction, which admits SemR by higher type traces in addition to Copy Theory, yielded a second diagnostic for covert movement. More specifically, it was seen that the hybrid theory must be supplemented by three assumptions that impose strict conditions on possible dissociations between binding and coreference relations on the one side and referential opacity on the other. One of these restrictions was claimed to be coextensive with a new empirical generalization regulating subextraction out of lower movement copies. Since this generalization appears to apply only to configurations created by movement and is limited to contexts of Quantifier Raising and silent s-variable binding, it also provides a new test for covert displacement.

In sum, the findings above furnish support for three broader theoretical claims: (i) there are DoY configurations in syntax, confirming the tenets of a derivational model of the grammar; (ii) situation pronouns are bound by movement; and (iii) it is possible to design a sufficiently restricted hybrid theory of reconstruction.

Various questions had to remain unanswered, which point into directions for further investigations. For instance, it is not clear at the moment which procedure is responsible for interpreting (the lower copy of) DoY contexts. Furthermore, the distribution of DoY derivations and the selected availability of extraction out of higher copies could not be related to any other known principle. Next, the condition on s-variable binding should be integrated into the analysis of referential opacity in other contexts such as dream reports (Percus and Sauerland 2003). Also, it would be interesting to see to which extent the conditions on s-binding match those on e-binding as e.g. studied in connection with Dahl's puzzle (Fox 2000). Finally, an adequate account of the locality condition on subextraction out of lower movement copies is still missing. While it is tempting to reduce this condition to general properties of movement (cyclicity, extension condition), how to attain a concrete analysis remains unclear at present.

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Appendix: The type of traces

When interpreting movement of DPs across intensional operators, different assumptions w.r.t. the possible logical type of the trace left by movement lead to different semantic results. In this appendix, I spell out the compositional semantics for two ways of analyzing the narrow scope reading of (53) by SemR, i.e. by positing a higher type trace inside the scope of *seem* (for detailed discussion see also von Fintel and Heim 2007):

(53) A friend$_2$ seemed T_2 to be winning

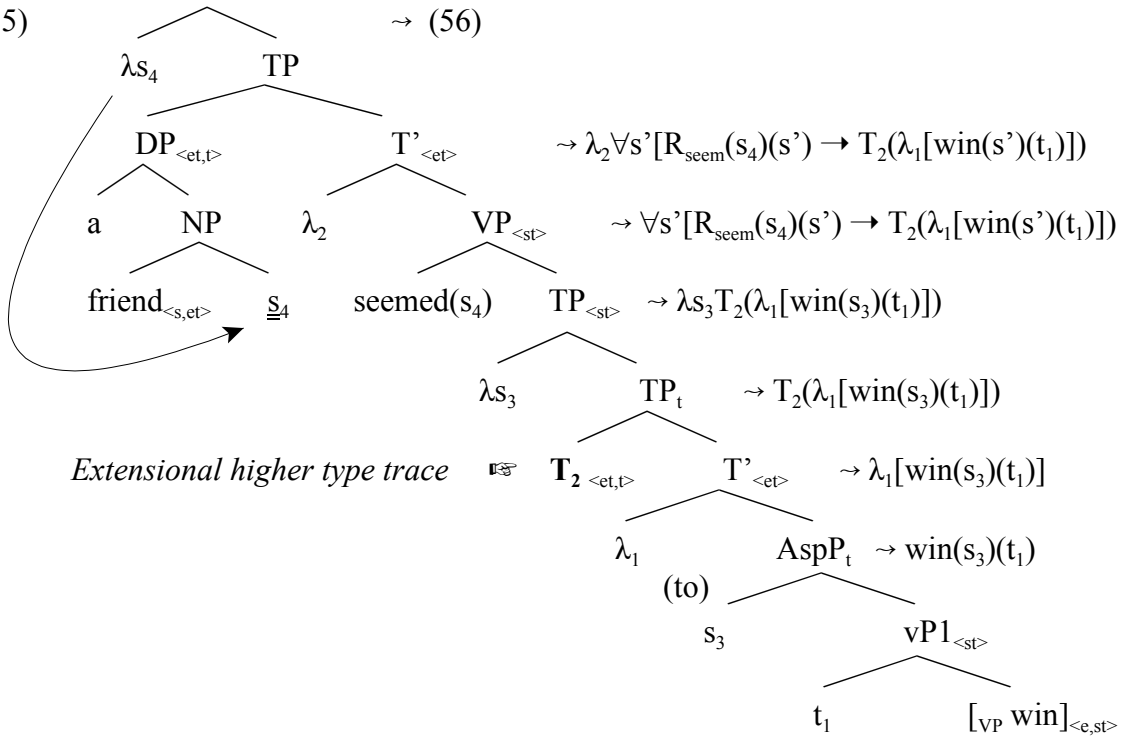
One of the desiderata for an adequate (hybrid) theory of reconstruction came in form of generalization (49)b, according to which narrow scope *de dicto* readings are derived by syntactic reconstruction. This requirement accounted for the observation that reconstruction for referential opacity, creating notional *de dicto* interpretations, entails reconstruction for binding theory. Generalization (49)b directly falls out from the assumption that higher type traces of DP are restricted to the extensional type <et,t>, (where 'extensional' is meant to refer to denotations that do not take s-type arguments; see also Keshet 2007). By contrast, if movement is free to strand intensional traces of type <<e,st>,st> (as in Rullman 1995) or some other type that includes situation arguments, accounting for (49)b becomes less straightforward.

