HARMONIC DERIVATIONALISM[1]

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1. INTRODUCTION

On a widely held view, cognitive systems consist of discrete, informationally encapsulated subcomponents or *modules* (Fodor 1975) operating on mental representations. As the modules can contain partially incompatible types of information, their expressions need to be modulated by *interfaces* in order to render representations of one system interpretable by its neighboring modules. For the language faculty, the two central syntax-external modules are model theoretic semantics and the sensor-motor system, which are accessed by their respective interfaces Logical Form and Phonetic Form. Recently, it has been argued that the modules interfacing with the core syntactic system also include a designated system computing logical inferences, called the *deductive system* (Fox 2000; Gajewski 2002).

The present paper outlines a new architecture of the grammar that redefines the way in which the logical syntax of meanings is derived. Concretely, it is suggested that the model of the grammar includes two covert components instead of a single one for deriving the abstract representations which are submitted to model theoretic interpretation: an *interface to DS*, which precedes the overt syntax system, and Logical Form (LF) which directly interfaces with the semantic component. In what follows I will, unless ambiguity arises, refer to the DS interface simply as DS.

The assumption of two covert components is justified by empirical as well as theoretical considerations. On the empirical side, the *DS-LF model* is supported by the fact that it offers an explanation for a class of structural restrictions on covert remnant movement identified in Lechner (2009, 2011a), where they are referred to as the *Condition on Extraction from Copies* or *CEC*. Theoretically, the new model offers at least two attractive features. First, it locates covert scope shifting operations and movements that solely serve the purpose of local type adjustment in two different parts of the grammar, resulting in a clean divide between movement that ensures interface readability and long-distance procedures which potentially create new interpretations. Second, it will be seen that DS is integrated into the stem of the derivation by an operation which is already widely used within the syntactic component in order to model syntactic *opacity* phenomena (such as Binding Theory obviation, see below): late lexical insertion of lexical nodes, a.k.a. Late Merge. Widening the role of Late Merge to apply not only within narrow syntax but also across modules leads to an increase of the overall symmetry of the system, while at the same time making optimal use of the analytical tools already employed in the analysis of opacity.

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The chapter is structured as follows. Subsequent to some general remarks on the relation between interfaces and opacity in section 2, section 3 briefly reviews the empirical basis for the CEC generalization. Section 4 attempts an explanation for the CEC. The analysis to be submitted crucially relies on the new DS-LF model of the grammar together with standard syntactic mechanisms such as Late Merge and the cycle. Some ramifications of the model will finally be considered in section 5.

2. Opacity

As opacity occupies a prominent position throughout the discussion of this chapter, the current section makes explicit some background concepts as well as the probably not so familiar notion of *opacity at the interfaces*.

In principle, linguistic interfaces can modulate the signal which is passed from one system to the next in two ways: qualitatively by signal transduction,[2] or quantitatively by altering the amount and internal composition of the information to be transmitted. The current discussion is concerned with changes across the quantitative dimension only. These changes determine (i) how much information is transferred at a given point (*amount*); at which point the information is released (*timing*); and (iii) where this information is precisely located in the representations built from the signal (*location*).

(1)

Quality	***Quantity***
Transduction (Changes in type of information to be transferred)	*Amount* (How much information is transferred?)
	Timing (When does the transfer take place?)
	Location (Where is the information located in representation?)

Quantitative factors do not only have an impact on information transfer across modules, but are also at work within an encapsulated component. It has been argued, for instance, that information in the syntactic system is packaged in discrete units (factor (i)), and that sequentially ordering these representations leads to the effect of syntactic derivations (factor (ii)). In order to show that the computation indeed proceeds in discrete, derivational steps, it is moreover necessary to find constellations in which the units are ordered in a particular sequence, subject to conditions which cannot be inferred from the output. Such constellations, known as *opaque contexts*, have been taken to be strongly indicative of incremental, derivational computation.

The study of opacity in linguistics has generally been restricted to phenomena located within a specific linguistic component such as syntax, phonology or morphology, where it has been instrumental in guiding the decision among competing models of the grammar.[3] According to the standard typology of Kiparsky (1971), opacity comes in two varieties, which in modern parlance are usually referred to as *over-* and *underapplication* (for important qualifications see Baković,

[2]Examples of signal transduction include microphones, which translate acoustic waves into electrical signals, or scales, which transduce from mass/weight to numbers.

[3]On the derivation vs. representation debate see, among many others, Brody (1995); Haider (1993); Lechner (to appear); Williams (2003).

to appear). Overapplication describes scenarios in which a principle or rule applies even though the context of that condition is not visible any more in the surface form. By contrast, in environments that are shaped by underapplication, a principle that should have applied, given the overt context, failed to do so. Two typical examples of over- and underapplication in syntax come from the interaction of Binding Theory and movement. Principle A reconstruction as in (2) is a manifestation of overapplication because the context of variable binding, that is c-command, is arguably not met any more subsequent to movement:[4]

(2) Which book about himself_1 did noone_1 like.

Overapplication is standardly modeled by assuming that the signal is richer than it appears, and includes devices such as silent lower occurrences of higher nodes (*copies*; Chomsky 1995).

With the assumption of copies, (2) ceases to be opaque. However, the analysis turns now Principle C obviation by A-movement, as in (3), into an instance of underapplication. Principle C is expected to affect the name in the lower copy located in the position marked t_2, barring coreference, but fails to do so. (Copies will be presented as traces for easy of readability.)

(3) [This picture of $\text{John}_1]_2$ seems to him_1 t_2 to be beautiful

A popular way to resolve this conflict consists in delaying lexical insertion of the offending parts (*picture of John*) to a point of the derivation where the name (*John*) is no longer c-commanded by the pronoun *he* (Whole Sale Late Merge; Takahashi 2007, extending Lebeaux 1998).

More specifically, Takahashi (2007) advances the hypothesis that the upper limit on insertion of nominal restrictor arguments is delimited by abstract Case in such a way that NP-restrictors need to be added inside their Case domains. Thus, objects have to be fully assembled inside vP, accounting for obligatory binding reconstruction with wh-movement in (4):

(4) [Which picture of $\text{John}_1]_2$ did she say that he_1 liked t_2 best

By contrast, Late Merge of the restrictor inside finite subjects can be delayed to T°. For the raising configuration (3), this entails that subjects which have undergone A-movement only need to be fully represented in their higher Case position. Thus, Takahashi derives classic instances of syntactic opacity from the interaction of two analytical strategies: copies and late delayed lexical insertion by Late Merge.

Opacity runs as a red thread through this chapter in various different guises. To begin with, parts of the discussion will be concerned with well-known analytical tools for modeling opacity in syntax, which include late insertion, copies and semantic reconstruction by higher type traces. In what follows, it will be argued that manifestations of opacity similar to those attested *within* core syntax can also be observed *across* components, specifically between syntax, DS and LF, revealing structural similarities between inter- and cross-componental relations which have, to my knowledge, not been made explicit in the literature so far. In short, such constellations of *opacity at the interfaces* arise whenever the hallmarks of under- or overapplication are detected across a sequence of operations which spans more than a single component. Recognizing these

[4]For details of the semantics of variable binding under reconstruction see Sauerland (1998). For alternatives, that do not require reconstruction, see Sternefeld (2012).

two distinct types of opacity is relevant inasmuch as both can be modeled by the same tools once the DS-LF-model is adopted, furnishing strong support for this revised architecture of the grammar. I will come back to further details, following a discussion of the empirical basis for the DS-LF-architecture in the next section.

