ON SEMANTIC AND SYNTACTIC RECONSTRUCTION

Winfried Lechner, UMass/Amherst

Abstract

This essay addresses various issues concerning noun phrase interpretation in German. It is argued that the concept of Semantic Reconstruction (Cresti 1995, Rullmann 1995) can be fruitfully used in order to derive quantifier scope ambiguities in German. Semantic Reconstruction will be demonstrated to be an independently needed strategy of grammar, that is not parasitic on syntactic reconstruction as expressed by Copy Theory (Chomsky 1992). The basic difference between Semantic Reconstruction and syntactic reconstruction will be traced back to their asymmetric availability in scrambling chains: scrambling can be undone only by Semantic Reconstruction. Hence, a scrambled QP may be read with narrow scope w.r.t. an NP that it has scrambled over, while the non-reconstructible interpretive principles (e.g. Principle A and pronominal variable binding) will be computed in the surface location for the very same QP. Furthermore, a compositional derivation of weak, cardinal readings of NP's in terms of syntactic reconstruction will be presented, that permits a principled account of the effects related to Diesing's Mapping Hypothesis (Diesing 1990, 1992). It will be shown that the interaction of Semantic and syntactic reconstruction finally correctly predicts an empirically adequate analysis of NP's that underwent scrambling in opaque contexts.

CONTENTS

1. PRELIMINARIES

1.1. THE DATA

Quantifier scope in intonationally unmarked[1] German clauses that obey basic word order is determined by the surface serialization of the quantificational terms (Frey 1989, Haider 1993). In (1), main sentence accent is assigned to the locative PP *von der Couch* and the subject QP unambiguously takes scope over the object:[2]

(1)   Einer hat jedes Spiel von der COUch aus gesehen $\exists > \forall$
        Someone has every from the sofa   out match seen
        "Someone has seen every match from the sofa"

Descriptively speaking, scope ambiguity arises only if the conditions in (2) are met:

(2)   C1: The scope bearing categories are *inverted in overt syntax,* either by scrambling or topicalization (due to Frey 1989).

        C2: The quantifier that has undergone scrambling or topicalization is a *weak NP*[3] in the sense of Milsark (1977) or a partitive headed by a weak determiner (henceforth *weak partitive*)[4].

In (3)a, a weak object has been topicalized over a strong subject, a situation that gives rise to ambiguity. In the equally ambiguous sentence (3)b, the fronted object is r ealized as weak partitive.

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[1]The data will be judged under *unmarked sentence intonation* in the sense of Cinque (1993). Under unmarked intonation, the main sentence accent falls on the most deeply embedded XP on the recursive side of VP, and no other category is assigned prosodic prominence. (But see Selkirk 1995 for a competing proposal.) The examples will be chosen in such a way that the quantificational terms under observation fall **outside** the main sentence accent. This has the effect of excluding the interference of focus in the interpretation of scope sensitive terms.

[2]Note on the side that if we replace this unmarked intonational pattern by a rising-falling contour tone over the two QP's - the so-called "I-Topic intonation" of Jacobs (1982) - the sentence becomes ambiguous, as witnessed by (i) below (Büring, in progress and Pafel 1991):
(i)   EIner hat JEdes Spiel von der Couch aus gesehen   *ambiguous*
         L+H*   H*+L
In what follows, I-Topic intonation will be ignored.

[3]I adopt Milsark's (1977) definition according to which weak determiners are all those which - if combined with a CN - may show up in the English existential construction. It is of importance that cardinals like *three* as well as *many* and *few* are classified as weak determiners, even though they also possess a strong, presuppositional (in case of *many* and *few*: proportional) interpretation (Diesing 1990, Partee 1988, Westerstal 1985), that does not pass the *there*-insertion test.

[4]The relevance of the type of NP involved has largely gone unnoticed in the literature or has remained unaccounted for, if discussed (Jacobs 1982, Höhle 1991, Pafel 1991). Judgements are subtle, but consistent among speakers. While Pafel (1991) and three informants share the intuitions given in the text below, it should be mentioned that for some speakers (Frey 1989, Haider 1993) ambiguity is independent of the choice of NP.

(3)　　a.　　[Irgendein Buch]$_i$ hat fast jeder t$_i$ mit Freude gelesen　　　　　　　　*amb*
　　　　　　　some　　book has almost everybody with pleasure read
　　　　　　　"Almost everybody has read some book with pleasure"
　　　　b.　　[Irgendeines/zwei von den Büchern]$_i$ hat fast jeder t$_i$ mit Freude gelesen　　　*amb*
　　　　　　　any/two　　　　　of　the books　has almost everybody with pleasure read
　　　　　　　"Almost everybody has read some/two of the books with pleasure"

(4)a and (4)b demonstrate that topicalized strong NP's and partitives headed by strong determiners resist a narrow scope construal, the examples can only be read in the scope order 'fronted object ≻ subject':

(4)　　a.　　[Fast jedes Buch]$_i$ hat irgendwer t$_i$ mit Freude gelesen　　　　　　　　∀ ≻ ∃
　　　　　　　almost every book has someone　with pleasure read
　　　　　　　"Somebody has read almost every book with pleasure"
　　　　b.　　[Jedes/die meisten von den Büchern]$_i$ hat irgendwer t$_i$ mit Freude gelesen　　QP ≻∃
　　　　　　　each /most　　　of　the books　　has someone　　with pleasure read
　　　　　　　"Someone has read each/most of the books with pleasure"

Scrambled QP's pattern along with topicalized ones. While scrambling of weak NP's and weak partitives leads to ambiguity, as shown by (5), the strong NP's in (6) can only be interpreted with wide scope:

(5)　　a.　　daß [irgendein Buch]$_i$ fast jeder t$_i$ mit Freude gelesen hat　　　　　　　　*amb*
　　　　　　　that some　　book　almost everybody with pleasure read　has
　　　　　　　"that almost everybody has read some book with pleasure"
　　　　b.　　daß [irgendeines/zwei von den Büchern]$_i$ fast jeder t$_i$ mit Freude gelesen hat　　*amb*
　　　　　　　that any/two　　　　　of the books almost everybody with pleasure read has
　　　　　　　"that lmost everybody has read some/two of the books with pleasure"

(6)　　a.　　daß [fast jedes Buch]$_i$ irgendwer t$_i$ mit Freude gelesen hat　　　　　　　　∀ ≻ ∃
　　　　　　　that almost every book someone　　with pleasure read　has
　　　　　　　"that somebody has read almost every book with pleasure"
　　　　b.　　daß [jedes/die meisten von den Büchern]$_i$ irgendwer t$_i$ mit Freude gelesen hat　　∀ ≻ ∃
　　　　　　　that each /most　of　the books　someone　　with pleasure read has

Examples (3) - (6) showed that crossing dependencies lead to ambiguity if the overtly moved category is a weak NP or a weak partitive. The distribution of facts can now be summarized as follows:

(7)   a.   The string [QP$_i$ ...[QP$_j$ ...[t$_i$ ... is ambiguous if QP$_i$ is a headed by a weak determiner.[5]
        b.   The string [QP$_i$ ...[QP$_j$ ...[t$_i$ ... is unambiguous otherwise.

(7) serves as a descriptive generalization, and we will see further empirical motivation for its specific formulation in section 3.3.

    The paper is organized as follows: After having laid out some basic assumptions in section 1.2, section 2 will provide a few critical notes on two competing analyses of scope (QR-theories and the Scope Principle of Aoun & Li 1989, 1993, Frey 1989). In section 3, an alternative account of the data in terms of Semantic Reconstruction will be proposed. As the argumentation proceeds, the empirical range of the investigation will be extended to include ATB-topicalization, scope relative to negation and the English *there*-insertion construction. Section 4 compares Semantic Reconstruction with Copy Theory of Chomsky (1992). In section 5 Diesing's (1990) account of weak indefinites will be reinterpreted in terms of Copy Theory, and section 6 eventually investigates the interaction between Semantic Reconstruction and Copy Theory in intensional contexts.

1.2. GERMAN CLAUSE STRUCTURE

For present purposes, I will adopt the model for German clause structure suggested by Munaro (1991)

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[5]Unfortunately, a simpler characterization of the NP's that give rise to ambiguity in terms of *semantic strength* is unavailable: Partitive NP's presuppose the existence of their generator set and therefore count as strong (vd. Milsark 1977, Barwise & Cooper 1981, Partee 1988), no matter which determiner they are headed by. Similarly, strong *few* and *many* are presuppositional. There is however a certain degree of uncertainty in the literature concerning the interpretation of weak partitives: Comorovski (1991) accepts them in existentials on the basis of (i):

(i)   Q: Did you correct yesterday's exams?
        A: No, there are several of yesterday's exams left to correct

Similar judgements are reported by Abbott (1995: 344), who also treats weak partitives as weak NP's:

(ii)   Remember those bats that got loose last night? There was one of them in the fridge this morning!

It seems however, that both (i) and (ii) are existentials in their presentational, and not their existence-asserting use.

    Interestingly, Kennan (1987: 296) has to resort to a non-standard syntactic analysis of weak partitives in order to be able to group them with strong NP's. Without going into details, it should be noted that his account at least suggests a close semantic similarity between weak partitives and weak NP's. I will leave the question of how to best formulate the underlying principles responsible for this similarity open.

    Note moreover that it is equally impossible to reformulate (7) in terms of more fundamental *set-theoretic properties* of the NP's involved (e.g. intersectivity or symmetry). Although weak partitives pattern along with other weak NP's in that they possess the property of intersectivity and symmetry (vd. Partee 1988), proportional *few* and *many* cause problems for a set-theoretic unification: in their strong, proportional reading, *few* and *many* (categorized as weak by Milsark 1977) are neither intersective nor symmetric. Nevertheless, proportional *few* and *many* trigger scope ambiguities if in the right context. I leave a satisfying semantic characterization of the NP's of clause (7)a for further research.

and Brugger & Poletto (1993). Verbal arguments are base-generated within VP and invariantly move to their respective SpecAgrP positions in overt syntax. The main motivation for this specific view comes from the relative position of prototypically indefinite objects like the wh-indefinite *was*/'whichever', which precede (VP-adjoined) manner adverbials and negation, as shown by (8).[6]

(8)   a.   daß wer [$_{AgrOP}$ was$_i$ [$_{NegP}$ nicht [$_{VP}$ t$_i$ gekauft hat]]]
            that somebody something not   bought has
            "that somebody did not buy something"
    b.   *daß wer [$_{NegP}$ nicht [$_{VP}$ was gekauft hat]]
            that somebody not something bought hast

Scrambling is analyzed adjunction to a maximal Agr-projection or TP. The two subject positions identified by Diesing (1990, 1992) and Kratzer (1989) are equated with SpecAgrSP and SpecTP, respectively. Finally, sentential particles (like *ja wohl*/'indeed' and *gottseidank*/'thanks god') and quantificational adverbs (*oft*/'often', *selten*/'rarely') are taken to separate the higher from the lower subject position, they are TP adjoined and demarcate the left boundary of TP. Hence, a simple ditransitive clause is assigned the structure below:

(9)   [$_{AgrSP}$ {Subject}$_i$ [$_{TP}$ *ja wohl/oft* [$_{TP}${Subject}$_i$ [$_{AgrIOP}$ IO$_j$ [$_{AgrOP}$ DO$_k$ [$_{NegP}$ [$_{VP}$ t$_i$ [t$_j$ [t$_k$ verb]]]]]]]]]

Nothing in the analysis to be developed hinges directly on this specific implementation of phrasal architecture, though.

2. THE SCOPE PRINCIPLE AND QR-THEORIES

It will be demonstrated that two of the major theories of scope (the Scope Principle and QR-theories) fail to capture the German facts outlined in section 1 in an adequate fashion.

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[6]Note on the side, that there is a potential problem with the assumption that all arguments obligatorily leave VP. Remnant topicalization can pied-pipe a direct object embedded within the fronted VP while leaving behind sentential negation:
(i)   [$_{CP}$ [$_{VP}$ Das Buch gegeben]$_i$ hat [$_{AgrSP}$ er [$_{AgrIOP}$ der Maria [$_{NegP}$ nicht t$_i$]]]]
          the book given   has   he   the M.   not
        "He has not given the book to M."
Prior to VP-topicalization, the object in (i) is evidently located in a position lower than negation. Moreover, sentential negation may precede an object even in non-topicalized structures, at least as long as negation bears a rising pitch accent:
(ii)   Er hat der Maria NICHT das Buch gegeben.
        he has the M. not   the book given
        "He has not given the book to M."
It is now interesting to observe the VP-topicalization structure in (i) also forces a pitch accent on negation. We may tentatively conclude that focus on the negative marker licenses overt Neg°- raising across objects.

2.2. QR-THEORIES

Given the distribution of data outlined in the introduction, approaches that rely on QR face at least three empirical problems. First, QR is expected to apply to any quantifier of an appropriate type, irrespective whether it has moved or not. This leaves the fact unaccounted for that ambiguity is only fed by crossing dependencies in German. Second, it is not obvious at first sight, how QR theories could explain why the lexical choice of QP_i in the surface structural string

(10) $[QP_i \dots [QP_j \dots$

influences the behavior of QP_j. Recall that - reinterpreted in terms of QR - QP_j may raise at LF over QP_i only if QP_i is headed by a weak determiner.[7] Finally, as we will see in section 3.5., QR theories make wrong empirical predictions for sentences that hold more than two quantificational terms. For limitations of space, I will not discuss potential amendments to QR theories here.

2.1. THE SCOPE PRINCIPLE

Frey (1989) employs the following Scope Principle (see also Aoun & Li 1989, 1993) in his account of German scope:

(11)   *Scope Principle* (Frey 1989:205)
        QP_i can have scope over QP_j if the head of the chain of QP_i c-commands the base of the chain of QP_j.

(11) expresses the insight that scope permutation is dependent upon overt inversion of the scope bearing categories. However, theories based on the Scope Principle generally do not permit an isomorphic mapping from LF to semantics, hence the correspondence between LF- representations and semantic formulas cannot be construed as a one-to-one relationship. In the derivation of a two-way ambiguous sentence, for instance, a single LF representation has to serve as the input to two different semantic structures, as schematically depicted below:

(12)   LF: $[QP_i \dots [QP_j \dots [t_i \dots$
        Semantic input 1: $[QP_i \dots [QP_j$
        Semantic input 2: $[QP_j \dots [QP_i$

Scope Principle theories therefore require an additional translation procedure that "splits up" LF representations in two (or more) semantic input strings. Moreover, these translation procedures would have to be sensitive to the type of QP involved, in order to account for the data introduced in section

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[7]This obstacle might be overcome by (a slightly modified version of) Beck's (1995, UMass talk) proposal that quantifiers establish barriers for LF-movement. We will however encounter structures that are inherently incompatible with raising accounts (vd. discussion of ATB-reconstruction and scope relative to negation in 3.3).

1.[8] Ambiguity arises only, if the higher, c-commanding QP is a weak NP or a weak partitive.

3. SEMANTIC RECONSTRUCTION

Even though the Scope Principle correctly captures the basic generalization about scope in German (ambiguity is dependent on overt movement), it was shown to suffer from two flaws: first, it leads to overgeneration, since it is insensitive to the type of QP's involved; and second, it requires additional help from procedures that translate a single LF output of an ambiguous clause into two distinct semantic representation. I will attempt to demonstrate that both shortcomings can be overcome, once the existence of a new scope feeding mechanism is acknowledged, to wit Semantic Reconstruction (Cresti 1995, Rullmann 1995).