The extensional version of SemR proceeds from the assumptions in (54). Only the last one ((54)d) is unfamiliar so far, but rather innocent in that it only assigns to situation arguments a particular position in the tree:

(54) a. SemR utilizes extensional higher type traces of type <et,t> (and possibly <et>).
b. Each predicate takes a silent situation pronoun as an argument (Percus 2000).
c. Situation pronouns are bound by movement of these pronouns, resulting in λ-abstraction (Percus 2000; Percus and Sauerland 2003).
d. Situation argument of the verb is contributed by Asp.

The axioms under (54) restrict SemR in such a way that reconstruction across intensional operators yields narrow scope *de re* readings, but does not produce narrow scope *de dicto* interpretations. The latter must accordingly be generated by reconstruction in syntax (Copy Theory), deriving the desired correlation that s-binding entails e-binding. The relevant portions of the LF-tree for the sample derivation of (53) are given in (55) (the labels should not confer any ontological commitment as to the nature of the nodes). Example (56) provides relevant details of the calculation.

(55)



(56) *(Attested) narrow scope* de re *reading by SemR:*

a. $[\![(55)]\!] = \lambda s_4\ [\lambda_2 \forall s'[R_{seem}(s_4)(s') \rightarrow T_2(\lambda_1\ [win(s')(t_1)])\ (\lambda Q \exists x[friend(\underline{s}_4)(x) \wedge Q(x)])]$

b. $\lambda s_4\ \forall s'[R_{seem}(s_4)(s') \rightarrow \lambda Q \exists x[friend(\underline{s}_4)(x) \wedge Q(x)]\ (\lambda_1\ [win(s')(t_1)])]$

c. $\lambda s_4\ \forall s'[R_{seem}(s_4)(s') \rightarrow \exists x[friend(\underline{s}_4)(x) \wedge \lambda_1\ [win(s')(t_1)](x)]]$

d. $\lambda s_4\ \forall s'[R_{seem}(s_4)(s') \rightarrow \exists x[friend(\underline{s}_4)(x) \wedge win(s')(x)]]$

Although the consequences of adopting different frameworks have already been discussed in the literature in isolation (see e.g. von Fintel and Heim 2007: 71ff and 86ff), the specific system