3. THE CONDITION ON EXTRACTION FROM COPIES

The present section reviews two empirical arguments for the CEC generalization in (5).

(5) *Condition on Extraction from Copies (**CEC**)*
Covert subextraction out of silent copies is as local as possible.

The arguments, to be discussed in turn, come from DP-reconstruction and scope freezing with predicate fronting.[5]

3.1. Reconstruction

While movement can be undone for the computation of both relative quantifier scope and binding relations, it has been observed that scope and binding reconstruction do not necessarily coincide, indicating that reconstruction involves an additional mechanism apart from copies (see also Truswell, this volume). For instance, short scrambling in German illustrates that scope reconstruction does not entail binding reconstruction. Even though (6)a admits an inverse reading for the scrambled direct object QP$_1$, it is not possible to construe the anaphor inside the scrambled object as being bound by the indirect object to its right (Lechner 1996, 1998). (6)b demonstrates that in absence of a higher binder reconstruction results in ill-formedness, corroborating the hypothesis that short scrambling cannot be undone for binding (Frey 1993).

(6) a. weil wir$_3$ [einige Freunde von *einander*$_{*2/3}$]$_1$ *allen*$_2$ t$_1$ vorstellen wollten
since we some friends of each other to all introduce wanted
"since we wanted to introduced some friends of each other to everybody"
$(\exists \succ \forall / \forall \succ \exists)$
b. *weil ich$_3$ [einige Freunde von *einander*$_{2/3}$]$_1$ *allen*$_2$ t$_1$ vorstellen wollte
since I some friends of each other to all introduce wanted
"since I wanted to introduced some friends of each other to everybody"

The bifurcation between binding and scope in (6)b can be given a natural analysis on the assumption that binding relations are structurally encoded at LF and that scope diminishment is delayed to the semantic component, such that the scrambled object reaches its scope position too late for the principles of Binding Theory and variable binding to apply. Implemented in terms of Semantic Reconstruction (SemR; Cresti 1995; Rullman 1995; von Stechow 1991), as in (7), the inverse reading of the scrambled QP$_1$ is derived by having QP$_1$ bind a generalized quantifier type trace into which QP$_1$ is converted in the inverse reading:[6]

(7) *we*$_3$ introduced [[$_{DP}$ some friends of *each other*$_3$]$_1$ [to everybody$_2$ [T$_{1,<et,t>}$ ...]]]]

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[5]Further evidence and discussion of the CEC can be found in Lechner (2009, 2011a/b, to appear).

[6]See also Truswell (this volume), who discusses interesting challenges for the mixed approach towards reconstruction coming from unexpected reconstruction effects in control contexts.

Contexts which lend themselves to an analysis in terms of SemR are opaque, and they are so in two different ways. Note that a derivation is always opaque relative to a given representation. If this representation is taken to be the surface form, SemR represents a case of rule overapplication, because the principles responsible for determining scope locate the scope for the fronted quantifier in a configuration which has been destroyed by movement. But SemR can also be see as a manifestations of underapplication. If the structural description includes copies in the source position of movement, a principle (Principle A) that would have been expected to apply fails to be visible in the output. The relations can also be stated as follows: SemR describes overapplication with respect to quantifier scope, and underapplication with respect to Principle A.

Moreover, opacity in both cases results from the interaction between rules that belong to two different grammatical components: movement applies in overt syntax, while reconstruction is delayed to semantics. Since opacity is diagnostic of a serial rule orderings, this cross-componental opacity presents a strong argument for the view that syntax precedes semantics, in support of a serial, syntacto-centric architecture of the grammar (Chomsky 1993). By contrast, it is not evident how the phenomena characterized by the hybrid reconstruction approach can be made to be compatible with monostratal models such as categorial grammars in which syntactic and semantic representations are built up simultaneously.

While (6) presents a strong argument for a theory of reconstruction which admits both SynR by copies and SemR, the hybrid approach is challenged by the observation that there are contexts in which SynR and SemR systematically co-vary, in support of a pure SynR approach (Fox 1999; Lebeaux 2009; Romero 1998). Such *Scope Trapping* environments appear to suggest that the hybrid approach overgenerates, because it admits unattested combinations of wide binding scope (of situation variables, see below) and narrow quantifier scope. The trapping generalization relevant for present concerns contains the two clauses in (8):

(8) a. If a moved DP is construed *de dicto*, it reconstruct for Binding Theory.
    b. If a dislocated DP reconstructs for Binding Theory, it is construed *de dicto.*

The paradigm in (9) confirms the validity of (8)a (Lechner 2009, to appear; Sharvit 2007). Both examples, modeled after Russell's (1905) yacht sentences, are ambiguous between a consistent *de dicto* interpretation for the raising subject, and a contradictory *de re* reading. Interestingly, in (9)a the fronted name *John* can be construed coreferentially with the pronominal experiencer *him* only on the contradictory *de re* reading. This follows on the assumption that the *de dicto* construal is produced by binding the situation variable (*s-variable*) inside the subject *John's height* to the raising predicate, which makes the referentially opaque reading contingent upon subject reconstruction into a position below *seem.* Relevant parts of the LF representation are made explicit in (10), while (11) provides details for the *de re* interpretation:

(9) a. [*John*$_2$'s height] seemed to *him*$_2$ to exceed his actual height.
    (*consistent *de dicto*/√ contradictory *de re*)
    i. *de dicto*: "It seemed to John that John is taller than he actually is."
    ii. *de re*: "John obtained the impression: I am taller than I am."
    b. [*His*$_2$ height] seemed to *him*$_2$ to exceed his actual height. (*de dicto/de re*)

(10) *Consistent* de dicto *reading of (9)a violates Principle C*

a. *[John$_2$'s height]$_{de\ dicto}$ seemed to him$_2$ to exceed his actual height$_{de\ re}$
b. *λs_0 [seemed [$\underline{\underline{\lambda s}}_1$ to *him$_2$* [*John$_2$*'s height-in-$\underline{\underline{s}}_1$] to exceed his height-in-s_0

(11) *Contradictory* de re *reading of (9)a does not induce Principle C effect*

a. [John$_2$'s height]$_{de\ re}$ seemed to him$_2$ to exceed his actual height$_{de\ re}$
b. $\underline{\underline{\lambda s0}}$ [[*John$_2$*'s height-in-$\underline{\underline{s0}}$] [seemed [$\lambda s_1$ to *him$_2$* to exceed his height-in-s_0

Russell ambiguities also supply a test for (8)b. Specifically, (12)a can only be understood as a consistent *de dicto* proposition, indicating that anaphor reconstruction results in narrow s-binding ((13)b; (12)b serves as control). Thus, if a moved DP reconstructs for the anaphor licensing, the s-variable must be locally bound to the next intensional predicate (Romero 1998):