Assume for expository reasons that the Scope Principle is reinterpreted in the following way: a quantifier that underwent movement can be either assigned scope in its surface position or, alternatively, be reconstructed back into its trace position by some suitable mechanism of optional reconstruction (to be spelled out in a moment). Then, there will be two distinct LF representations for a two-ways ambiguous sentence, and the mapping from LF to semantics becomes isomorphic again. This step removes the first shortcoming of the Scope Principle. Assume moreover that this process of optional reconstruction is available only for a well defined subset of QP's, namely weak NP's and weak partitives. Then, the dilemma of overgeneration mentioned in the outset is resolved, too.

It will be shown that the theory of Semantic Reconstruction (henceforth SemR) independently developed by Cresti (1995) and Rullmann (1995) displays exactly the properties called for in this context. In what follows, a brief introduction to the relevant concepts of SemR will be given.

3.1. SEMANTIC RECONSTRUCTION OF WH-PHRASES

As pointed out by Kroch (1989), the amount wh-question in (13) is ambiguous between a wide scope/*de re* and a narrow scope/*de dicto* interpretation for the restrictor *n books*:

(13)   How many books does Chris want to buy
      a.   What is the number n such that there are **n books** that Chris **wants** to buy
      b.   What is the number n such that Chris **wants** it to be the case that there are **n books** that he buys

If construed *de re*, the wh-phrase binds an individual variable in the trace position and semantic interpretation proceeds along standard lines. Cresti (1995) and Rullmann (1995) propose now that the narrow scope reading of (13) derives from a structure in which the overtly moved wh-phrase strands

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[8]It should be mentioned however that Frey's judgements differ from the ones taken as representative in this essay, hence this latter point does not *per se* carry over to his framework.

a **higher type trace** (typographic symbol 'T')[9] of Generalized Quantifier (extensional type $\langle et,t \rangle$) as in (14):

(14)   How many books does Chris want [$_{CP}$ **T** to buy t]

They demonstrate that this has the semantic effect of λ-converting the descriptive content of the wh-phrase back into the position of the higher type trace by 'Semantic Reconstruction'.[10] Since T is in the scope of the intensional operator, Semantic Reconstruction results in the desired narrow scope/*de dicto* interpretation of (13). Instead of providing the semantic computation for (14), I will spell out the necessary details in the next section on the basis of an example more relevant to the present discussion. It suffices to notice at this point that the location of a higher type trace determines the scope domain of the category that this trace is coindexed with. Moreover, SemR applies optionally, i.e. an operator may either bind an individual variable or a higher type trace.

Next we will see how Cresti's and Rullmann's system of SemR can be employed in order to derive quantifier scope interactions in German.

3.2. SEMANTIC RECONSTRUCTION OF QP'S IN GERMAN

Let us return to (3)a as an illustrative example for an ambiguous clause in German:

(3)a   [$_{CP}$ [Irgendein Buch]$_i$ hat [$_{AgrSP}$ fast jeder [$_{AgrOP}$ t$_i$ [$_{VP}$ t$_i$ gelesen]]]]   *amb*
            some   book   has   almost everybody   read
        "Almost everybody has read some book"

Given present assumptions concerning the clausal architecture of German, there are two traces associated with the topicalized object, one in VP-internal location and one in SpecAgrOP. If both traces are interpreted as individual variables, standard translation procedures will result in the surface scope order.

We may ask at this point whether it is also possible to assign a higher type to the denotations of the two traces, respectively. In a type driven LF-interface model, as the one that will be adopted here, the type of an object is determined by the type of the predicate that applies to that object (vd. Heim & Kratzer, to appear). Since we are dealing in (3)a with an extensional transitive predicate of type $\langle e, \langle e,t \rangle\rangle$, the internal argument can only be an e-type expression. Hence, the VP-internal trace left by topicalization will have to be an individual trace. It follows more generally, that higher type traces are not licensed within VP's that are headed by extensional predicates. However, no such restriction holds

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[9]Higher type traces were first introduced in von Stechow (1991).

[10]See Cresti (1995: 96 ff) and Rullmann (1995: 173ff) for details; see also Cinque (1980) and Longobardi (1987) on 'Scope Reconstruction' in syntax and Engdahl (1980) for an alternative semantic approach.

on the VP-external trace in SpecAgrOP. I would like to suggest now that SpecAgrP may indeed optionally host a higher type trace of Generalized Quantifier type. The according LF-tree representation of (3)a is given under (15)[11]:

(15) $[_{CP}$ [Irgendein Buch]$_i$ $[_{AgrSP}$ [fast jeder]$_j$ $[_{AgrOP}$ **T$_i$** $[_{VP}$ t$_j$ t$_k$ gelesen
              some book   almost everybody   read
         "Almost everybody read some book"

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                        CP_t
                    ╱        ╲
        some book_<et,t>      C'_<<<e,t>t>t>
                           ╱        ╲
                         λi        AgrSP_t
                              ╱          ╲
           almost everybody_<et,t>       AgrS'_<e,t>
                                      ╱        ╲
                                    λj        AgrOP_t
                                           ╱         ╲
                                   T_i,<et,t>       AgrO'_<e,t>
                                                 ╱        ╲
                                               λk         VP_t
                                                        ╱      ╲
                                                      t_j       V'_<e,t>
                                                              ╱      ╲
                                                            t_k       read
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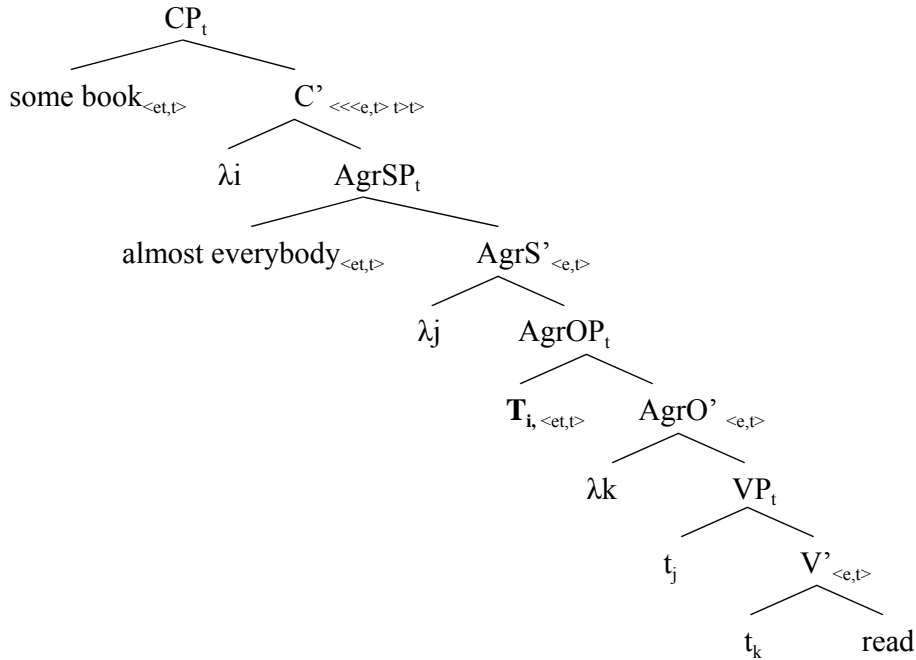
In the tree above, the higher type trace T$_i$ forces the fronted object to undergo Semantic Reconstruction into SpecAgrOP[12], resulting in the narrow scope interpretation for the topicalized QP. The relevant portions of the semantic derivation of (15) are spelled out below:

(16)   ⟦(15)⟧ =
    a.   = $[_{CP}$ **some book** $[λi [_{AgrSP}$ almost everybody $[λj [_{AgrOP}$ **T$_i$** $[λk [_{VP}$ t$_j$ read t$_k$]]]]]]]]
    b.   = λi [almost everybody (λj [**T$_i$** (λ1 [t$_j$ read t$_k$])])] (**some book**) =
    c.   = almost everybody (λj [**some book** (λk [t$_j$ read t$_k$])]) =
    d.   = almost every x [human(x) → ∃y[book(y) & read(y)(x)]]

(16)a forms the input to semantics: the object *some book* binds the higher type trace (via index 'i'), which in turn binds the VP-internal base of the chain (via index 'k'). λ-abstraction by the operator λi over the higher type trace T$_i$ in (16)b yields a predicate of (extensional) type <<<e,t>t>t>, which then applies to the object *some book*. As witnessed by the step from (16)b to (16)c, *some book* is

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[11]*Movement indices are interpreted as λ-operators, following Heim & Kratzer (to appear).*

[12]Similarly, indirect objects that scramble or topicalize over the subject may leave a higher type trace in SpecAgrOP.

subsequently λ-converted back into T_i by Semantic Reconstruction. As a consequence, the topicalized object *some book* comes to lie in the scope of the subject *almost everybody* and we accordingly arrive at the narrow scope interpretation in (16)d.

Not all QP's are allowed to strand a higher type trace; descriptively speaking, only weak NP's and weak partitives should have access to that option. It will therefore be necessary to introduce a convention along the lines of (17), that serves as a restriction on the occurrence of higher type traces:

(17)   *Trace Convention*
      a.   NP's with weak determiners may leave higher type traces
      b.   All other NP's strand individual variables

The distribution of data presented in section 1 now falls out straightforwardly from the interaction of Semantic Reconstruction and the Trace Convention: scope ambiguity is derived by optional SemR into SpecAgrOP, SemR is driven by higher type traces and only a specific group of QP's may strand such traces.

At this point, a number of complex empirical and conceptual questions arise that need to be addressed. In the sections to follow, I will restrict my attention to the four issues below:[13]

- ○ Can we find further support for the dichotomy of QP's suggested by the Trace Convention? (discussed in section 3.3.)
- ○ Where exactly are higher type traces located in the syntactic tree? (3.4.)
- ○ Is there evidence that favors scope fixing by lowering, instead of raising by QR? (3.5.)
- ○ What motivation is there for a lowering process in **semantics**? Is Semantic Reconstruction indeed independent from the well-studied instances of syntactic reconstruction? (Section 4-6)

3.3. EVIDENCE FOR TWO CLASSES OF QP'S

In the present chapter, three pieces of empirical evidence will be furnished that support the Trace Convention[14] and the claim that weak partitives behave like weak NP's.

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[13]Further questions include: (i) Can scope ambiguities cross-linguistically be reduced to SemR? What about cases in which LF-raising furnishes the target for other processes like VP-ellipsis (as in ACD or Pseudo-gapping)? (ii) Diesing (1990, 1992) maintains that restrictive clause formation of quantifiers takes place at LF. SemR is at odds with that claim, simply because a QP that undergoes SemR ends up in its scope domain only **after** LF.

[14]Initial support for the plausibility of a constraint like the Trace Convention can be also be drawn from data discussed in Williams (1994: 60). While indefinites can undergo Scope Reconstruction into specificational pseudoclefts, as in (i), universals resist a Scope Reconstructed reading, as shown by (ii):
(i)   [What every boy saw t_i /T_i] was [a friend of mine]$_i$ *amb*
(ii)   [What t_i /*T_i bothered a friend of mine] is [every article that appeared]$_i$ $\exists > \forall$/ *$\forall > \exists$
Even though Williams eventually discards an analysis of the examples above in terms Scope Reconstruction (for reasons that are not directly relevant to present purposes), it should be noted that the Trace Convention captures the contrast between (i) and (ii) correctly.

3.3.1. ATB-TOPICALIZATION AND CONNECTIVES

Höhle (1991) notes that an ATB-topicalized indefinite as in (18) may be interpreted with narrow scope w.r.t. the conjunction operator

(18)   [Einen Hund]$_i$ hat Hans T$_i$/t$_i$ gestreichelt und hat Maria T$_i$/t$_i$ gefüttert   *amb*
           a   dog   has H.   patted   and has M.   fed
    a.   There is a dog such that Hans patted and Mary fed that dog $\exists \succ$ *and*
    b.   Hans patted a dog and Mary fed a dog   *and* $\succ \exists$

The narrow scope (or Semantically Reconstructed) reading is paraphrased by (18)b. It could describe a scenario in which two different dogs are the theme of the patting and feeding event, respectively. Under current assumptions, the ATB-reconstructed interpretation (18)b is accounted for by postulating two higher type traces in the SpecAgrOP position of both conjuncts.[15]

Höhle furthermore observes that an ATB-topicalized strong NP can only be interpreted with surface scope w.r.t. to a coordinating operator (vd. also Moltmann 1992). He claims that example (19) is synonymous with (19)a, but lacks the scope reconstructed paraphrase given under (19)b:

(19)   [Jeden Hund]$_i$ hat Hans t$_i$ gestreichelt oder hat Maria t$_i$ gefüttert $\forall \succ$ *or*
           every dog has H.   patted   or has M.   fed
    a.   Every dog has the property that Hans patted that dog or Mary fed that dog $\forall \succ$ *or*
    b.   Hans patted every dog or Mary fed every dog   *or* $\succ \forall$

Even though Höhle's claim will essentially turn out as correct, it should be pointed out that example (19) does not show what it is purported to demonstrate. Since the reconstructed scope order 'or $\succ \forall$' logically implies the non-reconstructed scope order '$\forall \succ$ or', there is no model in which (19)b could be true and (19)a could be false. It is therefore impossible to construe a context that would be compatible only with the scope reconstructed reading (19)b. But then it becomes equally impossible to test whether (19) indeed possesses such a scope reconstructed interpretation that is logically independent from the surface scope order or not.

Let us for that reason substitute (19) by the corresponding negative statement below:

(20)   Unwahr ist: [jeden Hund]$_i$ hat Hans t$_i$ gestreichelt oder hat Maria t$_i$ gefüttert
           untrue is: every dog has H.   patted   or has M.   fed
           "It is not the case that every dog hast the property that Hans patted it or Mary fed it" $\forall \succ$ *or*

The scope reconstructed reading of (20) is now truth conditionally independent from the surface scope interpretation. To see this more transparently, imagine a scenario with three dogs, where Hans patted

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[15]It should be pointed out that the present account subsumes ATB-reconstruction under a general principle of scope fixing, whereas QR-theories need to resort for these and similar cases to Quantifier Lowering (May 1985). Hence, a system that exclusively makes use of raising is empirically inadequate; I hope to show that a system that solely relies on lowering fares better in this respect.

one dog and Mary fed two of them. Such a situation is not felicitously described by the surface scope order of (20): it holds true that each dog was either fed or patted, hence the negated formula '¬[∀x[dog(x) → pat(x)(Hans) v feed(x)(Maria)]]' comes out as false. The scenario would however be compatible with the scope reconstructed reading of (20) that is paraphrased below:

(21)   Unwahr ist daß Hans jeden Hund gestreichelt oder daß Maria jeden Hund gefüttert hat
        untrue is that H. every dog patted   or has M. every dog fed   has
        "It is not the case that Hans patted every dog or that Mary fed every dog"   *or ≻ ∀*

Since it neither holds, that Hans patted all of the three dogs nor that Mary fed all of them, the negated disjunctive statement '¬[∀x[dog(x)→pat(x)(Hans)] v ∀x[dog(x)→feed(x)(Maria)]]' comes out as true in our model. The upshot of the discussion above is that (20) depicts the present scenario only in the scope reconstructed construal. But it is now exactly this reading of (20) which is intuitively unavailable. We can therefore conclude that ATB-topicalized universals indeed do not undergo reconstruction.

    Finally, consider the behavior of partitives. We can observe that weak partitives pattern along with indefinites and not with inherently strong NP's. The ATB-reconstructed narrow scope reading of *two of the dogs* in the example below is somewhat marginal, but still intuitively available:

(22)   [Zwei von den Hunden]$_i$ haben viele t$_i$ gestreichelt und haben einige t$_i$ gefüttert   *amb*
        two of the dogs   have many patted   and have some fed
        "Many have patted and some have fed two of the dogs"

Hence, ATB-reconstruction constitutes a first piece of evidence in favor of the Trace Convention and the dichotomy weak NP's/weak partitives vs. strong NP's.