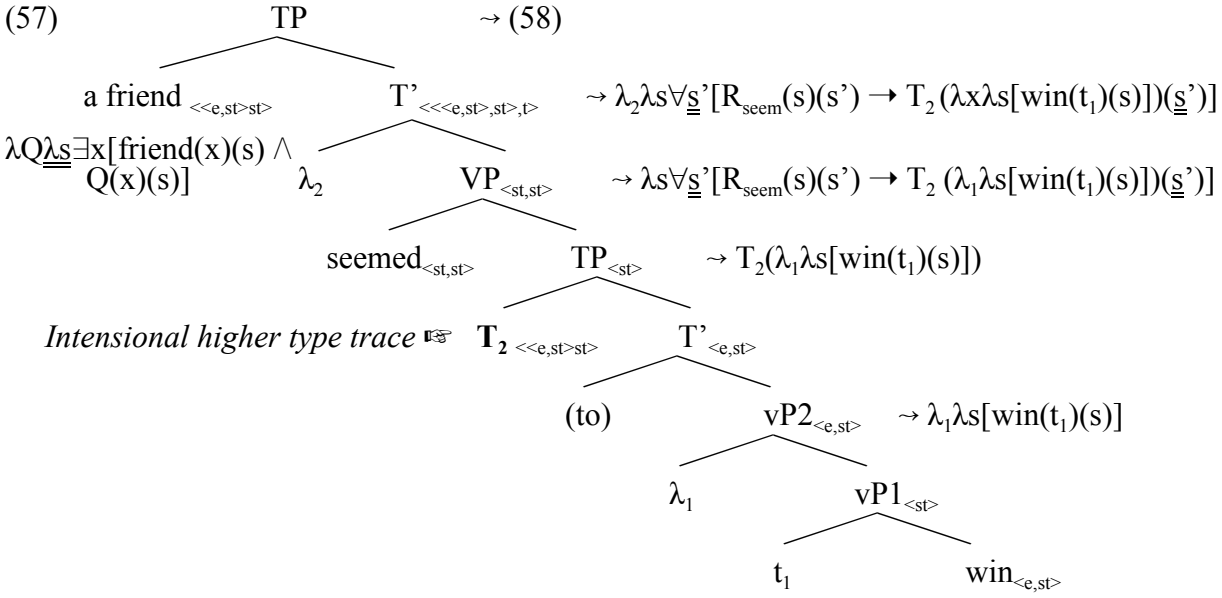
advocated below, in which movement strands extensional traces of type <et,t> and common noun denotations apply to situation variables as their first arguments, has - to the best of my knowledge - not been explored yet.

There are various alternative intensional versions of SemR, which have in common that the variable in the position of the movement trace denotes an intensional expression (where 'intensional' means that in the logical meta language, the expressions falling under this type take s-type arguments.) Thus, axiom (54)a is substituted by (54)a' below:

(54) a'. SemR potentially involves intensional higher type traces of type <<e,st>,st> (Rullman 1995), or <<s,et>,st>, among others.

Together with some concomitant changes in (54)d, this alternative version of SemR restores fronted DPs into a pre-movement configuration, and has situation variables inside these DPs being bound in these reconstructed positions. As a result, intensional SemR generates narrow scope *de dicto* interpretations. But this finding conflicts with the observation that *de dicto* readings entail e-binding reconstruction ((49)b). The intensional versions therefore produces representations for the unattested case (41)d. Again, the typed LF-tree (57) and the calculations in (58) interact in providing a sample derivation for sentence (53).

(57)



(58) *(Unattested) narrow scope* de dicto *reading:*

a. $[\![(57)]\!] = \lambda_2\, \lambda s \forall s'[R_{seem}(s)(s') \rightarrow T_2\,(\lambda_1 \lambda s[win(t_1)(s)])(s')]$
$(\lambda Q \lambda s \exists x[friend(x)(s) \wedge Q(x)(s)])$

b. $\lambda s\, \forall s'[R_{seem}(s)(s') \rightarrow \lambda Q \lambda s \exists x[friend(x)(s) \wedge Q(x)(s)](\lambda 1 \lambda s[win(t_1)(s)])(s')]$

c. $\lambda s\, \forall s'[R_{seem}(s)(s') \rightarrow \lambda s \exists x[friend(x)(s) \wedge \lambda_1\, \lambda s[win(t_1)(s)](x)(s)](s')]$

d. $\lambda s\, \forall s'[R_{seem}(s)(s') \rightarrow \lambda s \exists x[friend(x)(s) \wedge win(x)(s)](s')]$

e. $\lambda s\, \forall s'[R_{seem}(s)(s') \rightarrow \exists x[friend(x)(s') \wedge win(x)(s')]]$

To summarize, this appendix made explicit how and why the restriction on extensional traces derives the descriptive observation that reconstruction for s-binding correlates with binding reconstruction, as expressed by (49)b.