(12) a. [*Each others$_2$*'s height] seemed to *the boys$_2$* to exceed their actual height.
(√consistent *de dicto*/*contradictory *de re*)
i. *de dicto*: "It seemed to each boy that the others are taller than they actually are."
ii. *de re*: "Each boy had the impression: the other boys are taller than they are."

b. [*Their$_2$* height] seemed to *the boys$_2$* to exceed their actual height.
(√consistent *de dicto*/√contradictory *de re*)

(13) *Consistent* de dicto *reading of (12)a abides by Principle A*

a. [Each others$_2$'s height]$_{de\ dicto}$ seemed to the boys$_2$ to exceed their actual height$_{de\ re}$.
b. λs_0 [seemed [$\underline{\underline{\lambda s}}_1$ to *the boys$_2$* [*each others$_2$'s* height-in-$\underline{\underline{s}}_1$] to exceed their height-in-s_0

(14) *Contradictory* de re *reading of (12)a violates Principle A*

a. *[Each others$_2$'s height]$_{de\ re}$ seemed to the boys$_2$ to exceed their actual height$_{de\ re}$.
b. *$\underline{\underline{\lambda s0}}$ [[*each others$_2$*'s height-in-$\underline{\underline{s0}}$] [seemed [$\lambda s_1$ to *the boys$_2$* to exceed his height-in-s_0

The findings above entail that the hybrid theory can be contained from overgeneration only if two requirements are guaranteed. First, reconstruction by SemR always has to result in *de re* interpretations. Otherwise, it would be possible to derive combinations which reconstruct for scope and referential opacity, generating *de dicto* readings, but not for Binding Theory. But such constellations are incompatible with (8)a. Conversely, syntactic reconstruction by Copy Theory must invariantly produce a *de dicto* reading.[7] Otherwise, movement could reconstruct for binding and scope while preserving referential transparence (*de re*), in contradiction to (8)b.

The first task, i.e. ensuring that SemR is compatible with *de re* interpretations only, falls out from a general principle on higher type traces, which restricts their logical type to extensional types. For further details see Lechner (to appear). It is the second condition where we finally encounter a first manifestation of the CEC, repeated from above:

(5) ***Condition on Extraction from Copies (CEC)***
Covert subextraction out of silent copies is as local as possible.

[7]This requirement needs to be secured both by the hybrid and the pure SynR approach, and is therefore independent of the decision between these two theories.

Essentially, what the paradigm (12) and (8)b demonstrate is that a successful theory of reconstruction must be able to block long-distance binding of s-variables out of reconstructed subjects, in order to exclude LF-representations such as (15), which underlie the unattested *de re* reading.

(15) *$\underline{\underline{\lambda s0}}$ [seemed [λs_1 to *the boys*$_2$ [*each others*$_2$'s height-in-$\underline{\underline{s0}}$] to exceed their height-in-s_0

On the assumption that s-variable binding comes about by silent movement of the situation pronoun (Percus and Sauerland 2003), (15) is straightforwardly excluded by the CEC. In (15), variable s_0 has moved across a closer potential binder (λs_1) in violation of the minimality condition of the CEC. Thus, the CEC derives an important restriction on syntactic reconstruction.

3.2. Predicate Fronting

Further empirical motivation for the CEC from a different direction comes from scope freezing effects with predicate fronting. While (16)a is scopally ambiguous, VP-topicalization in (16)b makes unavailable the inverse scope interpretation (Barss 1986; Huang 1993; Sauerland and Elbourne 2002):

(16) a. Noone will teach every student ($\neg\exists \succ \forall$ / $\forall \succ \neg\exists$)
b. .... and [$_{vP}$ teach every student], noone will t ($\neg\exists \succ \forall$ / *$\forall \succ \neg\exists$)

Assume that inverse scope with distributive operators is the result of covert scope shifting operations (Fox 2000) and that object QR is triggered by the need to avoid type incompatibility (Heim and Kratzer 1998). Then, the object wide scope reading for (16)b is contingent upon wide object QR out of the lower vP copy across the subject, documented in (17)b. But this movement operation is not the most local one, because short QR across the subject trace, as depicted in (17)c, also yield an interpretable output representation. Thus, wide QR is prohibited by the CEC.

(17) a. .... and noone$_2$ will [$_{vP}$ t_2 teach every student$_1$] (LF, after vP-reconstruction)
b. .... and [every student$_1$ [noone$_2$ will [$_{vP}$ t_2 teach t_1]]] (blocked by CEC)
c. .... and [noone$_2$ will [every student$_1$ [$_{vP}$ t_2 teach t_1]]] (admitted by CEC)

Just as with DP-reconstruction, the CEC can be seen as a tool to model opacity, to be precise underapplication. The representation (17)a, which is an output configuration from the perspective of the interpretive branch of the model, fails to license an operation - scope shifting QR - that should have been able to apply given the information supplied by the local context. It is only by looking a the derivational history that it becomes possible to define the pertinent restriction. Thus, the LF (17)a is opaque. Note that the CEC applies only to silent copies. As a consequence, scope shifting in regular transitive environments ((16)a) is not subject to the stricter locality conditions imposed by the CEC.

To summarize, it was argued that covert movement operations are subject to a new condition limiting movement out of silent copies, the CEC. The CEC in essence describes contexts that fit the profile of underapplication opacity: an operation that would in principle be expected to affect a given representation at LF fails to do so, and it fails to do so due to properties visible only at earlier stages of the derivation (overt syntax). Next, it will be seen that the most plausible explanation for the CEC resides with a new architecture of the grammar, and not with a reduction to other, known principles within syntax.

4. Analysis

There are various analytical options that can be explored in looking for an explanation of the CEC, among others the candidates in (18):

(18) *Possible explanations of the CEC*
a. Silence of the containing node blocks non-local movement
b. Property of movement procedure
c. Feature structure of silent copies (locality as a result of impoverished feature inventory on silent nodes)
d. Properties of linearization procedure (locality as a result of order preservation)
e. *Architecture of the grammar*: the covert component is divided into a part which admits non-local movement and a part which only licenses local movement.

Hypothesis (18)a is not likely to succeed given that elliptical VPs are silent, yet nonetheless admit non-local movement (*An American flag is hanging in front of every embassy, and a British one is, too*). Options (18)b to (18)d are either evidently too strong ((18)b) or vacuous, in absence of further details. A plausible venue is given by hypothesis (18)e, though, according to which the stricter locality conditions expressed by the CEC reflect the point in the derivation at which these movements occur. With the information provided in section 3, it becomes also possible to be more specific about how the local processes should be separated from the non-local ones. In essence, the CEC defines a last resort strategy for movement, barring all optional displacement which is not motivated by rendering representations interpretable at the semantic interface. Moreover, CEC conform operations are local since Economy dictates that they target the closest possible landing site which guarantees interpretability. On this view, the CEC is not a construction specific principle of the grammar, but rather expose a fundamental characteristic of the interface with model theoretic semantic: LF admits only local operations which serve to repair type mismatches and possibly other processes that are needed to secure LF-transparency (in the sense of von Stechow 1991).