3.3.2. PREDICATIVE USE OF INDEFINITES AND PARTITIVES

A second property shared by indefinites and weak partitives is that they both can be used in predicational constructions ((23)), whereas strong NP's are generally excluded from such contexts, as demonstrated by (24))[16]:

(23)   a.   Hans ist ein Beatle
              "John is a Beatle"
        b.   Hans ist einer von den Beatles
              "John is one of the Beatles"

(24)   *Ringo, George und Paul sind die meisten Beatles/jeder (von den) Beatle(s)
              "*Ringo, George and Paul are most Beatles/each (of the) Beatle(s)"

---

[16]I am indebted to Angelika Kratzer for drawing my attention to these facts.

3.3.3. TOPICALIZATION AND NEGATION

Finally, scope interaction between quantifiers and negation also corroborates the existence of a split in the quantifier system that cross-cuts among partitives: In non-inverted clauses in German, the scope of a QP relative to negation is fixed by the surface word order. Example (25) is unambiguous:

(25)   Maria hat viele Leute nicht verstanden $QP \succ \neg$
        M.   has many people not understood

It is a well-documented fact about German (Jacobs 1982, Höhle 1991) that topicalization extends the number of available readings under certain conditions. More specifically, negation can take scope over the topicalized NP if the fronted element is an indefinite, as in (26), but not if it is a strong quantifier, as in (27)[17] (ex. (26)b taken from Frey 1989: 218):

(26)   a.   Ein Elektriker ist nicht gekommen   *amb*
              a   electrician is not   come
              "An electrician didn't come/No electrician came"
        b.   Viele Leute hat Robert nicht gemocht   *amb*
              many people has R.   not   liked
              "Robert didn't like many people"

(27)   a.   Jeder Elektriker ist nicht gekommen $\forall \succ \neg$
              every electrician is not   come
              "No electrician came"
        b.   Die meisten Fehler hat der Hans nicht gemacht   *most* $\succ \neg$
              the most mistakes has   the H.   not   made
              "Hans didn't make most mistakes"

Under the present perception, the distribution of data follows from the assumption that weak NP's optionally leave a higher type trace in some position c-commanded by negation (I will turn to the exact location of that trace in a moment).

(28) $[_{CP}$ NP$_i$ ... [nicht ... [$\mathbf{T_i}$ ... [$_{VP}$ ...

SemR will then interpret the topicalized NP within the scope of negation. The important point is now that weak partitives pattern along with weak NP's w.r.t. SemR, the following example is ambiguous:

(29)   Zwei von den Büchern hat Maria nicht gelesen   *amb*
        two of the books   has M.   not read
        "Mary has not read two of the books"

---

[17]As usually, ambiguity in (27)a reemerges if I-Topic intonation is employed (vd. Höhle 1991 and Büring, work in progress):
(i)   JEder Hund ist nIcht gekommen   : amb
         L+H*   H*+L

To see that we are actually dealing with two logically independent readings in (29), suppose that there are four book, one of which Mary has not read. Then, the sentence is true under the narrow scope reading of the NP ('not $>$ two of the books'), but false under the wide scope reading ('two of the books $>$ not'). Hence, we observe again that partitives and weak NP's form a coherent class w.r.t. SemR, both may strand a higher type trace lower than negation.

3.4. LOCATION OF HIGHER TYPE TRACES

The current section focusses on the distribution of higher type traces in the syntactic tree. It will be argued that neither adjoined positions nor the lower subject slot SpecTP should be seen as a licit site for T's.

3.4.1. AGAINST VP-ADJOINED T'S

The discussion of QP - QP interactions in 3.2. led to the conclusion that T's can be hosted by SpecAgrOP (and SpecAgrIOP). However, nothing has been said so far about the specific location of T's in the examples that involved scope relative to negation. This was for a good reason. Consider again (26)a, concentrating for now on the narrow scope reading of the indefinite:

(26)a   Ein Elektriker ist nicht gekommen   *amb*
               a   electrician is not   come
               "An electrician didn't come/No electrician came"

Given the by now familiar procedures of SemR, we might at first sight be led to expect that the topicalized NP leaves behind a higher type trace somewhere in the scope of sentential negation. Assume more concretely that this T is VP-adjoined, sandwiched in between NegP and the lower segment of VP:

(26)a $[_{CP}$ NP$_i$ $[_{AgrSP}$ ... $[_{NegP}$ **nicht** $[_{VP}$ **T$_i$** $[_{VP}$ t$_i$ gekommen]]]]]]   (*nicht* as sentential negation)

Then, we are confronted with a problem that presents itself as follows: We adopted the premise that all internal arguments leave VP and move into their respective Case positions in overt syntax. If VP-adjoined T's are taken to be legitimate LF-objects, any argument QP that leaves VP should have access to that strategy. Suppose now that the subject leaves a VP-adjoined T on its way to SpecTP. Then, an object in its canonical base position (SpecAgrOP) c-commands this VP-adjoined higher type trace and should therefore be able - contrary to fact - to obtain scope over the subject via SemR:

(30) $[_{AgrSP}$ QP$_i$ $[_{AgrOP}$ QP$_j$ $[_{VP}$ **T$_i$** $[_{VP}$ t$_i$ t$_j$ verb]]]

Hence, unless VP-adjoined T's are excluded on principled grounds, structures that observe basic word order like the one sketched in (30) are falsely predicted to be ambiguous.

     It seems therefore as if the 'topicalization-plus-negation' constructions points to an apparent inconsistency in the system: on the one hand, VP-adjoined higher type traces allow us to capture the

wide scope reading of negation w.r.t. topicalized QP's; on the other side, they lead to overgeneration in case of QP-QP interaction. In order to resolve this apparent contradiction, an alternative analysis of the topicalization example (26)a will be motivated (essentially following Frey 1989), which has the virtue of dispensing with VP-adjoined T's.

According to Frey (1989: 218) the negative particle *nicht* in (26)a functions as constituent negation adjoined to the subject rather than sentential negation. The subject NP undergoes fronting to SpecCP by an instance of "Split Topicalization", stranding the negative marker. Assume now that the topicalized NP leaves behind a higher type trace, as shown below:

(31) $[_{CP}$ NP$_i$ ... $[_{AgrSP}$ $[_{DP}$ **nicht** $[_{DP}$ **T$_i$** $]]$ $[_{VP}$ t$_i$ gekommen$]]]$: *nicht* as constituent negation

SemR of the topicalized constituent back into its trace position will consequently yield the effect of a narrow scope construal of the indefinite w.r.t. negation. Notice that this strategy does not seek resort in VP-adjoined higher type traces. Naturally, we should ask at this point whether a decision between the two competing analyses presented so far - one in terms of sentential negation, the other in terms of constituent negation - can be made on grounds of independent evidence,that comes from properties of the German modal *brauchen* ('need not'). The modal *brauchen* behaves like a negative polarity item, it is licensed only in downward entailing contexts:

(32)   daß Hans das Auto *(nicht) zu verkaufen braucht
            that H.   the car   not to sell   needs
            "that H. needs not sell the car"

As pointed out by Brugger & Poletto (1993: 48), sentential negation supports *brauchen*, while constituent negation fails to do so. This asymmetry is reflected in the contrast between (33)a and (33)b:

(33)   a.   daß Hans das Auto nicht zu verkaufen braucht
              that H.   the car not to sell   needs
              "that H. needs not sell the car"
        b.   *daß Hans nicht das AUto zu verkaufen braucht (sondern das Sofa)
              that H.   not   the car to sell   needs but   the couch
              "that H. needs not sell the CAR (but the couch)"

In (33)a, with the associated structure below, the object *das Auto* has scrambled out of the infinitival complement (in italics) to the left of *nicht*. Since the negative particle is situated in the matrix clause, its c-command domain also includes the NPI *brauchen*:

(33)a   ...$[_{XP}$ [das Auto]$_i$ $[_{XP}$ $[_{NegP}$ **nicht** $[_{VP1}$ *$[_{CP}$...PRO $[_{AgrOP}$ t$_i$ $[_{VP2}$ t$_i$ zu verkaufen]]]* **brauchen**$]]]]$

The situation is distinctly different with (33)b. Here, the scope of contrastive negation is restricted to the NP *das Auto* that it is focus-associated with (vd. Jackendoff 1972):

(33)b   *... [$_{AgrOP}$ [**nicht** [das AUto]]$_i$ [$_{VP1}$ *[$_{CP}$ ...PRO [$_{AgrOP}$ t$_i$ [$_{VP2}$ t$_i$ zu verkaufen]]]* **brauchen**]]]

Hence, *brauchen* in (33)b falls outside the scope of a negative context, and ungrammaticality ensues.

Let us return now to the topicalization structure (26)a and embed it under the modal *brauchen*. The relevant example is given below:

(34)   [Ein Elektriker]$_i$ hat nicht t$_i$ zu kommen brauchen
        an electrician has not   to come   needed
        "Some electrician didn't have to come"

Under unmarked intonation, (34) is grammatical only in the surface scope reading, i.e. if the indefinite has not undergone SemR.[18] How are we to interpret this fact in view of the NPI test? Consider the three possible LF structures that can be assigned to (34):

(35)   LF1:   NP$_i$ hat [$_{AgrSP}$ t$_i$ [$_{NegP}$ nicht   [$_{VP}$ t$_i$ *[$_{CP}$ PRO zu kommen]* brauchen]]]]
        LF2: *NP$_i$ hat [$_{AgrSP}$ T$_i$ [$_{NegP}$ nicht [$_{VP}$ **T$_i$** [$_{VP}$ t$_i$ *[$_{CP}$ PRO zu kommen]* brauchen]]]]
        LF3: *NP$_i$ hat [$_{AgrSP}$ [nicht [$_{DP}$ **T$_i$** /**t$_i$**]]$_j$ [$_{VP}$ t$_j$ *[$_{CP}$ PRO zu kommen]* brauchen]]]

In LF1, the subject chain exclusively consists of individual variables, which results in the attested surface scope order; moreover, the NPI *brauchen* is licensed by sentential negation in this case. LF2 combines an analysis in terms of sentential negation with higher type traces in VP-adjoined location and in SpecAgrSP. In other words, LF2 represents the missing scope-inverted reading where *ein Elektriker* undergoes SemR into the VP-adjoined T. Note moreover that *brauchen* is c-commanded by sentential negation, therefore licensed. We can take the unavailability of this scope-reconstructed reading for (26)a as an empirical evidence **against** VP-adjoined higher type traces: if VP-adjoined T's were permitted, LF2 would have to be considered well-formed, and an empirically unattested reading would be wrongly ruled in.[19]

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[18]The narrow scope construal for the indefinite in (34) reemerges under I-Topic intonation, where a pitch accent falls on the subject and negation.

[19]Interestingly, (34) minimally contrasts with examples in which an embedded **object** moves to the topic position, as in (i) below:
(i)   [Einen Elektriker]$_i$ hat Hans nicht t$_i$ zu rufen brauchen   *amb*
       an electrician has H. not   to call needed
       "H. didn't have to call an electrician"
As opposed to (34), (ii) allows for the scope order '¬ ≻ ∃'. This comes as no surprise under the current analysis, given that the object originates in the embedded clause. The derivation proceeds as in (ii) (Note that the ban on VP-adjoined higher type traces is observed!)
(ii) [$_{CP}$ [Einen Elektriker]$_i$ hat [$_{AgrSP}$ Hans [$_{NegP}$ **nicht** [$_{VP1}$ *[$_{CP}$ [$_{AgrOP}$ **T$_i$** [$_{VP2}$ zu rufen]]]* brauchen]]]]
In (ii), the object *einen Elektriker* moves to SpecAgrOP of the embedded clause, where it leaves behind a higher type trace and subsequently raises to the matrix SpecCP. Sentential negation in the higher clause has now both scope over the NPI and the higher type trace in SpecAgrOP and we arrive at the scope order '¬ ≻ ∃'.

Note on the side that the ban on VP-adjoined higher type traces can presumably be reduced to a violation of Improper Movement (or the PUB of Müller & Sternefeld 1994) that prohibits raising from A'-positions to A-positions (or combination of A'- and A-chains). Both the VP-internal base of the chain and SpecAgrSP qualify as A-positions, while VP-adjuncts count as A'-positions. Hence, a movement chain cannot involve VP-adjoined traces and material in a higher SpecAgrP.

LF3 finally results from a factorization that interprets *nicht* as constituent negation, and is underspecified as to whether SemR applies or not. As we have already seen above, constituent negation fails to provide a proper context for *brauchen* and LF3 can be easily disqualified as a logical form of (34).

Recapitulating shortly, the NPI test demonstrated the following: if the fronted NP had been allowed to strand a higher type trace in VP-adjoined position, nothing would have precluded a reading in which negation takes scope both over the fronted NP and the NPI *brauchen*. Since it was exactly this reading that was missing, we excluded VP-adjoined higher type traces. By parity of reasoning, the only option that we are left with in order to derive the narrow scope construal of our original example (26)a is to adopt an analysis in terms of Split Topicalization à la Frey as in (31):

(26)a   Ein Elektriker ist nicht gekommen   *amb*
            a   electrician is   not   come
            "An electrician didn't come/No electrician came"

(31) $[_{CP} NP_i ... [_{AgrSP} [_{DP}$ **nicht** $[_{DP}$ **T$_i$** $]] [_{VP}$ gekommen$]]]$ $\neg \succ \exists$

In (31), constituent negation adjoins to the higher type trace, which constitutes the target of SemR for the subject and we gain the desired narrow scope effect for the topicalized indefinite. Naturally, this strategy will be reserved for contexts that do not require the presence of sentential negation for independent reasons (as for instance NPI-licensing).

Finally, the derivation of the surface scope construal of (26)a proceeds along already familiar lines. The topicalized NP strands two individual variables and *nicht* resides in the canonical position for sentential negation:

(36) $[_{CP}$ [Ein Elektriker]$_i$ ist $[_{AgrSP} t_i$ $[_{NegP}$ nicht $[_{VP} t_i$ gekommen$]]]]$ $\exists \succ \neg$

Thus, the potential problem of overgeneration discussed in the outset of the current section can be resolved by banning VP-adjoined higher type traces.[20] The latter restriction might be reducible to the more general prohibition of Improper Movement.

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[20]Cresti (1995: 119) formulates a filter similar in spirit that excludes both overt and empty non-individual type categories from CP-adjoined location. Hence, Cresti's filter can be generalized in one direction: adjunction positions never hold higher type **empty** categories.