The present proposal entails two consequences. First, it presents a more natural conception of the interface with model theoretic interpretation than the orthodox version of LF, which includes both local adjustment operations and non-local scope shifting movement. Second, it follows that since local CEC-conform movement applies at the LF-interface and LF is the last component in the stem of the derivation, optional, non-local scope shifting operations must precede LF. Thus, covert movement that applies early in the derivation is subject to more liberal locality conditions than covert operations that apply late. The grammar therefore has to make available a second silent component apart from LF for hosting non-local, scope shifting operations.

A potential candidate for such a second silent component emerges in form of the deductive system (Fox 2000; Gajewski 2002; Fox and Hackl 2006), or, to be precise, the grammar internal interface to DS. The following subsection briefly characterizes some core features of DS and suggests a new way to integrate the DS interface into the architecture of the grammar.

4.1. The DS-LF model

Fox (2000) introduces DS as a formal calculus that derives logical inferences which are, among others, used by the economy metric regulating possible scope relations (Scope Economy). A conception of DS particularly conducive to the one to be used below can be found in Gajewski (2002).

According to Gajewski, the analysis of various semantic phenomena, including the definiteness restriction and well-formedness conditions on exceptives, needs to make reference to properties of the logical skeleton of the expressions involved.[8] Roughly, the logical skeleton is obtained by replacing all non-logical, non-permutation invariant constants by variables of identical type, as illustrated for the existential construction in (19).

(19) a. There is no man/a man/*every man
b. Logical skeleton: [*there*$_e$ [*be* [*no/a/every* $P_{<e,t>}$]]]

Gajewski explores the idea, originating with Barwise and Cooper (1981), that ill-formedness ensues if the logical skeleton of an expression yields non-contingent truth conditions under all possible assignments, resulting in *l(ogically) analytical* statements. For instance, (19) can be shown to be l-analytical just in case strong determiners are inserted in the logical skeleton (19)b.

The concept of the logical skeleton dovetails with a group of proposals which have recently been advanced for various domains according to which certain formal principles of the grammar operate on impoverished representations. Such 'incomplete' linguistic objects can either be categorially underspecified (Richards 2010; Lechner 2004) or they may lack part of their descriptive content. Also, different theories have operationalized lexical impoverishment with the help of different analytical strategies, including late insertion in Distributed Morphology and counter cyclic (Whole Sale) Late Merge in the analysis of Principle C (Takahashi 2006; see (3) above).

There is now an intriguing synergy between DS and Late Merge, which can be exposed by assigning to DS the role of a second, grammar internal covert component with three properties: (i) DS precedes overt syntax; (iii) scope shifting operations apply at DS (if licensed by Scope Economy); (iii) the impoverished representations generated at DS are supplied with lexical content by Late Merge in course of the syntactic derivation. In short, Late Merge fills the logical skeleton with lexical content.[9] For reasons of expository convenience, I will from here on reserve the acronym 'DS' for the grammar internal component and refer to the language external deductive system in the sense of Fox and Gajewski by its full name (in analogy to the distinction between the linguistic level LF and the non-linguistic, philosophical notion *logical form*).

At the moment, the exact nature of the formal objects DS operates on is not entirely clear. In principle, DS representations could be taken to correspond to logical skeletons, as alluded to above. On this view, scope shifting operations at DS change the order of quantified expressions whose restrictors are property variables throughout DS, to be lexicalized by Late Merge only once the derivation reaches overt syntax. While this implementation offers the advantage of

[8]See Barwise and Cooper (1981) for existentials; see von Fintel (1994) for exceptives.

[9]Gajewksi (2002) attributes an idea along these lines to Danny Fox.

optimizing the interface with the (grammar external) deductive system, as the latter one operates on logical skeletons, I will adopt the more liberal position that lexical insertion by Late Merge can take place at any point of the derivation, throughout DS and overt syntax. This has the advantage of rendering the integration of DS representations into the overt syntactic system more efficient and simpler because movement copies can be generated by standardly sanctioned mechanisms. Hence, in what follows it will be assumed that DS representations can - but do not have to be - completely lexically impoverished. Other options are conceivable, but as far as I can see, the particular analyses to be advance below do not inherently depend on any particular choice as to how representations are lexicalized.

Subsequent to DS and overt syntax, the derivation reaches the model theoretic interface LF. Whereas DS operations are by nature non-local, as they test for different scope options, all LF movement, prototypically exemplified by type driven QR, is strictly local and exclusively serves the purpose of rendering representations readable at the interpretive interface. Thus, the resulting *DS-LF Model*, schematized in (20), partitions scope shifting QR and operations required for type repair into two separate components.

(20) ***The DS-LF model***

Lexical Insertion by (Whole Sale) Late Merge

DS → **Overt Syntax** → **PF**

↓

optional scope shifting rules **LF** → model theoretic interpretation

↓

grammar external deductive system obligatory local adjustment rules (type driven QR,...)

With the assumptions about the DS-LF model above, the sample derivation for a scopally ambiguous example such as (21) proceeds as follows. Assume for reasons of concreteness that in the case of (21), the DS representations resemble the logical skeleton. Then, the DS for the surface scope reading, given in (21), includes two determiners and variables in the position of the restrictor arguments and the verb. In addition to the logical skeleton for the overt scope order, the model also makes available a second DS-representation for the inverse reading ((21)b), in which the object has been exported across the subject:

(21) Two policemen spied on every boy

a. [two $P_{<e,t>}$ [$R_{<e,et>}$ [every $Q_{<e,t>}$]]]

b. [every $Q_{<e,t>}$ [two $P_{<e,t>}$ [$R_{<e,et>}$ [every $Q_{<e,t>}$]]]]

Scope Economy tests now whether the wide scope option derives a new interpretation that is logically independent from (21)a (Fox 2000). To that end, both (21)a and (21)b are transferred to the grammar external deductive system.[10] Since the external system confirms the logical independence of the two readings, both DS-representations are further processed by overt syntax. Note that the scope of an expression is not fixed or interpreted at DS. DS merely explores which among the logically possible scope relations are legitimated by the grammar external deductive system, passing licit configurations on to overt syntax and, eventually, to LF.

In overt syntax, roots and functional morphemes, including formal syntactic features, are merged. For the surface scope reading, there is only a single option for lexical insertion, detailed in (22), which correctly derives scope as well as word order:

(22) *Lexical insertion into object narrow scope representation*

a. [two $P_{<e,t>}$ [$R_{<e,et>}$ [every $Q_{<e,t>}$]]]
b. two policemen spied on every boy

As for the inverse reading, it is at least at first sight tempting to correlate long object movement at DS with Late Merge of the restrictor into the scope position of the object, as in (23):

(23) *Lexical insertion into object wide scope representation*

a. [every $Q_{<e,t>}$ [two $P_{<e,t>}$ [$R_{<e,et>}$ [every $Q_{<e,t>}$]]]]
b. every boy [two policemen spied on every $Q_{<e,t>}$]

However, this simple conception is contradicted by two facts. First, QR does not obviate Principle C effects (**Two policemen*$_5$ *spied on every boy who trusted the guys*$_5$). Hence the restrictor must be inserted low, inside the VP (for motivation see (26)c, below). Second, Late Merge into the scope position fails to account for the correct linearization, because QR does not have an effect on word order. Thus, the system has to insert the descriptive content in a cyclic fashion, starting with the lower occurrence of the object, proceeding from there to the higher one, as in (24). The higher copy is then marked as PF-inert (typographically symbolized by strikeout), just like in more traditional single output models that locate all movement operations, irrespective whether they are overt or covert, in the stem of the derivation (Bobaljik 1995; Groat and O'Neil 1996; Pesetsky 2000).