3.4.2. AGAINST T'S IN SPECTP

So far, specifiers of Agr-projections could be identified as potential hosts for T's. Next, the questions will be addressed whether both subject positions - SpecTP and SpecAgrSP - are licit stranding sites for higher type traces. To this end, let us first try to find a way to clearly identify the left edge of TP. A suitable test that demarcates the left boundary of TP presents itself in the form of the adverbial *gottseidank* ('thanks god'). *Gottseidank* follows definite subjects in SpecAgrSP, as in (37)a, but precedes indefinite subjects, whose canonical surface position is the lower subject position SpecTP, as shown by (37)b (vd. also Haiden 1995):

(37) a. daß [$_{AgrSP}$ Hans **gottseidank** gekommen ist
          that   H.   thanks god   come   is
          "that Hans has thanks god come"

      b. daß [$_{AgrSP}$ (*wer/*niemand) [$_{TP}$ **gottseidank** [$_{TP}$ (wer/niemand) gekommen ist
          that   somebody/nobody thanks god   somebody/nobody come is

Consider now the pair below. In both examples, an indefinite subject has undergone movement to SpecCP. But while the quantificational object remains in-situ in (38)a, it has scrambled to the left of the TP-adverbial and adjoined to a higher TP-node in example (38)b:

(38) a. [Ein Student]$_i$ hat [$_{TP}$ gottseidank [$_{TP}$ t$_i$ [$_{AgrOP}$ jede Aufgabe mit Freude gelöst $\exists > \forall$
          a   student has   thanks god   every problem with joy   solved
          "Thank god, a student has solved every problem with joy"

      b. [Ein Student]$_i$ hat [$_{TP}$ jede Aufgabe$_j$ [$_{TP}$ gottseidank [$_{TP}$ t$_i$ [$_{AgrOP}$ t$_j$ mit Freude gelöst
          a   student has   every problem   thank god   with joy solved $\exists > \forall$

(38)a is unspectacular, only the surface scope order is attested. The more interesting case is represented by (38)b, because it provides an empirical basis for testing whether SpecTP should be allowed to hold higher type traces or not. The two possible LF-representations look as follows:

(39) LF1: [Ein Student]$_i$ hat [$_{TP}$ jede Aufgabe$_j$ [$_{TP}$ gottseidank [$_{TP}$ **t$_i$** [$_{AgrOP}$ t$_j$ mit Freude gelöst
      LF2: [Ein Student]$_i$ hat [$_{TP}$ jede Aufgabe$_j$ [$_{TP}$ gottseidank [$_{TP}$ **T$_i$** [$_{AgrOP}$ t$_j$ mit Freude gelöst

If the subject were able to bind a higher type trace in SpecTP, as in LF2 above, we would expect that the object that scrambled to the left of SpecTP may take scope higher than the subject (*every problem* c-commands the trace of *a student* in SpecTP). It appears however, that (38)b is as unambiguous as (38)a, and LF1 has therefore to be considered the sole licit LF.[21] Thus, empirical considerations lead us to the conclusion that SpecTP cannot hold higher type traces.

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[21]The object in (38)b has to be prevented from adjoining to AgrSP, otherwise ambiguity would be predicted. Presumably, Shortest Move favors TP-adjunction over AgrSP-adjunction, as the latter involves crossing of an additional node.

3.5. Scope Determined By Lowering

In 3.5.1. I claim that some well-known idiosyncratic properties of the English Existential Construction provide a strong argument in favor of a lowering mechanism in the semantic component, and against the view that scope is exclusively determined by LF-movement operations. Section 3.5.2. is purported to demonstrate that SemR fares better than QR in the analysis of structures with more than two quantificational terms in German.

3.5.1. English Existentials: Evidence for Higher Type Traces

There are two lines of reasoning in the tradition of the analysis of existentials that - if combined - complement each other in a rather interesting way. The first group of approaches consists of various variations on the concept of Expletive Replacement (Chomsky 1986, 1991, Lasnik 1992, Groat 1993). An alternative perspective was brought to attention by Heim (1987), who proposed a semantic filter on the postverbal subject position. I will attempt to show that data that remained unaccounted so far in both frameworks can be straightforwardly be analyzed in a combined theory if one also admits for SemR.

Assume for reasons of concreteness Groat's (1993) version of Expletive Replacement, in which *there* resides in SpecAgrSP, checking off Case (but not Phi-) features of the complex head AgrS°+T°. At LF, the full NP subject will have to raise and adjoin to the expletive in SpecAgrSP. Movement of the associate is driven by the need to eliminate Phi-features of the AgrS°+T° complex:

(40) There are some books
       Spell-Out: $[_{AgrSP}$ there $[_{AgrS'}$ T°+AgrS° $[_{VP}$ NP   (Expletive checks Case)
       LF: $[_{AgrSP}$ **NP$_i$** +there $[_{AgrS'}$ T°+AgrS° $[_{VP}$ **t$_i$**   (NP checks φ-features)

Whatever turns out to be the correct implementation in terms of features, the postverbal subject will have to leave its overt location at LF.

Let us at this point turn to Heim's (1987) discussion of the Definiteness Effect. She notices that both overt and phonetically empty bound variables in existentials give rise to a violation of the Definiteness Restriction, as witnessed by (41):

(41)   a. *[No perfect relationship]$_i$ is such that there is it$_i$
       b. *[Which one of the two men]$_i$ were there t$_i$ drunk

What bound pronouns and traces left by wh-movement have in common is their semantic type, they both denote individuals of type <e>. Heim therefore formulates the following filter on the semantic type of the postverbal associate:

(42)   *Trace Filter (Heim 1987)*
       There be x, where x is an individual variable.

We are now already in a position to combine Groat (1993) and Heim (1987): given present assumptions (i.e. the Trace Convention), strong QP's may only strand individual variables. One

immediate consequence is that the trace of a strong NP will violate Heim's Trace Filter after Expletive Replacement:[22]

(43) *There are all books
   a. Spell-Out: $[_{AgrsP}$ [there] $[_{VP}$ are [all books]]]
   b. LF: $[_{AgrsP}$ [[all books]$_{i, <et,t>}$ there$_e$] $[_{VP}$ are *t$_{i, e}$]]

The trace left by *all books* in (43)b forms an illicit LF-object and (43) is correctly predicted to be deviant.

According to the Trace Convention, weak NP's may leave higher type traces.[23] Weak NP's can therefore escape the prohibition on e-type traces and example (44) comes out as well-formed:

(44) There are some books
   LF: $[_{AgrSP}$ [[some books]$_{i, <et,t>}$ there$_e$] $[_{VP}$ are$_{<et,t><e,t>}$ T$_{i, <et,t>}$]]

The associate in (44) moves at LF to adjoin to the expletive from where it binds a VP-internal higher type trace. In semantics, the copula can directly combine with the higher type trace, if we adopt Montague's (1973) translation of *be* as an expression of type $<<<e,t>,t>, <e,t>>$. The VP denotation applies to the expletive, which will here be treated as a semantically vacuous entity of type e.[24] Thus, we see that higher type traces are in principle also licit VP-internally, provided that the verb subcategorizes for a term of the approriate type (i.e. if the verb takes an $<<e,t>t>$-type argument).

The assumption that the empty category in postverbal position is of type $<<e,t>t>$ leads to a concrete prediction: we expect Expletive Replacement to be "undone" in semantics by SemR. And in fact, the associate in *there*-insertion contexts has always to be interpreted with narrowest possible scope,[25] an observation that has been made by Partee (1975) for raising constructions, Williams (1984)

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[22]Heim (1987, fn.4) proposes a different solution to the same problem: all NPs are of generalized quantifier type, and may be interpreted in postverbal subject position. Strong and weak NPs are told apart by conditions on files. But since the postverbal NP has to undergo syntactic LF movement for syntactic reasons anyway, the line of argumentation adopted here appears to be preferable.

[23]Even though weak partitives may strand T's, they are excluded from *there*-insertion contexts (presumably due to their presuppositionality). Similarly problematic are non-specific definites as in (i) (cited in Enc (1991) and attributed to D. Pesetsky) which will have to be exempted from the Trace Convention:
(i)   There is the following counter example to Streck's theory

[24]Various alternatives are conceivable (see e.g. Hoekstra & Mulder 1990), but nothing hinges on the specifics.

[25]Rullmann (1995: 194f) makes the same observation for amount quantification, and was the first to suggest the presence of higher type traces in the expletive construction. Amount quantifiers are licit as subjects of existentials (see example (i)) and necessarily take narrow scope, as shown by (ii):
(i)   [How many soldiers] were t there drunk

for modal contexts and Moro (1991) for negative environments:

(45) a. There seems to be a unicorn approaching   *de dicto*
      b. There must be someone in this house   *de dicto*
      c. There weren't many book in the studio $\neg \succ$ many

In a similar vein, postverbal subjects display a strong tendency to be read within the scope of quantifiers that are embedded in the "coda" of the existential:

(46) a. There was a stranger following every agent to his house $\forall \succ \exists$
      b. There is some senator in every committee $\forall \succ \exists$

Adopting Heim & Kratzer's (to appear) assumption that (most instances of) QR are type driven, it seems plausible that the strong NP in the coda has to undergo short LF-movement to a node of type t. The narrow scope reading for the postverbal subject follows then from the fact that the universal has to attach at least as high as at the VP-level, while the associate is interpreted in-situ (via SemR).

The facts in (45) and (46) remain puzzling for any theory that allows scope relations to be established **only** at LF.[26] Those approaches have to adopt a rather stipulative upward-and-downward movement processes at LF ('yo-yo-movement'), at least if they want to adhere to the strategy of Expletive Replacement. Under present assumptions, however, the lack of a wide scope interpretation comes as no surprise at all: LF movement of the associate has to leave a higher type trace, in order to comply with Heim's generalization. The T in postverbal position in turn immediately leads to SemR in

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(ii)   [How many police officers] did they claim there were T/*t at the scene of the crime?
        (Rullmann 1995: 195, ex. (34b))
Note however that the postverbal subjects in (i) and (ii) move already in overt syntax, rendering LF-raising superfluous. Hence, reconstruction in (ii) could in principle also apply at LF, instead of in semantics. In other words, (i) and (ii) are also compatible with a theory that collapses syntactic and semantic reconstruction to the effect that one never occurs without the other. The examples given in the text are on the other hand a first indication suggesting that both processes are independently called for. Given the plausible assumption that LF-raising cannot be undone at LF (i.e. by syntactic reconstruction), the required narrow scope construal of the subjects in (45) and (46) can only be accounted for by a post-LF mechanism, to wit SemR.

[26]See Abe (1993), den Dikken (1995) and Mahajan (1990) for proposals to circumvent the problem. Recently, Chomsky (1995) proposed to restrict LF-movement to raising of formal features. This conception would also account for the lack of wide scope readings in existentials, but faces serious problems in light of raising-to-object constructions. Postal (1974) shows convincingly that ECM subjects have the same scope domain like objects of the superordinate clause. Lasnik's (1993) reinterprets Postal's data in terms of covert raising of the ECM-subject to SpecAgrOP of the higher clause. If LF-movement indeed failed to extend the surface scope of an expression, as suggested by the feature movement account, this specific property of ECM-constructions would remain unaccounted for. Note that the present theory resolves the tension between subjects of existentials and subjects of ECM-infinitivals as far as their respective scope behavior is concerned: Heim's filter simply "forces" postverbal subject back into their surface position in the semantic component, while no such restriction holds for ECM subjects, hence they may obtain scope higher than their own clause.

the semantic component. Heim's generalization and Groat's Checking analysis furnish therefore empirical support in favor of scope-fixing by lowering, and a lowering process that applies at a later level than LF.

3.5.2. QUANTIFIER SCOPE INTERACTION: EVIDENCE AGAINST QR

Another piece of evidence that endorses the view taken here that scope relations are fixed by lowering comes from quantifier scope interactions with more than two QP's. QR-theories and SemR make different predictions as to which readings should be available in a representation with three QP's, where two QP's have undergone leftwards movement, crossing the third QP in the structurally highest positions. Consider to that effect the double object construction (47) in which all three arguments are realized as quantificational terms:

(47)   Er sagte daß ja wohl [mindestens ein Bild] [den meisten Gästen] [jeder Gastgeber]
        he said   that indeed at least   a picture the most   guests every host
        hinter vorgehaltener Hand gezeigt habe
        secretly   shown has
        "He said that every host has secretly shown at least one picture to most of the guests"

The hierarchical organization of the three QP's in (47) has been rearranged by scrambling. Abstracting away from irrelevant details, we can schematically depict (47) as below:

(48)   Spell-Out: $[_{TP}$ DO$_i$ $[_{TP}$ IO$_j$ $[_{TP}$ SUB$_k$ $[_{AgrIOP}$ t$_j$ $[_{AgrOP}$ t$_i$
                                        at least one   most   every

The direct object qualifies as weak NP, hence it may optionally undergo SemR into SpecAgrOP. None of the other QP's is expected to show scope flexibility in the SemrR approach: The indirect object counts as strong QP and therefore cannot strand a higher type trace, while the subject resides in its canonical position, and accordingly equally fails to have access to SemR. Consequently, the present approach only permits for *Reading I* - given under (49)a - apart from the surface scope order:

(49)   a.   *Reading I: Semantic Reconstruction of DO:*
              LF: $[_{TP}$ **DO$_i$** $[_{TP}$ IO$_j$ $[_{TP}$ SUB$_k$ $[_{AgrIOP}$ t$_j$ $[_{AgrOP}$ **T$_i$**
                                       at least one   every   most
        b.   *Reading II: QR of subject:*
              LF: [**SUBJ$_k$** $[_{TP}$ DO$_i$ $[_{TP}$ IO$_j$ $[_{TP}$ **t$_k$** $[_{AgrIOP}$ t$_j$ $[_{AgrOP}$ t$_i$
   *every   at least one   most*

QR-theories on the other hand (at least) predict the existence of *Reading II* in (49)b, in which the strong subject crosses over both direct and indirect object. They may also lead us to expect, that *Reading I* is available, at least if multiple applications of QR are taken to be licit.[27]

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[27]Among the various construals that QR would allow us to derive, *Reading II* appears to be the most

Take a scenario (*Scenario I*) that can be felicitously described by *Reading I* but not by *Reading II*. It might look as follows: there are three pictures, five guests and three hosts at a party, and three of the guests have the honor of being shown pictures by each of the hosts:

(50)　"It holds for **most of the guests**, that **every host** shows that guest **at least one picture**"

①　→　①　→　❶
　　　　②　→　❷
　　　　③　→　❸

②　→　①　→　❷
　　　　②　→　❷
　　　　③　→　❸

③　→　①　→　❸
　　　　②　→　❷
　　　　③④⑤　→　❸
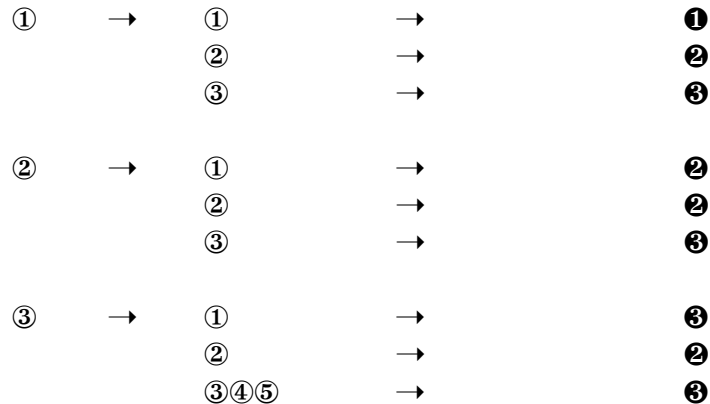
It clearly holds that most of the guests (namely three out of five) are such that each of the three hosts showed that guest a picture, a situation which is captured by *Reading I*. On the other hand, *Reading II* is not compatible with *Scenario I*, because it does not hold that every host presents a picture and shows that picture to most guests. In fact, host ① shows a different picture to guests ① to ③.

Imagine moreover a second, alternative model, lets call it *Scenario II*, that can be described by *Reading II*, but not by *Reading I:*

(51)　"**Every host** shows **at least one picture** to **most of the guests**"

①　→　❶　→　①　②　　③
②　→　❷　→　　②　③　　④
③　→　❸　→　　　③　　④　⑤

In *Scenario II*, every host shows one picture to three guests, which makes (47) true in *Reading II*. But it does now not hold that most guests are such that they have been shown a picture by every host. In fact, only guest 3 was shown a picture by all of the hosts. *Reading I* is therefore not compatible with *Scenario II*.