(24) *Lexical insertion into object wide scope representation*

a. [every $Q_{<e,t>}$ [two $P_{<e,t>}$ [$R_{<e,et>}$ [every $Q_{<e,t>}$]]]]
b. ~~every boy~~ two policemen spied on every boy

More complex structures such as subject to subject raising and other long distance displacement phenomena require additional assumptions about the mechanisms generating DS representations, some of which to be made explicit below. A more complete study of the typology of movements in the new architecture has to await another occasion, though. The next section precedes to the analysis of CEC effects in the DS-LF model.

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[10]Transfer to the language external Deductive System minimally involves translation of the logical vocabulary of a natural language into the logical constants of a formal system. Alternatively, one could assume that DS includes logical constants only (e.g. symbols such as '∀'), and that the morphonological matrix (*every*) is provided by Lexical Insertion.

4.2. The DS-LF model and the CEC

Turning to scope freezing with VP-fronting first, recall that the CEC admits local QR of QP_1 below the subject QP_2, schematized in (25)a, but bars wide, scope inverting QR across the subject QP_2, as in (25)b:

(25) a. $[VP_{PF} \ldots \quad [_{TP}\, QP_2\, [QP_1 \ldots [_{VP} \ldots t_1 \ldots]_{LF}\,]]]$ (local QR out of reconstructed VP)
b. $^*[VP_{PF} \ldots [QP_1\, [_{TP}\, QP_2 \quad \ldots [_{VP} \ldots t_1 \ldots]_{LF}\,]]]$ (wide QR out of reconstructed VP)

As will be seen in below, scope freezing falls out from the claim constitutive of the DS-LF model that LF-operations are strictly local together with the assumptions in (26) and (27). The propositions in (26) are known from the literature. I will briefly comment in turn.

(26) a. The Extension Condition (Chomsky 1993): non-LF movement extends the tree.
b. Lexical Insertion can take place throughout the derivation, at DS or in overt syntax. LI can in principle target any position of a chain.
c. Takahashi (2006): LI into a node α is admissible only if α is c-commanded by its Case assigning head (see also Takahashi and Hulsey 2009 on Whole Sale Late Merge).
d. Takahashi (2006, 2011): Non-lexicalized chain positions are filled by (possibly silent) determiners. These positions are converted into individual variables in semantics.

(27) *Uniformity Condition (UC)*
If a node α is fully lexicalized, and α moves/α is the highest node of a movement chain, α c-commands its lower occurrences throughout the derivation.

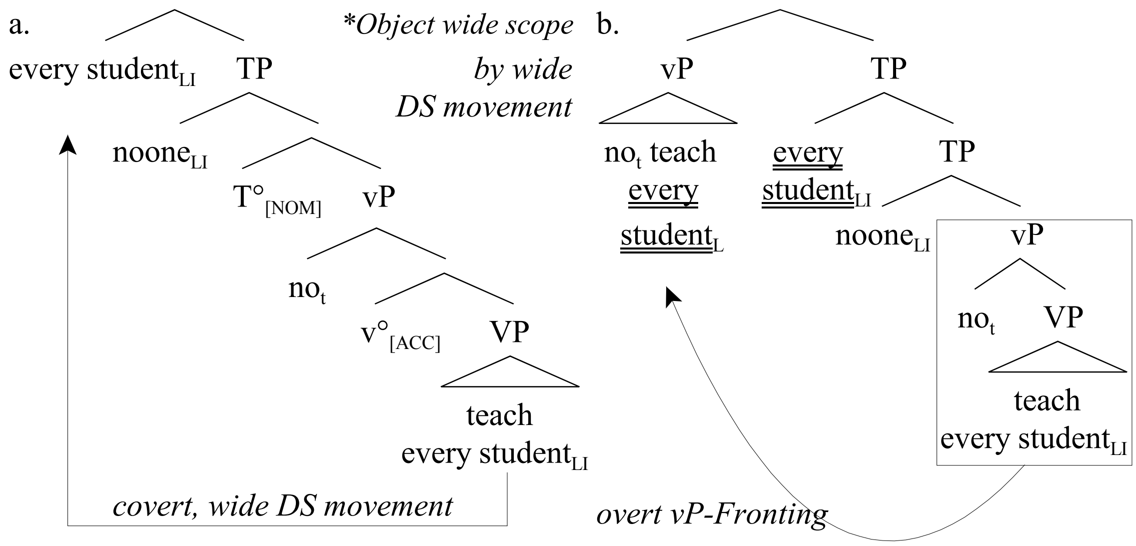
(26)b captures the default hypothesis that LI is free to apply at any point of the overt derivation, subject to additional conditions. These conditions are spelled out in (26)c and (26)d. Following Takahashi, I assume that restrictor arguments of determiners can be added only within their Case domain ((26)c; for evidence see discussion of (3) above). Moreover, if a determiner remains not lexicalized throughout the derivation, it is translated as an individual variable ((26)d). This requirement, which arguably follows from the hypothesis that natural language quantification is restricted, ensures that bare determiner insertion does not only preclude syntactic, but also semantic reconstruction. Finally, the only new addition to the catalogue of principles regulating the interplay between LI and the derivation the Uniformity Condition (UC) is (27). The UC in (27) is meant to express the idea that DPs which are fully assembled and move need to c-command their lower copies throughout the derivation. In essence, the UC is a descendent of Fiengo's (1977) Proper Binding Condition or some version of the cycle, relativized to DPs that are 'complete' in the sense that both the determiner and the restrictor NP have been merged. As this in turn presupposes that both D and NP have been assigned Case by a higher c-commanding head, (27) is intuitively closely related to Takahashi's Case condition ((26)c). Both conditions impose c-command requirements on elements that are in need of Case. Hopefully, future research will reveal directions towards a unification of these two principles (see Lechner 2011b). [11]

[11] On current assumptions, determiners are translated as bare individual variables ((26)d). Hence, the UC is a c-command condition on copies, and not on variables. This is interesting because it is usually believed that the Proper Binding Condition and other generalizations about remnant movement can be

Returning to the analysis of scope freezing with VP-fronting, consider how the system excludes the unattested object ≻ subject scope order first. For ease of readability, I will subscript DPs which include a lexical restrictor by 'LI' and nodes that consist of D° only and are therefore translated as traces (i.e. individual variables) by 't'. Offending constellations are underlined. Furthermore, nodes are labeled to guarantee better orientation in the tree even though strictly speaking, DS is categorially underspecified.