What are now native speaker's judgements concerning our original example (47)? Although intuitions are of an extremely subtle nature, most informants agree that (47) may serve as a description

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plausible candidate. It takes into account that in German (descriptively speaking) only QP's that have been crossed over by overt movement may QR. Moreover, it eliminates a potentially interfering variable, that we would have encountered if we had chosen to QR the scrambled IO. If the commonly held view (Diesing 1990) that the interpretation of overtly moved NP's is fixed at surface structure in German is correct, we might expect that the scrambled IO canoot undergo further QR. But even if we were to allow for this additional reading in which *most guests* QRs, the argumentation in the text would remain unaffected (see footnote 29 for more details on this point).

of *Scenario I*, but not *Scenario II*. In other words, the sentence permits for *Reading I*, that is derived by SemR, but not for the putative interpretation *Reading II* that is predicted by QR-theories.[28] Thus, the facts favor the SemR approach over the LF-movement account.[29]

We can finally sum up the preliminary results that we gained in section 1 to 3:

○ Quantifier scope ambiguities in German are fed by Semantic Reconstruction, not by QR.
○ Both overt movement (German) and covert movement (English) may leave Higher Type Traces.
○ Higher Type Traces are licensed in SpecAgrP, and VP-internally, but not in adjoined positions and SpecTP.

The next section will be concerned with the relation between SemR and syntactic reconstruction 0and establish the basis for a compositional derivation of non-presuppositional, weak readings of NP's.

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[28]To be precise: multiple application of QR would allow us to derive *Reading I*. The important point is however, that the reading which involves only a single application of QR - namely *Reading II* - is absent. Hence, QR inevitably leads to overgeneration.

[29]In fact, QR theories predict the existence of a third reading: Assume that in the surface sequence *at least one picture - most guests - every host* it is not the lowest but the intermediate QP that undergoes QR. Then, we arrive at the scope order *'most guests - at least one picture - every host'*. Such an interpretation cannot be obtained by SemR, at least given the syntactic restrictions on higher type traces suggested in the text. If there were a T in between the subject *every host* and the scrambled object it would have to be TP adjoined and the problem encountered in section 3.4.2. would reemerge (viz. crossing dependencies that do not invert the basic word order would be expected to feed ambiguity).
 Does this third reading (*'most guests - at least one picture - every host'*), that could only be accounted for by QR but not by SemR, indeed exist? The answer seems to be yes: most informants agree that example (47) may indeed depict a situation in which the relations in (i) apply:
(i) Guest ① is shown picture ❶ by every host,
  Guest ② is shown picture ❷ by every host, and
  Guest ③ is shown picture ❸ by every host.
Does this now mean that we are compelled to admit for QR in the end, given that this third scope order cannot be derived by SemR? Here, the answer is negative, because the third reading *'most guests - at least one picture - every host'* logically implies *Reading I* which was construed in terms of SemR (*'most guests - at least one picture - every host'*). Hence, following the line of argumentation initially brought to attention by Reinhart (1976, 1983), there is no need for such a third reading in the interpretation of (47). Every scenario that can be captured by the third reading can also be captured by *Reading I*. Thus, the existence of the third reading does not in itself represent an argument against a theory that derives scope exclusively in terms of SemR.

4. SEMANTIC RECONSTRUCTION VS. SYNTACTIC RECONSTRUCTION

So far, higher type traces have been treated as atoms of the grammar, alongside with individual variables. A question that arises in this context is whether the occurrence of SemR should be tied more closely to syntactic reconstruction (SynR). Assume for the moment that one could prove that higher type traces in a lower chain link are nothing else than the semantic spell-out of a movement copy in that position at LF, and let us reconsider under this change of premises a standard example for quantifier scope ambiguity like (5)b:

(5)b   weil [irgendein Buch]$_i$ fast jeder t$_i$ gelesen hat   *amb*
             since some   book almost everybody read has

In a system that collapses SynR and SemR, the two readings of (5)b would simply result from two different applications of the "Copy and Delete" mechanism of Chomsky (1992). The surface scope reading of (5)b could then be represented as in (52), while the narrow scope reading for the indefinite would be derived by deletion of the higher copy (i.e. SynR), as illustrated by (53)[30]:

(52)   a.   [$_{AgrSP}$ [irgendein Buch] [$_{AgrSP}$ fast jeder [$_{AgrOP}$ [irgendein Buch]   (LF-input)
        b.   [$_{AgrSP}$ [irgendein Buch] [$_{AgrSP}$ fast jeder [$_{AgrOP}$ ~~[irgendein Buch]~~
        c.   [$_{AgrSP}$ [irgendein Buch] [$_{AgrSP}$ fast jeder [$_{AgrOP}$ [t] $\exists \succ \forall$

(53)   a.   [$_{AgrSP}$ [irgendein Buch] [$_{AgrSP}$ fast jeder [$_{AgrOP}$ [irgendein Buch]   (LF-input)
        b.   [$_{AgrSP}$ ~~[irgendein Buch]~~ [$_{AgrSP}$ fast jeder [$_{AgrOP}$ [irgendein Buch]
        c.   [$_{AgrSP}$ [$_{AgrSP}$ fast jeder [$_{AgrOP}$ [irgendein Buch] $\forall \succ \exists$

Such a simple conception would clearly have to be preferred, since the syntactic component would not have to be enriched by empty categories of different semantic types (i.e. traces could always be translated as individual variables, and copies as entities of higher type). As it will turn out, however, there are strong arguments against identifying SemR with SynR, and I will therefore set out to defend what will be called the 'Independence Hypothesis':

(54)   *Independence Hypothesis*
        (i)   Syntactic reconstruction is not dependent upon Semantic Reconstruction
        (ii) Semantic Reconstruction is not dependent upon syntactic reconstruction

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[30]The implementation of the Copy and Delete mechanism in the text varies substantially from Chomsky (1992), where reconstruction is treated as deletion of the restrictor of the higher copy and the determiner (the wh-expression) of the lower copy. This analysis can however not be directly applied to reconstruction of NP's that are not headed by a wh-determiner, since the resulting structures (resembling (i)) are uninterpretable (at least given the compositional principles adopted here and a generalized quantifier treatment of determiners).
(i)   [$_{AgrSP}$ irgendein$_i$ [$_{AgrSP}$ fast jeder [$_{AgrOP}$ [t$_i$ Buch] [$_{VP}$ lesen]]]
              some   almost everybody book   read

In order to do so, it will be necessary to show that both (i) and (ii) below hold:

(55)   (i)   One can find environments of SynR, in which SemR is not attested.
       (ii)   There are contexts in which SemR applies, but SynR does not.

4.1. reviews shortly a supportive piece of evidence for (i) above. The bulk of the this section will however be devoted to a justification of the claim made in (ii): on the basis of a more thorough empirical survey of reconstruction phenomena in German, it will be demonstrated that higher type traces can be found in environments that do not license copies.

4.1. SYNTACTIC RECONSTRUCTION WITHOUT SEMANTIC RECONSTRUCTION

As initially discussed in Longobardi (1985), weak islands block Semantic Reconstruction.[31] Example (56) below only allows for the wide scope interpretation of *how many books*:

(56)   How many books do you wonder whether Chris wants to buy

Cinque (1990) points out that syntactic reconstruction is not restricted in such a rigid way: Principle A, B and C of Binding Theory can be checked in a chain position that is embedded within a wh-island, as shown below (examples from Cresti 1995):

(57)   a.   It is [to herself$_i$]$_j$ that I don't know whether Mary$_i$ wrote t$_j$
       b.   *It is [to her$_i$]$_j$ that I don't know whether Mary$_i$ wrote t$_j$
       c.   *It is [to Mary$_i$]$_j$ that I don't know whether she$_i$ wrote t$_j$

In (57), the clefted constituent originates from within a wh-island, hence SemR into the trace position is not available. Still, the fronted PP behaves as if being within the c-command domain of the embedded subject.

     A similar example has been brought to attention by Cresti (1995: 90):

(58)   [What image of himself$_i$] do you wonder whether John$_i$ has

Even though he wh-phrase in (58) resists a narrow scope construal, the anaphor can be bound by the lower subject. Thus, (57) and (58) constitute *prima facie* instances of syntactic reconstruction without semantic reconstruction. It can be inferred that copies in lower chain positions do not always have to be spelled out as expressions of higher types in semantics.

     The more interesting question - the one which will help us to decide whether Semantic Reconstruction is an independently needed strategy of grammar - is whether there are environments in

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[31]Longobardi uses the term 'Scope Reconstruction'. For various proposals of how to constrain 'Scope Reconstruction' see Cresti (1995), Frampton (1990), Kroch (1989), Rullmann (1995), and Williams (1994).

which SemR applies, but SynR fails to do so. Section 4.2. intends to demonstrate that scrambling in German displays exactly these properties.

4.2. SEMANTIC RECONSTRUCTION WITHOUT SYNTACTIC RECONSTRUCTION
4.2.1. SCRAMBLING AND BOUND VARIABLE PRONOUNS
4.2.1.1. RESTRICTIONS ON SYNTACTIC RECONSTRUCTION

It has been widely observed in the literature (Webelhuth 1985, Frey 1989, Haider 1989) that German allows for selective violations of WCO. A pronoun embedded within an object that has scrambled to the left of a quantificational subject can be bound by this subject. The following examples from Webelhuth (1985) illustrate this point:

(59) a.   weil [$_{AgrSP}$ jeder$_i$ [$_{AgrOP}$ seine$_i$ Mutter liebt]]
           "since everybody love his mother"
      b.   *weil [$_{AgrSP}$ [seine$_i$ Mutter] [$_{AgrOP}$ jeden$_i$ liebt]]
           "since his mother loves everybody"
      c.   weil [$_{AgrSP}$ [seine$_i$ Mutter]$_j$ [$_{AgrSP}$ jeder$_i$ [$_{AgrOP}$ t$_j$ liebt]]]
           "since his mother, everyone loves"
      d.   weil [$_{AgrSP}$ jeden$_i$ [$_{AgrSP}$ seine$_i$ Mutter [$_{AgrOP}$ t$_j$ liebt]]]
           "since everybody, his mother loves"

(59)b is a standard case of WCO, the subject falls outside the c-command domain of the object QP. In (59)c, the object NP which contains the pronominal variable resides to the left of the subject QP and apparently reconstructs back into t$_j$, thereby establishing a c-command relationship between the bound pronoun and its antecedent at LF. An account in terms of Copy Theory would assign to (59)c an LF structure as in (60):

(60)   weil [$_{AgrSP}$ [seine Mutter] [$_{AgrSP}$ jeder$_i$ [$_{AgrOP}$ [seine$_i$ Mutter] liebt]]]

In (60), variable binding "targets" the lower scrambling copy, while the higher copy undergoes deletion at LF. Note furthermore that the deviance of (59)b indicates that reconstruction of subjects into their VP-internal base has to be blocked; otherwise, (59)b would be expected to behave on a par with (59)c[32]. (59)d finally demonstrates that reconstruction is optional, the binder itself may be interpreted in its

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[32]Psych predicates of the *preoccupare* class pose a problem, as their behavior suggest that SynR proceeds to the base of the chain. In (i), for instance, the Experiencer object may bind into the Theme subject:

(i)   weil [$_{AgrSp}$ [ihr$_i$ Roman] [$_{AgrIOP}$ [jeder Autorin]$_i$ gefallen hat
           "since her$_i$ novel pleased every author$_i$"

In a Belletti & Rizzi (1988) style analysis, scope (and binding) relations would be read off D-structure, and the VP internal copies would be relevant for interpretation, in contradiction of what has been said in the text. The correct generalization capturing both the cases of transitives and psych predicates seems to be that whenever the surface subject reconstructs to its VP-internal base, the object has to do so, too.

surface position.

Frey (1989) and Haider (1989) challenge the validity of Webelhuth's generalization that scrambling may be undone in all cases on the basis of an investigation of the behavior of double object constructions. They notice that scrambling of a direct object over an indirect one as in (61)b bleeds the bound reading for pronouns embedded in the scrambled phrase:

(61) a. weil sie [$_{AgrIOP}$ jedem$_i$ [$_{AgrOP}$ sein$_i$ Geschenk überreichte]]
          since she   everyone   his   present   gave
          "since she gave everyone his present"
      b. *weil sie [$_{AgrIOP}$ [sein$_i$ Geschenk]$_j$ [$_{AgrIOP}$ jedem$_i$ [$_{AgrDOP}$ t$_j$ überreichte]]]
          since she   his   present   everyone   gave

Descriptively speaking, SynR has to be restricted to categories that have overtly crossed over the subject. The direct object in (61)b will then be submitted to A'-binding in its surface location. German looks now very much like Japanese, a language in which movement over the subject is reconstructible, but scrambling of one object over the other is not.[33]

Unfortunately, there is an additional complicating factor involved in German: constituents that have passed over the subject do not reconstruct all the way down into their base, but are evaluated in a position in between the subject and the highest internal argument. This accounts for the contrast between (62)b and (63)b below. In (62)b, movement of the direct object is (partially) undone and the subject may bind into the fronted object (Frey 1989: 95f):

(62) a. weil [$_{AgrSP}$ [jede Architektin]$_i$ [$_{AgrIOP}$ dem Peter [[$_{AgrOP}$ ihren$_i$ Hund zeigte]]]
          since   every architect   the P.   her   dog showed
          "since every architect showed her dog to P."
      b. weil [$_{AgrSP}$ [ihren$_i$ Hund]$_j$ [$_{AgrSP}$ [jede Architektin]$_i$ [$_{AgrIOP}$ dem Peter [$_{AgrOP}$ t$_j$ zeigte]]]]
          since   her   dog   every architect   the P.   showed

As demonstrated by (63)b, the object can however not have undergo SynR into its Case position, otherwise the inability of the indirect object to bind into the direct object would remain unaccounted for:

(63) a. weil [$_{AgrSP}$ Peter [$_{AgrIOP}$ [jeder Architektin]$_i$ [$_{AgrOP}$ ihren$_i$ Hund zeigte]]]
          since   P.   every architect   her   dog showed
          "since P. showed her dog to every architect"
      b. *weil [$_{AgrSP}$ [ihren$_i$ Hund]$_j$ [$_{AgrSP}$ Peter [$_{AgrIOP}$ [jeder Architektin]$_i$ [$_{AgrOP}$ t$_j$ zeigte]]]]
          since   her dog   P.   every architect   showed

Summing up, the data considered so far can be given a uniform treatment under the assumption that scrambled objects undergo 'shallow' reconstruction in a position in between TP and AgrIOP. Then, the

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[33]See Abe (1993), Hoji (1985), Nemoto (1993), Saito (1989), Takano (1995) on the properties of so-called 'medium scrambling' (clause internal movement over the subject) in Japanese.

LF-output that results from application of the Copy and Delete mechanism looks as follows:

(64) $[_{AgrSP}$ Subject $[_{AgrIOP}$ **[Copy of IO/DO]** $[_{AgrIOP}$ ... $[_{AgrOP}$ ...

A quantifier in subject position may accordingly bind a pronoun contained in an object copy, whereas object quantifiers will fail to obtain c-command over the AgrIOP-adjoined copy.[34]

4.2.1.2. AVAILABILITY OF SEMANTIC RECONSTRUCTION

Let us at this point extend the investigation to include SemR by comparing the behavior of scrambling chains w.r.t. SemR and SynR.

First, we may observe that SynR is attested in configurations that do not permit SemR. Take for example sentence (59)c, repeated below, where the object undergoes 'shallow' SynR into a position c-commanded by the subject[35]:

(59)c   weil $[_{AgrSP}$ ~~[seine Mutter]~~$_j$ $[_{AgrSP}$ jeder$_i$ $[_{AgrOP}$ [seine$_i$ Mutter] liebt]]]
           "since his mother, everyone loves"

Since the reconstructed NP *seine Mutter* does not qualify as weak, the lower copy in (59)c cannot be interpreted as higher type trace according to the Trace Convention. This furnishes additional support for Cinque's and Cresti's hypothesis that SynR is more permissive than SemR.