In (28)a, the object has shifted over the subject at DS, landing in a position above TP. Subsequent VP-fronting in (28)b alters the hierarchical relations between the object and its copies, as the TP-adjoined occurrence of *every student* no longer c-commands the copy inside the higher occurrence of VP. As a result, constellation (28)b violates the UC:

(28) ... and [$_{vP}$ teach every student], noone will (¬∃ ≻ ∀ / *∀ ≻ ¬∃)



Observe also that a minimal variant of (28), not depicted here, in which the object starts as a determiner (*every*) and the restrictor (*student*) is late merged above vP abides by the UC but is excluded by the Case requirement (26)c, because objects have to be assigned Case within vP.[12]

(28) illustrated that complete copies created by movement need to preserve c-command relations. Evidently, what applies to the object should also hold for the subject. That is, one is led to expect that if the DP to be carried along by predicate fronting is a subject copy, the base position (SpecvP) can be filled by the bare determiner, inducing Late Merge in SpecTP, but not by the fully assembled DP. The derivation in (29) demonstrates that this prediction leads to important, empirically verifiable consequences.

Suppose that at DS, the object does not cross over the subject, but undergoes short movement only, adjoining to what will later, in syntax, become vP ((29)a). Given this alternative

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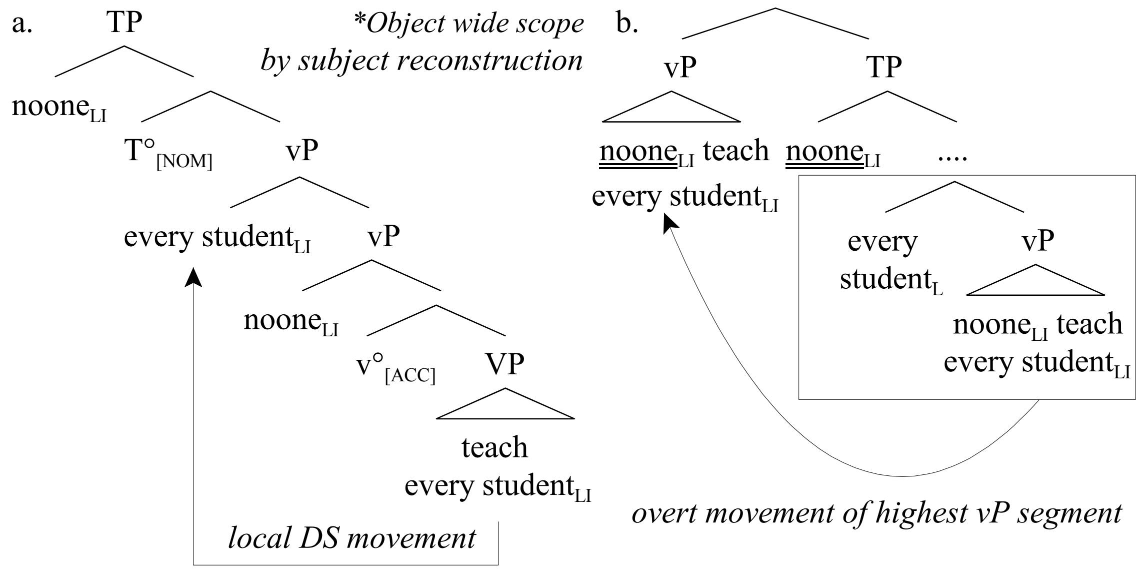
reduced to conditions on licit variable binding configurations ("a variable needs to be bound at LF/throughout the derivation"). If the UC is on the right track, it falsifies 'conditions on variables' style analyses.

[12]Whole Sale Late Merge of restrictors is licenced by Case. This entails that if LI is to apply at DS, a level which by definition lacks syntactic features such as Case, the Case requirement must be satisfied retroactively, in overt syntax. A simple way to implement retroactive licensing is to instruct overt syntax that all complete DP copies reside within the c-command domain of their case assigner.

parse, VP-fronting may target the highest vP segment in (29)b, removing the complication which afflicted (28)b. In (28)b, the object no longer enters into ambiguous c-command relations with its copies. However, as can also be seen from (29)b, the UC now penalizes the chain created by subject raising, because the c-command relations for the subject are disrupted by VP-fronting.

(29)


It follows that the only way for the derivation to abide by the UC is to merge only the determiner in SpecvP, and to add the restrictor of the subject late, in SpecTP.

What is of particular importance for present purposes is the fact that applying the UC to subjects derives the generalization that in contexts of predicate fronting, the unattested inverse scope order cannot be generated by subject reconstruction below the object. Specifically, it must be ensured that at LF, which closely resembles (29)a, the scope of the subject is not read off its lowest copy. Otherwise, the subject could be assigned narrow scope with respect to the object, which resides in the lowest type compatible node for quantifiers. The UC weeds out such configurations, though, by requiring that the SpecvP initially starts as a determiner only. From this it follows that the subject cannot reconstruct below the object in syntax.[13] Thus, the analysis derives the fact that unattested scope inversion with predicate fronting cannot be produced by subject reconstruction into SpecvP.

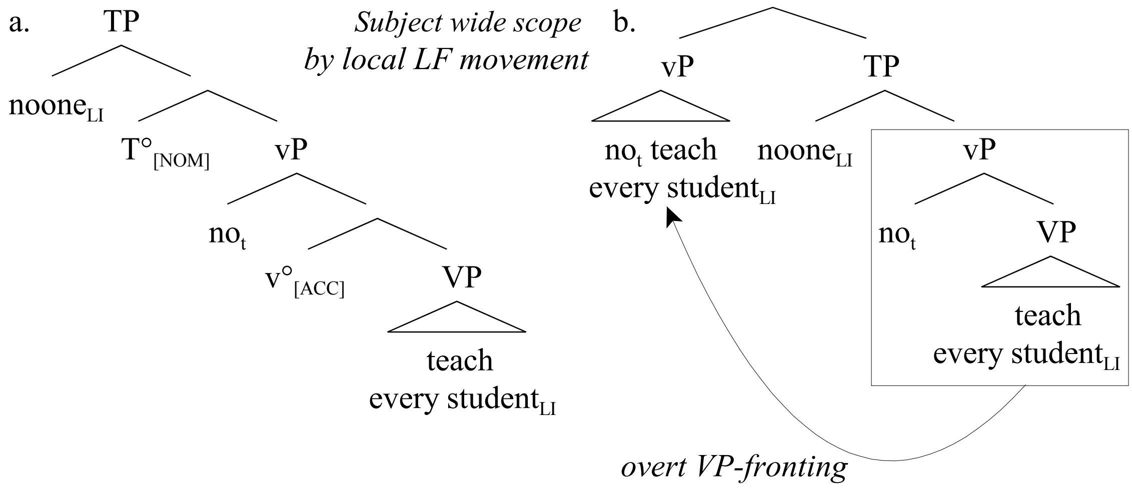
The prohibition on inserting complete DPs into remnant moved predicates has another desirable consequence. Since bare D°s always translate into individual variables ((26)d), semantic reconstruction below the object is also blocked. Thus, the UC does not only account for the unavailability of wide object shift across the subject at DS, but also for the observation that subjects of fronted vPs do not reconstruct into their base position, either in syntax or by SemR. A single principle accordingly derives both of the two requirements any successful analysis of scope freezing with predicate fronting has to meet.