More relevant for present purposes, it can also be demonstrated that scrambling can be undone by SemR, but not by SynR. Consider to that end an ambiguous structure in which a weak direct object NP has been scrambled over a strong indirect object NP, as in (65)b:

(65)   a.   weil sie $[_{AgrIOP}$ jedem Kandidaten$_i$ $[_{AgrOP}$ [ein Bild von seinem$_i$ Auftritt] zeigte]]
             since she   every candidate   a   picture of his   appearance showed
             "since she showed every candidate a picture of his appearance [in the show]"
       b.   weil sie $[_{AgrIOP}$ [ein Bild von seinem Auftritt]$_j$ $[_{AgrIOP}$ jedem Kandidaten]$[_{AgrOP}$ t$_j$/T$_j$ zeigte]
             since she   a   picture of his   appearance   every candidate   showed
             "since she showed every candidate a picture of his appearance [in the show]"

(65)b possesses both a surface scope reading and an interpretation resulting from SemR of the direct object *ein Bild von seinem Auftritt* into the higher type trace in SpecAgrOP. Interestingly, even though *ein Bild von seinem Auftritt* may be construed with narrow scope w.r.t. the indirect object *jedem Kandidaten*, the pronoun contained in the scrambled phrase cannot be understood as being bound by

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[34]I have no specific proposal to offer as to why scrambling displays exactly these reconstruction properties.

[35]Under current assumptions, the object copy resides in an adjoined position. Since adjunction positions cannot hold higher type traces, there is an additional reason to believe that SynR is independent from SemR.

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jedem Kandidaten. This follows straightforwardly from the interaction of three hypotheses adopted so far, namely:

- SpecAgrOP can hold a higher type trace, yielding the inverted scope order.
- The direct object may not undergo SynR into SpecAgrOP.
- Variable binding is licensed at LF.

Thus, example (65)b can be seen as evidence that SemR does not have to be "supported" by some process of SynR in the syntactic component, indicating that SemR should be granted an autonomous status in the grammar.

4.2.1.3. EXCURSUS: SYNTACTIC RECONSTRUCTION VS. SUBJECT RAISING

One might now object that the basic foundation of the argument presented above is questioned by the availability of an alternative analysis for A'-binding, one that does not rely on SynR.[36] Assume for the moment that the subject in (59)c resides in SpecTP at Spell-Out and raises at LF from SpecTP to SpecAgrSP. Then, the subject would obtain c-command over constituents that precede it at Spell-Out. Moreover, such an analysis would not have to resort to any process of SynR for the object. The two competing analyses are sketched below:

(66)   a.   *Derivation I* (SynR of object):
           LF: weil [$_{AgrSP}$ [~~seine Mutter~~]$_j$ [$_{AgrSP}$ jeder$_i$ [$_{AgrOP}$ **[seine$_i$ Mutter]** liebt]]]
                    since   his mother   everybody   his mother   likes

       b.   *Derivation II* (Subject raising from SpecTP to SpecAgrS):
           LF: weil [$_{AgrSP}$ **jeder$_i$** [seine$_i$ Mutter]$_j$ [$_{TP}$ **t$_i$** [$_{AgrOP}$ liebt]]]

If *Derivation II* turned indeed out to be correct, the interaction of scrambling and pronominal variable binding discussed in the last section would simply not provide a testing ground for the Independence Hypothesis, since variable binding could be accounted for without resort to SynR. In what follows, I will therefore present two arguments in favor of the original analysis of (59)c in terms of SynR (*Derivation I*).

First, V2 clauses in which an object containing a bound pronoun resides in SpecCP are not compatible with the subject raising hypothesis:

(67)   [$_{CP}$ [Seine$_i$ Mutter] liebt [$_{AgrSP}$ jeder [...]]]
              his   mother loves   everybody
              "Everybody loves his mother"

In (67), there is simply no position structurally higher than the object that the subject could move into

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[36]I am indebted to Kyle Johnson for pointing out this alternative to me.

at LF. Note also that topicalization patterns along with scrambling in that a topicalized direct object does not reconstruct back into its Case position, but only somewhere in between TP and AgrIOP (vd. Frey 1989):

(68) a. Sie hat [$_{AgrIOP}$ jedem$_i$ [$_{AgrOP}$ sein$_i$ Geschenk überreicht]]
          she has   everyone   his   present   given
          " She gave everyone his present"
      b. *[Sein$_i$ Geschenk]$_j$ hat sie [$_{AgrIOP}$ jedem$_i$ [$_{AgrDOP}$ t$_j$ überreicht]]]
          his   present   has she   everyone   given

Both topicalization and scrambling receive a uniform treatment under the reconstruction approach: objects undergo only 'shallow' SynR and variable binding is computed after application of the Copy and Delete mechanism. Moreover, topicalized NP's behave like scrambled ones not only w.r.t. SynR, but also in that they may leave a higher type trace in their Case position, triggering SemR. The topicalized direct object in (69)b may be interpreted within the scope of the indirect object that remains *in-situ* :

(69) a. Sie hat [$_{AgrIOP}$ jedem Kandidaten$_i$ [$_{AgrOP}$ [ein Bild von seinem$_i$ Auftritt] gezeigt]]
          she has   every candidate   a   picture of his   appearance shown
          "She showed every candidate a picture of his appearance"
      b. [$_{CP}$ [Ein Bild von seinem Auftritt]$_j$ hat sie [$_{AgrIOP}$ jedem Kandidaten] [$_{AgrOP}$ T$_j$ gezeigt]]
          a   picture of his   appearance   has she   every candidate   showed

We can observe once again that even though *ein Bild von seinem Auftritt* can get a narrow scope construal, the pronoun resists a bound interpretation by the indirect object *jedem Kandidaten*. These facts are readily explained by the interplay of SynR and SemR, but remain mysterious under the subject-raising hypothesis.

A second argument against subject raising (and *Derivation II*) is based on the A'-binding behavior of QP's that are already in the higher subject position by Spell-Out: as shown by (70)b, specific or strong subjects in SpecAgrSP retain their capacity to bind into scrambled objects to their left (recall that *gottseidank* /'thanks god' was taken to demarcate the left periphery of TP).

(70) a. daß [$_{AgrSP}$ jeder [$_{TP}$ gottseidank [$_{TP}$ t seine$_i$ Bücher wiedergefunden habe]]
          that   everybody thanks god   his   books re-found   have
          "that everybody has found his books again"
      b. daß [$_{AgrSP}$ [seine$_i$ Bücher]$_j$ [$_{AgrSP}$ jeder [$_{TP}$ gottseidank [$_{AgrOP}$ t$_j$ wiedergefunden habe]]]]
          that   his   books   somebody thanks god   re-found   have

The availability of the bound reading in (70)b poses a problem for the subject raising hypothesis: the subject already shows up in its higher position in surface syntax, precluding further raising at LF. The subject reconstruction account makes on the other hand the correct predictions.

It has been argued in this short excursus, that constructions in which a subject binds into an object to its left (putative WCO-violations) cannot be reconciled with an analysis in terms of subject raising, and should be seen as genuine instances of SynR. Thus, scrambling chains can indeed be taken to serve as a diagnostic environment for the independence of SynR and SemR. Both processes are (to a more or less limited extend) available in these configurations, but they are subject to distinct restrictions. Next, the behavior of anaphoric expressions embedded in scrambled phrases will be considered.

4.2.2. SCRAMBLING AND PRINCIPLE A

The principles of reconstruction active with bound pronouns are (roughly) the same as the ones found with Principle A. Relevant for present purposes is the observation that scrambled anaphors do not reconstruct if they have crossed over objects, as witnessed by the contrast in (71) (see Frey 1989, Müller 1993 and literature cited therein):

(71)   a.   weil er die Leute$_i$ über einander$_i$ aufgeklärt hat
            she he the people about each other enlightened has
            "since he has informed the people about each other"
       b.   *weiler [$_{AgrOP}$ [über einander$_i$]$_j$ [$_{AgrOP}$ die Leute$_i$ [t$_j$ aufgeklärt hat]]
            since he   about each other   the people enlightened has

Although the trace position t$_j$ in (71)b cannot hold a copy at LF, it can be shown that t$_j$ constitutes a potential scope reconstruction site. Consider to this end the examples under (72) and (73):

(72)   a.   weil sie$_i$ [vielen Gästen]$_j$ [einige Freunde von einander$_{i/j}$] vorgestellt haben
            since they many guests some friends of each other introduced have
            "since they have introduced many guests to some friends of each other"
       b.   *weil ich [einige Freunde von einander]$_i$ vielen Gästen t$_i$ vorgestellt habe
            since I   some friends of each other many guests introduced have
       c.   weil sie$_j$ [einige Freunde von einander$_j$]$_i$ vielen Gästen t$_i$ vorgestellt haben
            since they some friends of each other many guests introduced have

(73)   a.   weil sie$_i$ [jedem Freund]$_j$ [einige Geschichten über einander$_{i/j}$] verschwiegen haben
            since they every friend some stories   about each other withhold   have
            "since they withheld some stories about each other from every friend"
       b.   *weil ich [einige Geschichten über einander]$_i$ jedem Freund t$_i$ verschwiegen habe
            since I some stories   about each other every friend withhold   have
       c.   weil sie$_j$ [einige Geschichten über einander$_j$]$_i$ jedem Freund t$_i$ verschwiegen haben
            since they some stories   about each other every friend withhold   have

The dative object in the scopally unambiguous examples (72)a and (73)a contains an anaphor that may be either bound by the subject or the direct object (Grewendorf 1984). Scrambling of an accusative to the left of a dative - as shown by (72)b and (73)b - blocks the lower construal of the reciprocal contained in the accusative, showing once again that objects do not reconstruct by SynR. If we provide however

a suitable binder for the anaphor,[37] as done in (72)c and (73)c, the structures not only become grammatical, but also display scope ambiguity: the two internal arguments commute now in scope, indicating that the scrambled direct object may optionally undergo SemR into its Case position SpecAgrOP. The pertinent LF-representation of the narrow scope readings that forms the input to semantics look as follows:

(74) $[_{\text{AgrSP}}$ Subject$_i$ ... $[_{\text{AgrIOP}}$ **$[_{\text{NP}}$ ... einander$_i$ ...]$_j$** $[_{\text{AgrIOP}}$ [Indirect Object QP] $[_{\text{AgrOP}}$ **T$_j$** $[_{\text{VP}}$ ...]]]

Hence, (72)c and (73)c represent a second case in point for the claim that there are movement processes which can be undone by SemR, but not by SynR.

4.2.3. CP-SCRAMBLING

The third and final piece of empirical evidence supporting the Independence Hypothesis comes from scrambling of sentential complements in German: CP-scrambling patterns along with NP-scrambling in that it does not syntactically reconstruct. But while SemR with scrambled NP's was merely optional, we will see that Semantic Reconstruction appears to apply obligatorily to fronted clauses.

4.2.3.1. LACK OF SYNTACTIC RECONSTRUCTION

Two phenomena lend support to the assumption that CP-scrambling lacks SynR. First, CP-scrambling bleeds binding of pronominal variables[38] and leads to WCO effects. In (75)a and (76)a below, the indirect object and the subject bind a pronoun in the infinitival complement, respectively; moving the infinitival to the left of the subject leads to a clear WCO violation in both cases, as witnessed by examples (75)b and (76)b:

(75) a. daß [die Professorin]$_j$ keinem$_i$ versprechen wollte [PRO$_j$ seinen$_i$ Bruder zu beherbergen]
           that the professor   nobody   promise   wanted   his   brother to put up
           "that the professor didn't want to promise anybody to put up his brother"
      b. *daß [PRO$_j$ seinen$_i$ Bruder zu beherbergen] die Professorin$_j$ keinem$_i$ versprechen wollte

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[37]It is assumed throughout that the Binding Theory also applies to A'-positions. *Prima facia* evidence that anaphors can be bound in A'-positions can be drawn from structures like (i) (due to G. Fanselow, Umass talk, 02/95):
(i)   weil er$_i$ sich$_i$ [anstatt PRO$_i$ pg$_i$ um die Studenten zu kümmern] t$_i$ allein mit dem Buch beschäftigte
           since he himself instead PRO about the students to care   only with the book occupied
           "since he only spent time with the book instead of taking care of the students"
Here, the anaphor has scrambled over the adjunct clause, licensing a parasitic gap. If binding were computed in the lower copy, (i) would become indistinguishable at LF from its ill-formed variant in (ii), where the reflexive remains *in-situ*.
(ii)   *weil er$_i$ [anstatt PRO$_i$ pg$_i$ um die Studenten zu kümmern] sich$_i$ allein mit dem Buch beschäftigte

[38]See Grewendorf & Sabel (1994) for further discussion. Three informants and I disagree however with the assessment of the data given in Grewendorf & Sabel (1994), who accept (75)b and (76)b as grammatical.

(76) a. daß ihr$_j$ keiner$_i$ raten würde [PRO$_j$ seinen$_i$ Bruder zu besuchen]
         that her nobody recommend would his   brother to visit
         "that nobody would recommend her to visit his brother"
      b. *daß ihr$_j$ [PRO$_j$ seinen$_i$ Bruder zu besuchen] keiner$_i$ raten würde

Note that the b-examples are on a par with standard cases of WCO that we observed in double object constructions as far as relative acceptability goes:

(77) *Sie hat [seine$_i$ Sekretärin]$_j$ jedem$_i$ t$_j$ am Mittwoch vorgestellt
        she has his   secretary everybody on Wednesday introduced
        "She has introduced his secretary to everybody on Wednesday"

    Thus, the absence of a bound reading for (75)b and (76)b demonstrates that the interpretative principle responsible for variable binding does not have access to a lower, VP-internal copy of the CP at the level of LF.[39]

    Second, it can be demonstrated that CP-scrambling does not reconstruct in order to allow for repair of violations of the Proper Binding Condition (PBC).[40]

(78) *Proper Binding Condition (Fiengo 1974)*
       All traces are bound [by a c-commanding antecedent]

Note in the beginning that wh-movement out of a scrambled CP yields perfectly acceptable result, as demonstrated by (79):

(79) Wen$_i$ glaubst du daß [$_{CP}$ t$_i$ zu treffen] keiner versuchen wird
       who believe you that   to meet   nobody try   will
       "Who do you believe that nobody will try to meet"

Scrambling out of a scrambled CP results in slightly more complex but nonetheless fully grammatical structures, as long as the PBC is obeyed.[41] In example (80)a, the most deeply embedded CP (in italics)

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[39]Recall from section 4.2.1. that a quantified subject can bind a pronoun embedded in an NP to its left. As is evidenced by the deviance of (76)b, a subject may not obtain scope over a pronoun that is contained in a clausal constituent to its left. This means that we are forced to assume that while NP's undergo 'shallow' SynR into a position in between TP and AgrIOP, a CP may not undergo syntactic reconstruction **at all**. Even though this interesting asymmetry invites speculations as to the deeper motivation for SynR, I will leave the solution of this puzzle for further research.

[40]The argument is based on the (non-trivial) assumption that the PBC holds at LF, and that a restricted (yet to be devised) theory of SynR should be able to capture Strict Cyclicity in an adequate fashion (see Kitahara 1995).

[41]See also Geilfuß (1991), who takes scrambling out of scrambled CP's to be acceptable. Again, Grewendorf & Sabel's (1994) arrive at a different assessment of the data, they claim on the basis of (i) that scrambling out of scrambled CP's invariantly leads to deviant results.
(i)   *daß den Hund$_i$ zweifellos [t$_i$ zu füttern]$_j$ keiner versuchte t$_j$
         that the dog   without doubt to feed   nobody tried

resides in its base position. This infinitival CP can now be scrambled over the sentential adverb *niemals*, as shown by (80)b. Scrambling of the indirect object pronoun *ihr* out of the scrambled infinitival finally results in a structure like the one depicted under (80)c:

(80)   a.   eine Frau [$_{CP}$ die$_i$ die Maria niemals [$_{VP}$ *[$_{CP}$ ihr t$_i$ zu zeigen]* versuchen würde]]
            a woman who the M.   never   her to show   try   would
            "a woman who M. would never want to try to show to her"

       b.   eine Frau [$_{CP}$ die$_i$ die Maria *[$_{CP}$ ihr t$_i$ zu zeigen]$_j$* niemals [$_{VP}$ t$_j$ versuchen würde]]
            a woman who   the M.   her to show   never   try   would

       c.   eine Frau [$_{CP}$ die$_i$ **ihr$_k$** die Maria *[$_{CP}$ t$_k$ t$_i$ zu zeigen]$_j$* niemals [$_{VP}$ t$_j$ versuchen würde]]
            a woman who   her   the M.   to show   never   try   would

The scrambled pronoun in (80)c c-commands its trace t$_k$ in satisfaction of the PBC. Failure to obey the PBC, as in (81), leads to sharply ungrammatical results:[42]

(81)   *eine Frau [$_{CP}$ die$_i$ die Maria *[t$_k$ t$_i$ zu zeigen]$_j$* **dem Peter$_k$** niemals [$_{VP}$t$_j$ versuchen würde]]
            a woman who the M.   to show   the P.   never   try   would
            "a woman who M. would never want to try to show to P."

The upshot of the discussion above is that PBC violations cannot be repaired: a scrambled CP which contains an offending trace is not reconstructed back into a position at LF in which the proper c-command relations could be (re)established.

4.2.3.2. AVAILABILITY OF SEMANTIC RECONSTRUCTION

The previous section has concentrated on the absence of SynR with CP-scrambling. Scrambled CP's do

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Although I concur on their judgement w.r.t. (i), the whole picture seems to look more complex: Note that (i) involves scrambling out of a pre-subject CP, whereas the grammatical structures in the text hint at the availability of scrambling out of a post-subject CP. I will therefore adopt the following descriptive generalization: NP scrambling out of scrambled CP's is restricted to CP's in post-subject location.

[42]The same point can be made w.r.t. CP's that have scrambled over ECM-subjects, as in (i), and CP's that have been evacuated out of a constituent that has undergone Verb Projection Raising to the right of the finite auxiliary, as in (ii):

(i)   a.   weil **es$_j$** der Peter [**t$_j$** zu lesen]$_i$ noch nie jemanden t$_i$ versuchen sah
            since it the P.   to read   yet never somebody try   saw
            "since P. has never seen anybody try to read it"

       b.   *weil der Peter [**t$_j$** zu lesen] noch nie jemanden **dieses Buch$_j$** versuchen sah
            since the P.   to read   yet never somebody this book try   saw

(ii)   a.   daß **ihn$_j$** Hans [**t$_j$** einzuladen]$_i$ hat t$_i$ versuchen wollen
            that him H.   invite   has try   want
            "that H. wanted to try to invite him"

       b.   *daß Hans [**t$_j$** einzuladen] **den Gustav$_j$** hat versuchen wollen
            that H.   i nvite   the G.   has try   want

Both (i)a and (ii)a conform with the PBC, while in the deviant cases (i)b and (ii)b, the scrambled CP "jettisoned" one of its argument in a position to its left in violation of the PBC.

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however undergo Semantic Reconstruction; in fact, the semantic principles used throughout this paper even force them to do so.[43]

A quantifier contained in a fronted CP is either construed independently or within the scope of all other quantificational terms that the CP has crossed over, as witnessed by (82):

(82)   weil [mindestens einen Hund zu füttern] keiner versprochen hatte   ¬∃ ≻ *at least one*
       since at least   one dog to feed   nobody promised   had
       "since nobody had promised to feed at least one dog"

(82) exclusively allows for the scope order 'matrix subject ≻ embedded object'. SemR allows us to give a natural account for this fact. Assume that movement of a CP only strand a trace of (extensional) type t. Then, a dislocated CP will always be λ-converted back into its base position by SemR. The relevant steps in the computation are provided below:

(83)   LF: [$_{TP}$ [$_{CP}$ mindestens einen Hund zu füttern]$_i$ [$_{TP}$ keiner$_j$ [$_{VP}$ t$_j$ [t$_i$ versprochen hatte]]]]
       ⟦CP⟧ = [one dog feed] [λi [nobody [λj [t$_j$ promise t$_i$]]]] =
            = [λi [nobody [λj [t$_j$ promise t$_i$]]]] ([one dog feed]) =
            = [nobody [λj [t$_j$ promise [one dog feed]]]]
            = ¬∃x [promise (one dog feed)(x)] =
            = ¬∃x [promise ($∃_{≥1}$ y[dog(y) & feed (y)(x)]) (x)]

Since (83) depicts the only way of associating the scrambled CP and its trace in semantics (given that CP's cannot be assigned alternative types) we derive the obligatoriness of the effect of scope reversal.[44]

4.3. Résumé

Let me at this point shortly review the results of section 4: it was argued that higher type traces cannot be made parasitic upon the presence of a syntactic copy. We identified environments in which scrambled NP's and scrambled CP's displayed none of the properties generally associated with syntactic reconstruction, but were still able to undergo Semantic Reconstruction. The table in (84) sums up the

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[43]Fronted CP's behave in that respect like topicalized predicates (vd. Barss 1986, Huang 1993).

[44]Note on the side that the lack of a wide scope reading for the embedded object QP in (82) lends additional support to the descriptive generalization that was formulated in footnote 41 (viz: 'scrambling is possible only out of scrambled CP's in post-subject location'). Without this restriction, an alternative derivation for (82) would become available, one that would result in the (non-attested) scope order 'at least one dog ≻ nobody'. To sees this more clearly, consider (i) below, in which the object QP *mindestens einen Hund* has (vacuously) scrambled out of the **preverbal** CP, which itself is in a scrambled position:
(i)   *weil [$_{TP}$ [mindestens einen Hund$_i$ [$_{TP}$ *[$_{CP}$ t$_i$ zu füttern]$_j$* [$_{TP}$ keiner [$_{VP}$ t$_j$ versprochen hatte]]]]
              since   at least   one dog   to feed   nobody promised had
Even though the CP *to feed* will be interpreted in the position marked by the trace t$_j$ by SemR, the short movement step of the object *at least one dog* out of the CP made it possible for the object to gain scope over the subject *keiner*. Hence, we need a restriction along the lines alluded above, that turns scrambled CP's in pre-subject position into islands.

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relevant findings (the grammatical principles involved in the tests are set in brackets):

(84)   *Reconstruction Properties of Scrambling*

	Syntactic Reconstruction	Semantic Reconstruction
Object over object scrambling:	No (Bound pronouns, Principle A)	SpecAgr(I)OP[45]
Object over subject scrambling:	'Shallow' SynR inbetween TP and SpecAgrIOP (Bound pronouns, Principle A)	SpecAgr(I)OP
CP-scrambling:	No (Bound pronouns, PBC)	VP-internal foot of chain

Semantic Reconstruction and syntactic reconstruction should consequently be conceived of as two independent strategies of grammar.

In section 5, I will attempt to relate the lack of SynR in scrambling chains to Diesing's (1990, 1992) Mapping Hypothesis and motivate a new account of so-called 'weak' readings of weak quantifiers that dispenses with a structurally fixed existential closure operator in the syntactic tree.

5. THE INTERPRETATION OF WEAK NP'S

In Diesing (1990, 1992) and Diesing & Jelinek (1995) indefinites and weak NP's either denote generalized quantifiers (type $<<e,t>t>$) or cardinality predicates (type $<e,t>$). Cardinality predicates introduce an unbound variable that is unselectively bound by existential closure within VP. This view is incompatible with a semantic module that uses functional application (alongside with predicate modification and function composition; see Heim & Kratzer, to appear) as its main mode of composition. To illustrate with an example: In (85), a weak object of type $<e,t>$ applies to the free variable that should be bound off by existential closure. But combining the NP with the variable results in a formula, and the selectional requirements of the transitive verb can no longer be met, as the sister to the verb is not of type type e:

(85)   Mary saw some movie
        $*\exists x_i [see_{<e<e,t>>} (some\ movie_{<e,t>} (x_i))(Mary)]$

(85) reflects the insight that in a Heim-Kamp style analysis of indefinites, indefinite NP's are treated as

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[45] It has not been shown explicitly in the text that SpecAgrIOP also constitutes a licit target for SemR. Pertinent examples can be easily constructed on the basis of sentences where an indirect object QP has scrambled over a subject quantifier.

conditions on variables; roughly, these conditions are conjoined with other restrictions, such as the ones set up by the main predicate, to yield an open formula which is finally bound off by existential closure.

If one wants to transfer the Heim-Kamp analysis into a framework that is built on functional application, it seems therefore desirable to look for some other device for the representation of weak readings. It will be argued, that these readings are derived by syntactic reconstruction, Determiner Raising and a semantic rule of Generalized Predicate Modification, following a suggestion by Heim (1992). An immediate consequence of this new conception will be that the semantic interpretation of traces will be extended to also include empty categories of type <e,t>.

5.1. GENERALIZED PREDICATE MODIFICATION

Heim (handout for class lecture 02/17/1992, University of Tübingen) presents a concrete semantics for weak NP's based on a categorematic treatment of weak determiners. In her proposal, the weak determiner heading the NP first undergoes Determiner Raising at LF (Dobrovie-Sorin 1987), as shown by the LF-representation in (86)a. Then, the remaining common noun is incorporated into the verb, as in (86)b (English and German examples will be treated on a par; for a slightly simplified version see Lechner 1998):

(86)   weil Maria sah einen Film
         "since Mary saw some movie"
         a.   [some$_i$ [Mary [see t$_i$ movie]]]   (Determiner Raising)
         b.   [some$_i$ [Mary [[see-movie] t$_i$]]]   (Incorporation)

In semantics, the incorporated CN and the verb are translated as a complex predicate of type <e<e,t>> by the rule of Generalized Predicate Modification (GPM), defined below:

(87)   *Generalized Predicate Modification (GPM)*
         If $[\![N']\!] = \alpha$ and $[\![V°]\!] = \beta$, where β is of type <e,...<e,t>> with n e's, then
         $[\![V° N']\!] = \lambda x_1,....\lambda x_n [\alpha(x_1) \& \beta(x_1)....(x_n)$

Applied to our example above, GPM yields (88):

(88) $[\![\text{see-movie}]\!]$ = $\lambda x \lambda y [\text{movie}(x) \& \text{see}(x)(y)]$

In the next two steps of the computation, the two-place relation formed by GPM applies to the trace left by Determiner Raising and then to the subject. (89)b represents then the semantic output that derives from the interpretation of (86)b up to the raised determiner:

(89)   a. $[\![\text{see-movie } t_i]\!]$ = $\lambda x \lambda y [\text{movie}(x) \& \text{see}(x)(y)] (t_i)] =$
                                                        = $[\lambda y [\text{movie}(t_i) \& \text{see}(t_i)(y)]]$
         b. $[\![\text{Mary [see-movie } t_i]]\!]$ = $[\lambda y [\text{movie}(t_i) \& \text{see}(t_i)(y)] (\text{Mary})] =$
                                                        = $[\text{movie}(t_i) \& \text{see}(t_i)(\text{Mary})]$

Finally, Heim defines a categorematic rule for the translation of the weak determiner that has the effect

of introducing existential closure as a binder over the variable left by Determiner Raising:

(90) $[\![some_{weak}]\!]$ =   a function of type $<et,t>$, such that for any $f \in D_{e,t}$
   $[\![some_{weak}]\!](f)= 1$ iff $\exists x\ [f(x) =1]$

Combining the determiner with the rest of the clause yields finally the output of semantics in (91)b:

(91)   LF: $[some_i\ [Mary\ [see\text{-}movie\ t_i\ ]]]$
   a. $[\![Mary\ [see\text{-}movie\ t_i\ ]]\!]$ = $[movie(t_i)\ \&\ see(t_i)(Mary)]$
   b. $[\![some\ [Mary\ [see\text{-}movie\ t_i\ ]]]\!]$ = $some_{weak}\ (\lambda i[movie(t_i)\ \&\ see(t_i)(Mary)]) =$
      = $\exists x[movie(x)\ \&\ see(x)(Mary)])$

What are now the consequences that adopting Heim's analysis has for the current assumptions concerning German phrase structure? Recall to begin with that all verbal arguments reside in their respective SpecAgrP positions in clauses that obey basic word order. Moreover, we saw that the weak interpretation of an NP is contingent upon the NP being a sister to the verb. Incorporation of any of the arguments out of their respective SpecAgrP-positions into the verb (or the VP-internal copy of the verb) is blocked as a violation of the ban on lowering. A straightforward way to circumvent this problem is offered by syntactic reconstruction: Suppose that A-movement to the specifier of an Agr-phrase is undone by syntactic reconstruction first, and that Determiner Raising and noun incorporation target a reconstructed VP-internal copy[46].

Given these modifications, consider once again the derivation of example (86), repeated below:

(92)   weil Maria einen Film sah
   "since May saw a movie"
   a. $[_{AgrSP}$ Maria $[_{AgrOP}$ [einen Film] $[_{VP}$ [einen Film]   sah]]]
   b.   Maria $[_{AgrOP}$ **einen$_i$** $[_{AgrOP}$ **[t$_i$** Film] $[_{VP}$ **einen$_i$** $[_{VP}$ [t$_i$ Film]   sah]]]
   c.   Maria $[_{AgrOP}$ einen$_i$ $[_{AgrOP}$ [t$_i$ Film] $[_{VP}$ einen$_i$ $[_{VP}$ [t$_i$ **t$_j$**]   sah-**Film$_j$**]]]]]
   d.   Maria $[_{AgrOP}$ einen$_i$ $[_{AgrOP}$ ~~[t$_i$ Film]~~ $[_{VP}$ ~~einen$_i$~~ $[_{VP}$ [t$_i$ t$_j$]   sah-Film$_j$]]]]
   e.   Maria $[_{AgrOP}$ einen$_i$ $[_{AgrOP}$ $[_{VP}$ [t$_i$ t$_j$]   sah-Film$_j$]]]

As illustrated by (92)a, movement of the internal argument to SpecAgrO strands a copy in the base of the chain. Then, Determiner Raising separates the determiner from its restriction in both copies ((92)b) and the head noun subsequently incorporates into V° ((92)c). Finally, the higher restriction and the lower determiner is erased in (92)d, providing the input for semantics as given under (92)e.[47]

Interestingly, it can be shown that the specific choice of the copies that undergo deletion in (92)d

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[46]A problem is raised by the fact that subjects are generally thought to not incorporate into verbs. In order to allow for this option - otherwise, subjects would be wrongly predicted to lack a weak reading - I assume (without discussion) that incorporation is licensed in Spec-head configurations (alternatively, the verb could be hypothesized to undergo short movement in a Larsonian shell, licensing arguments to incorporate from SpecVP into the next V° up in the tree.)