Finally, the trees in (30) document the evolution of the legitimate subject ≻ object scope order. As seen in (30)a, the object is fully assembled within VP, in accordance with the Case condition (26)c, while the restrictor of the subject DP is late merged in SpecTP in order to avoid

[13] An interesting alternative proposal to restrict subject reconstruction in the same environments based on the cycle is explored in Heck and Assmann (2012).

the conflict with the UC observed in (29). In overt syntax, the vP is fronted ((30)b). Then, at LF, the object undergoes local type driven movement, adjoining to vP. Subject reconstruction into SpecvP is furthermore prohibited, as SpecvP is occupied by the determiner only. As a result, the analysis correctly predicts that the derivation unambiguously generates the subject ≻ object order.

(30) a. b.



Turning to DP-reconstruction next, recall that if a DP raises and reconstructs for the evaluation of binding relations, the CEC admits the local *de dicto* interpretation, in which the s-variable moves locally, as in (31)a, but blocks the constellation (31)b, where the s-variable skips the closest possible landing site right below the intensional operator (*seem*). Nodes subscripted by 'PF' signal spell-out positions, while 'LF' subscripts denote reconstructed positions.

(31) a. $[DP_{PF}$ ... [seem $[\lambda s_1$... $[_{DP}$ ...s_1...$]_{LF}$]]] (SynR of DP, *de dicto*)
b. *$[\lambda s_0$ $[DP_{PF}$ ... [seem ... $[_{DP}$ ...s_0...$]_{LF}$]]] (SynR of DP, *de re*)

Again, the CEC effect can be reduced to the DS-LF-model and the cycle.

To begin with, s-variables must be assumed to be part of the logical skeleton. Otherwise, the existence of narrow scope *de re* readings, exemplified by (32) (from Bäuerle 1983), would remain mysterious.

(32) Georg believes that a woman from Stuttgart loves every member of the VfB team.
(*believe* ≻ *a woman* ≻ *every member*, de re)

In (32), the restrictor *member of the VfB team* can be understood *de re*, while the containing universal QP is at the same time construed within the scope of the indefinite *a woman from Stuttgart* ('Fodor's third reading'; Fodor 1970; see Heim and von Fintel 2002 and Sternefeld 2010 for discussion). Thus, the s-variable of the embedded *in-situ* object can be - unlike the s-variable of overtly moved noun phrases - be construed long distance. This indicates that situation pronouns are already present at DS, the only level which allows non-local silent movement operations in the present system.

Furthermore, I assume that movement at DS (s-movement, wide QR) does not proceed successive cyclically, but directly lands in the 'scope' position of the affected expression. This is natural given that DS does not include formal syntactic features yet which are arguably responsible for determining the location of phases and other syntactic locality domains. Also, regular QR at LF has, to the best of my knowledge, never been conceived of as a successive cyclic operation.

With these qualifications in place, it becomes apparent why the LF-representation (31)b is ill-formed. Moving the s-variable long distance at DS, as shown in (33)a, creates a configuration that, if combined with subsequent subject raising in overt syntax ((33)b), leads to a violation of the Extension Condition. Concretely, the domain within which the first, local step of subject raising to the lower SpecTP applies in (33)b is properly contained within the domain established by s-movement.

(33) a. [λs_0 ... [seem... [DP-s_0 ...]]] (long s-movement at DS)
b. *[λs_0 ... [seem...[$_{TP}$ [DP-s_0]$_1$ [t_1 ...]]]] (subject raising in overt syntax)

What (33) demonstrates is that the cycle blocks long s-movement *prior* to raising.[14] Assume now alternatively that the s-variable remains *in-situ* throughout DS ((34)a) and the subject raises to its surface position in overt syntax ((34)b), followed by reconstruction at LF. Finally, the s-variable is locally moved in order to ensure interpretability ((34)c). Then, one obtains the legitimate narrow scope reconstructed *de dicto* interpretation for overtly moved DPs.[15]

(34) a. [seem... [DP-s ...]] (no s-movement at DS)
b. [DP-s [seem... [DP-s ...]]] (subject raising in overt syntax)
c. [seem [λs_1 ... [DP-s_1...]]] (reconstruction and local s-movement at LF)

To summarize, the DS-LF model offers a natural analysis of phenomena which fall under the descriptive generalization of the CEC. Silent operations can either apply early in the derivation, at DS, in case of which they may change scope orders and apply long distance; or they are delayed to LF, where they are subject to stricter locality conditions, since as a 'true' interface, LF only admits local displacement that serves the purpose of repairing type mismatches.

5. DISCUSSION

Although at this point, the contours of a theory become visible, many details are still missing and important questions need to be asked. In what follows, I will briefly add a few clarifying remarks.

First, even though parts of the procedure fixing interpretation takes place prior to syntax, it is important to observe that the DS-LF model is not a variant of generative semantics. This is so because all model theoretic interpretation takes place in a single component. DS merely contributes another set of restrictions on the possible shape the logical syntax of natural language

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[14]Local movement of the object of (32) at LF does not conflict with the cycle because the movement is obligatory, i.e. type-driven.

[15]There is a third logically possible derivation to be considered, in which the subject raises, either at DS or overtly, followed by local movement of the s-variable and reconstruction of the DP.

(i) a. [DP -s_0 ... [seem... [DP -s_0 ...]]] (subject raising)
b. [λs_0 ... [DP -s_0 ... [seem... [DP -s_0 ...]]]] (local s-movement)
c. [λs_0 ... [seem... [DP -s_0 ...]]] (reconstruction)

This *Duke of York* 2derivation (Lechner, to appear) is presumably blocked by the fact that s-movement in (i)b would have to target both subject copies in order to ensure that the s-variable in the lower copy is bound by λs_o, too. This kind of Across-The-Board movement would be a hapax legomenon, though.

expressions can take. For instance, while scope relations are represented at DS, where they are subject to conditions such as Scope Economy, it is LF that prepares them for compositional interpretation. As a result, overt movement can - unlike in theories advocated by generative semanticists - make a difference to interpretive properties, e.g. by extending binding domains.[16]

Second, one might wonder if DS and LF ever generate contradictory statements about scope relations. Two questions are relevant here. Can a wide scope DS - for instance, a DS encoding inverse scope - end up as narrow scope LF? And can narrow scope DS representations be transformed into wide scope LFs? Both constellations will be exemplified below. Assume that an object quantifier QP_1 covertly crosses the subject at DS, as in (35)a. Then, one might suspect, the lower, VP-internal occurrence of QP_1 has to be translated as an individual variable, and must not be reconstructed, as in (35)b. Otherwise, DS derives the inverted reading, while LF interprets the surface scope order, apparently leading to inconsistent predictions of the system.

(35) *Illicit configuration I: wide scope DS paired with narrow scope LF*

a. DS:	[QP_1	[QP_2 [...QP_1...]]]		(wide scope shift of object at DS)
b. LF:		[QP_2 [$_{VP}$ ...QP_1...]]]		(object reconstruction)

The problem turns out to be only apparent, though. DS provides a particular initial hypothesis about a possible scope order, without - and this is crucial - being committed to the correctness of this claim. The system is constructional just like the standard model in that it admits scope relations which have been established at an earlier point to be changed by operations which apply later on in the derivation. Moreover, in (35)a, inversion at DS is motivated by the need to assess the legitimacy of the inverted order in addition to the surface order. Thus, the surface reading which is eventually generated by LF is independently available. Possible mismatches between DS and LF which arise from undoing DS movements at LF are therefore inconsequential.

The converse relation is illustrated by (36). Here, the object undergoes local QR, but subject reconstruction below the vP-adjoined object results in object wide scope at LF. Again, the derivation seems to lead to inconsistency, in this case because LF produces a non-surface scope option which is not made available by DS. (Given that LF movement is always maximally local, such a combination can be arrived at by reconstruction, but not by wide object QR at LF.)

(36) *Illicit configuration II: narrow scope DS paired with wide scope LF*

a. DS:		[QP_2 [...QP_1...]]	(surface scope)
b. OS:	[QP_2	[$_{vP}$ QP_2 [$_{VP}$ ...QP_1...]]]	(overt subject movement to SpecTP)
c. LF:	[QP_2 [QP_1	[$_{vP}$ QP_2 [$_{VP}$ ...QP_1...]]]]	(local object QR)
d. LF:	[QP_1	[$_{vP}$ QP_2 [$_{VP}$ ...QP_1...]]]	(subject reconstruction)

Recall at this point from section 4.2, that DP-reconstruction is contingent upon the presence of a restrictor, and that the choice whether such a restrictor is merged is made as early as at DS. Hence, DS has already access to the information whether the subject of (36) reconstructs or not. This is of relevance, as the choice between early and late merge of the restrictor is also reflected in differences in the DS-representations to be transferred to the deductive system. For instance, if a DS with a full subject copy in SpecvP is assembled, DS does actually not encode the surface

[16] I am grateful to Rob Truswell for discussion of this and other issues addressed in this section.

scope option, but the inverted interpretation. Thus, the conflict posed by scope mismatches between DS and LF representations simply turns out to have been illusive - and disappears.

Finally, the proposal makes no predictions as to how the boundedness of scope is to be accounted for. One option might be to group DS operations together in cyclic domains, replicating phase bound analyses of scope boundedness. Alternatively, the domain of DS could be the full numeration, filtering out illicit wide scope options during overt syntax. At the moment, I remain agnostic about this, as well as numerous others, issue.

The reminder of this section briefly comments on the role of opactity and the architecture. In section 3, it was noted that the CEC can be understood as a description of phenomena which display the signature of underapplication opacity. The absence of a wide scope option for object quantifiers and s-variables inside reconstructed nodes could only be expressed by reference to previous stages of the derivation - locality of movement is conditioned by overt displacement of the containing categories. In the DS-LF model, opacity can be given a different characterization: it comes as a result of the model in conjunction with a general principle - the cycle - which guides the order in which operations apply. Moreover, CEC-effects are not analyzed within a single component, but resolved by distributing movement across two components, DS and LF.

Taken together with Copy Theory and Late Merge, the inter-componental and cross-componental strategies for opacity resolution above yield the *Square of Opacity* in (37).

(37)

	Opacity	*Overapplication*	*Underapplication*
a.	*within a component*	Copy Theory	Late Merge (of adjuncts)
b.	*across components*	SemR (w.r.t. scope)	SemR (w.r.t. binding) Late Marge (of restrictors)[17]

As (37) reveals, opacity is not an exception, but manifests itself in all cells of the matrix generated by a model that packages information within and across components. This finding supports the hypothesis that natural language is derivational in the strongest possible way, as expressed by Harmonic Derivationalism in (38):

(38) ***Harmonic Derivationalism***
Natural language employs procedural signal manipulation and information packaging within informationally encapsulated systems as well as across components.

The term *Harmonic Derivationalism* combines the ideas of derivational theories of syntax with the belief that language is best understood as a set of ordered encapsulated systems that contain discrete information which is passed on from one system to the next by interfaces. Harmony derives from the fact that intra-componental and cross-componental interactions are sequentially ordered.

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[17]Late Merge of adjuncts (Lebeaux 1988) applies within syntax. Late Merge of restrictors across components supplies DS representations with lexical content. These restrictors can be inserted high if the determiner has moved within its case domain, either at DS or in syntax.

6. Conclusion

In this contribution, I submitted a new architecture of the grammar, in which overt syntax is preceded by a second, covert component, DS, that branches off to the grammar external deductive system (Fox 2000). DS hosts all non-local movement operations (among them scope shifting QR and long s-movement) which potentially have an impact on truth conditional interpretation. In the current model, it becomes possible to assign the traditional repository of covert movement (LF) the role of a true interface whose function is restricted to rendering otherwise syntactically well-formed representations afflicted by local type incompatibilities interpretable by the rules of semantics.

The logical skeletons which DS operates on consist of logical, permutation invariant symbols and can be - but do not have to be - lexically impoverished. Underspecified nodes are provided with lexical content by Whole Sale Late Merge, either at DS or in syntax. Admitting Late Merge both within and across components increases symmetry of the system by making optimal use of the Late Merge resource independently used by the grammar.

Empirically, the DS-LF model provides a set of effective and comprehensive strategies for the analysis of syntactic opacity effects. (39) repeats the main components of the analyses from above. Recall that only (39)e is new, and can probably be related to independent properties of Case or the derivational system:

(39)
a. Lexical Insertion can take place throughout the derivation, at DS or in overt syntax. LI can in principle target any position of a chain.
b. Takahashi (2006): LI into a node α is admissible only if α is c-commanded by its Case assigning head
c. Takahashi 2006, 2011): Non-lexicalized chain positions are filled by (possibly silent) determiners. These positions are converted into individual traces.
d. All syntactic movement that does not take place at the LF interface observes the Extension Condition. As a repair strategy, LF movement is exempt from the cycle.
e. *Uniformity Condition*. If a node α is fully lexicalized, and α is the highest node of a movement chain, α c-commands its lower occurrences throughout the derivation.

Even though various aspects of the system look promising, the discussion of this chapter presented an outline of a theory only, with many details still to be added in the future. For instance, the particular assumptions about how DS interacts with the language external deductive system and overt syntax will most likely turn out to be in need of substantial revision. In the present paper, I assumed that DS representations are underspecified, so as to minimize changes in the interface from DS to the grammar external deductive systems. Other options are conceivable, though, as already alluded to in section 4. For instance, DS might operate on fully lexicalized terms throughout, which are then stripped off during transfer to the deductive systems. Crucially, these theoretical choices do not affect the main claim that scope shifting silent movement precedes overt syntax.

Also, various open questions remain, some of which have already emerged in course of the discussion. What is for example the underlying explanation for the UC, i.e. how does Case constrain remnant movement? In some sense, the UC has the flavor of a condition which should ultimately fall out from architecture of the system, similar to the strict cycle condition. Another issue in need of clarification pertains to the proper division of labor between DS and overt syntax must be made explicit. Are optional movements such as scrambling, which are known to have an effect on scope, computed in syntax, or pre-empted by DS? (See Lechner 2011b for some speculations.) At the moment, I have to defer answers to these and other questions to future investigations into the nature of the DS-LF architecture.

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