[47] The trace t_j left by noun-incorporation has to be treated as being semantically vacuous, while the trace stranded by Determiner Raising receives an interpretation as individual variable.

is not arbitrary, but governed by more general principles. In developing his account of Multiple Binding Domain Effects (Barss 1986), Chomsky (1992) argues that copies which contain a trace of head movement cannot be erased, since such a step would lead to improper head-chain formation. A typical manifestation of a Multiple Binding Domain Effect can be observed in (93), where the fronted wh-phrase contains an anaphor bound by the lower subject:

(93)   [Which picture of herself$_i$]$_j$ does Bill think Sally$_i$ likes t$_j$
      a.   [Which picture of herself] does Bill think Sally likes [which picture of herself]
      b.   Which x ~~[x picture of herself]~~ does Bill think Sally **self$_i$** -likes ~~[which x~~ [x picture of **t$_i$**]]
      c.   Which x does Bill think Sally self$_i$ -likes [x picture of t$_i$]

The input to LF given in (93)a still contains two copies of the fronted category. In (93)b, a head chain is formed by anaphor-cliticization of *self$_i$* to the main predicate. The lower copy contains now a bound trace and cannot be erased. Hence, the higher restrictor and the lower wh-determiner undergo deletion. Applying now the same reasoning to the derivation of the weak reading in (92)d, we correctly predict that the lowest copy, which contains the trace of noun-incorporation, cannot be erased at LF.

      Heim's semantic analysis of weak NP's appears not only to be compatible with the implementation of syntactic reconstruction in Chomsky (1992), but also offers a way to compositionally derive existentially closed interpretations.

5.2. THE MAPPING HYPOTHESIS, SCRAMBLING AND WEAK NP'S

According to Diesing's (1990, 1992) Mapping Hypothesis, an NP that escapes the $\exists$-closure operator by overt movement in German loses its existentially bound, weak reading. A standard example illustrating this phenomenon, taken from Kratzer (1989), is given below:

(94)   a.   weil wir [$_{AgrOP}$ immer [$_{AgrOP}$ ein gutes Projekt [$_{VP}$ fördern]]]   *existential*
          since we   always   a good project   sponsor
          "since we always sponsor a good project"
    b.   weil wir [$_{AgrOP}$ [ein gutes Projekt] [$_{AgrOP}$ immer [$_{AgrOP}$ t$_i$ fördern]]]   *generic*

Whereas (94)a receives an existential interpretation, the object NP in (94)b can exclusively be construed as strong and generic.

      In the present system, weak readings are syntactically derived by Determiner Raising and noun incorporation in collaboration with the principles of Copy Theory. This analysis does not make reference to a designated position for $\exists$-closure in the tree but rather introduces $\exists$-closure in the interpretation of the weak NP itself. It follows trivially that we can no longer relate the positional requirements on NP-interpretation expressed by the Mapping Hypothesis to the hierarchical relation between an $\exists$-closure operator and the NP in whose interpretation we are interested in. In what follows, it will be demonstrated that Mapping effects actually already fall out from the analysis developed so far, once the restrictions on SynR are taken into account. Moreover, I will argue that the present account

fares better in its empirical coverage than 'static' theories that employ a fixed ∃-closure operator.

Let us see now how the present system handles the contrast between (94)a and (94)b. As far as (94)a is concerned, nothing new has to be added. The weak reading results from exactly the same procedure that was applied to example (92) in the previous section: first Determiner Raising moves *ein* out of all copies, then noun-incorporation targets the VP-internal copy to form a complex predicate and finally the higher copies delete:

(95) a. [$_{AgrOP}$ immer [$_{AgrOP}$ [ein Projekt]   [$_{VP}$ [ein Projekt]   fördern]]]]]
    b. immer **[ein$_i$** [$_{AgrOP}$ [t$_i$ Projekt]   **[ein$_i$**   [$_{VP}$ [t$_i$ Projekt]   fördern]]]]
    c. immer [ein$_i$ [$_{AgrOP}$ [t$_i$ Projekt]   [ein$_i$ [$_{VP}$ [t$_i$ **t$_j$**]   fördern-**Projekt$_j$**]]]]
    d. immer [ein$_i$ [$_{AgrOP}$ [t̶$_i̶$ ̶P̶r̶o̶j̶e̶k̶t̶]   [e̶i̶n̶$_i̶$ [$_{VP}$ [t$_i$ t$_j$]   fördern-Projekt$_j$]]]]
    e. immer [ein$_i$ [$_{AgrOP}$ [$_{VP}$ [t$_i$ t$_j$]   fördern Projekt$_j$]]]

Now, the reason why the scrambled NP in (94)b lacks such a weak reading can be traced back to the by now well-established lack of SynR with scrambling chains. Since scrambling does not reconstruct, there is no VP-internal copy of the object available from which noun-incorporation could proceed. But a weak reading is in turn dependent upon head-chain formation. Hence, sentence (94)b can only be assigned a strong interpretation, in course of whose derivation all copies with the exception of the highest operator and the lowest trace undergo deletion:[48]

(96) a. wir [$_{AgrOP}$ ein Projekt [$_{AgrOP}$ immer [$_{AgrOP}$ ein Projekt   [$_{VP}$ ein Projekt   [fördern]]]]]
    b. [$_{AgrOP}$ [ein Projekt]$_i$ [t$_i$ [immer [[ein Projekt]$_i$ [$_{AgrOP}$ t$_i$ [$_{VP}$ [ein Projekt]$_i$ [$_{VP}$ t$_i$ V°]]]]]]]]
    c. [$_{AgrOP}$ [ein Projekt]$_i$ [t̶$_i̶$ [immer [[e̶i̶n̶ ̶P̶r̶o̶j̶e̶k̶t̶]$_i$ [$_{AgrOP}$ t$_i$ [$_{VP}$ [e̶i̶n̶ ̶P̶r̶o̶j̶e̶k̶t̶]$_i$ [$_{VP}$ t$_i$ V°]]]]]]]]
    d. [$_{AgrOP}$ [ein Projekt]$_i$ [immer   [$_{VP}$ t$_i$ V°]]]

The alternative derivation for (94)b (the one that would have resulted in the unattested weak reading) crashes at LF: Incorporation of the object into the verb as in (97)a leaves a trace, which is later - like all VP-internal copies in scrambling chains - subjected to deletion, as shown by (97)b:

(97) a. [$_{AgrOP}$ ein$_i$ [$_{AgrOP}$ [t$_i$ Projekt] ... [$_{VP}$ ein$_i$ [$_{VP}$ [t$_i$ **t$_j$]**   **Projekt$_j$**-fördern]]]]
    b. [$_{AgrOP}$ ein$_i$ [$_{AgrOP}$ [t$_i$ Projekt] ... [$_{VP}$ e̶i̶n̶$_i̶$ [$_{VP}$ [t̶$_i̶$ ̶t̶$_j̶]̶   Projekt$_j$ - fördern]]]]
    c. *[$_{AgrOP}$ ein$_i$ [$_{AgrOP}$ [t$_i$ Projekt] ... [$_{VP}$ Projekt$_j$ - fördern]]]]

The LF-output (97)c contains now an improper one-member chain (<*Projekt*>) which lacks a foot in an A-position. Thus, the weak reading for the scrambled object of (94)b is correctly predicted to be

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[48]Evidently, the principles responsible for the lack of SynR are 'ranked higher' than the ones governing proper head chain formation. Otherwise, incorporation would be expected to lead to a derivation in which the lowest copy is preserved, and where head-movement so to say 'overrides' the ban on SynR (similar to what we observed with anaphor cliticization). Numerous interesting questions that fall outside the scope of the present investigation ensue.

missing.[49]

5.3. TWO ARGUMENTS IN FAVOR OF THE GPM APPROACH

There are two empirical arguments that favor the present view over theories that employ a syntactically detectable ∃-closure operator attached to a specific syntactic projection.

First, the present system naturally accounts for the local nature of ∃-closure. Unlike scope, binding by ∃-closure is a strategy restricted to the minimal clause. In other words, an NP can be existentially bound only by the next ∃-closure operator up in the tree. For instance, the scrambled indefinite object *eine Sonate* in (98) can only receive a generic, strong reading, despite the fact that it is within the scope of the ∃-closure operator in the upper clause:

(98)   Peter hat einem Freund gesagt [$_{CP}$ daß ein Pianist eine Sonate$_i$ immer t$_i$ auswendig kann]
         P.   has a   friend said   that a pianist a   sonata always knows by heart
         "Peter has told a friend that a pianist always knows a sonata by heart"

Thus, material in subordinate clauses is not affected by the presence of ∃-closure in a higher sentence. In the present system, this follows directly from the fact that a given NP is not associated with copies in a lower clause (unless it has been long distance moved). It is on the other side not obvious how Diesing's original proposal could account for this locality constraint.[50]

Second, more than a single syntactic position in the tree seems to be be associated with an ∃-closure operator. Bobaljik (1995) demonstrates that in a string 'particle - subject - object - manner adverbial', as in (99)b, the object receives a strong interpretation, while the subject can be construed as weak:

(99)   a.   weil ja doch Kinder sorgfältig Äpfel essen   *Subject and*
               since indeed children carefully apple eat   *Object existential*
         b.   weil ja doch Kinder **Äpfel** sorgfältig **t$_i$** essen   *Subject existential*
               since indeed children apple carefully eat   *and Object generic*

This indicates that the representation of (99)b holds two ∃-closure operators, one located in the vicinity of the particle *ja doch* and one adjacent to the manner adverbial. As can be seen from the LF below, the subject resides now within the scope of ∃-closure-I, while the object is outside the c-command domain of ∃-closure-II:

(100)   [$_{TP}$*ja wohl*/∃-closure-I/[$_{TP}$ Subject [$_{AgrOP}$ **Object$_i$** [$_{AgrOP}$ *sorgfältig*/∃-closure-II [$_{AgrOP}$ **t$_i$** ...

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[49]For some yet unknown reasons, topicalized NP's do not reconstruct for pronominal variable binding and the priciples of Binding Theory, but are reported to allow for a weak reading by some speakers.

[50]See Tsai (1994), who also notices this problem, for a potential solution in terms of cyclicity.

By the same reasoning, it can be shown that there exists a third site for ∃-closure, apart from the two positions identified by Bobaljik. In ditransitive constructions, scrambling of the indirect object over an adverbial results in a strong, specific reading for this object, while the subject may still be read existentially:

(101) a. weil Männer widerwillig Kindern Tiere zeigen   *Subj, IO and DO existential*
          since men reluctantly children animals show
          "since men reluctantly show animals to children"
    b. weil Männer **Kildern**$_i$ widerwillig **t**$_i$ Tiere zeigen   *Subject and DO existential,*
          since men children   reluctantly animals show   *IO generic*

(101)b can be given an adequate treatment under the assumption that the syntactic tree contains a third ∃-closure operator, one that is aligned to the left edge of AgrIOP as depicted below:

(102)   [Subject [$_{AgrIOP}$ **Indirect Object**$_i$ [$_{AgrIOP}$ *widerwillig*/∃-closure-III [$_{AgrIOP}$ **t**$_i$ [$_{AgrOP}$ DO ...

So far, three distinct positions for ∃-closure have been identified in the tree, viz. the left edge of TP, AgrIOP and AgrOP, respectively. All three of these positions are indispensable in Diesing's original theory to account for the data in (99)b and (101)b. It seems however as if an explanation of the facts above in terms of multiple discrete ∃-closure operators fails to capture the correct empirical generalization: strong readings are not triggered by movement over a specific node in the tree, but rather by scrambling to any position in the phrase marker whatsoever.

The alternative approach advocated here capitalizes exactly on this observation: First, only arguments in their canonical surface positions can be reconstructed back into their VP-internal base; and secondly, existential closure is introduced by Determiner Raising out of this position for each argument seperately. Hence, the present account does not have to resort to either multiple ∃-closure operators nor to any idiosyncratic locality restrictions on ∃-closure.

6. INTERPRETATION DRIVEN BY SEMR AND SYNR

6.1. THE MAPPING HYPOTHESIS AND SEMR

Semantic reconstruction by higher type traces and syntactic reconstruction for weak readings by copies form two distinct processes, that are individually available in the system. One prediction is now that SemR out of scrambled positions into a higher type trace, lower than sentential adverbs and particles like *ja wohl,* should be available. The prediction is borne out, the examples below show ambiguity, indicating SemR:

(103) a.   weil [ein Buch]$_i$ ja wohl fast jeder t$_i$ gelesen hat   *amb, object strong*
            since a   book   indeed almost everybody read has
            "since almost everybody has indeed read a book"
      b.   weil [eine Aufgabe]$_i$ ja wohl die meisten t$_i$ gelöst haben   *amb, object strong*
            since a   problem indeed the most   solved have
            "since most of the people have indeed solved a problem"

(104)   [$_{TP}$ QP1 [$_{TP}$ ja wohl [$_{TP}$ QP2 [$_{AgrOP}$ T$_1$ /t$_1$ [$_{VP}$ *[copy of QP1] V°]]]]]

Moreover, both sentences in (103) appear to lack a non-presuppositional narrow scope reading (vd. Diesing 1990), that can only be achieved by syntactic reconstruction into VP. This is expected, since scrambling permits semantic SemR into the respective SpecAgrP, but bleeds weak readings of weak QP's.[51]

6.2. INTENSIONAL CONTEXTS

Intensional contexts provide another interesting testing ground for the theory of SemR: referentially opaque predicates subcategorize for objects of higher semantic type, and we expect therefore that such predicates license SemR of their objects into a VP-internal position. This final section will outline rather than offer a detailed discussion of some issues that are of potential relevance in this context.

To begin with, consider an ambiguous example as in (105):

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[51]Recall from section 3.3.2. that those NP's which trigger SemR may also serve as predicates in post-copular position, indicating that they are optionally of semantic type <e,t>:
(i)   a.   Hans ist ein Beatle
                "John is a Beatle"
        b.   *Hans ist jeder Beatle/alle Beatles
                "*John is every Beatle/all Beatles"
One might now be tempted to argue that SemR is in fact not driven by traces of Generalized Quantifier type, but involves empty categories of type <e,t>, and that weak readings derive from SemR of these NP's into VP (as suggested by Angelika Kratzer, p.c.). This step would facilitate a natural semantic identification of those NP's that permit SemR by simply stating that only NP's for which an <e,t>-type interpretation is defined may leave behind a (in this case) VP-internal higher type trace of type <e,t>. Furthermore, the verb together with the Semantically Reconstructed argument could in such a system be interpreted by GPM, where GPM operates on an LF as given under (ii):
(ii)   [$_{AgrXP}$ NP$_i$ [$_{AgrXP}$ ... [$_{VP}$ T$_{i,<e,t>}$ V$_{<e<e,t>>}$]]]
There is however one problem inherent in this conception that has already been addressed: the <e,t> approach does not explain the lack of non-presuppositional readings of scrambled NP's. Descriptively speaking, we do not want SemR to be able to feed weak interpretations. I will therefore adhere to the initial assumption that SemR proceeds by traces of Generalized Quantifier type, which in turn forces a strong reading on the NP. The alternative <e,t> approach could eventually be excluded by the assumption that non-incorporated NP's (see (ii)) are always translated in terms of functional application, while GPM is confined to incorporation structures.

(105) daß ein Einhorn_i schon einige t_i gesucht haben   *de dicto/de re*
      that a unicorn already some looked for have
      "that numerous people have already looked for a unicorn"

In (105), scrambling of the object of an intensional verb does not affect the availability of both a *de dicto* and a *de re* construal for that object. Following Zimmermann (1992) it will be assumed that intensional verbs denote relations between individuals and properties; *look for* is accordingly of (extensional) type $<<e,t.><e,t.>>$. Moreover, I would like to suggest that the *de dicto* reading of (105) is derived by SemR and that since *look for* subcategorizes for a $<e,t.>$-type entity as an internal argument, the latter may strand a variable of type $<e,t.>$ VP-internally:

(106) LF: daß [$_{AgrSP}$ ein Einhorn [$_{AgrSP}$ einige [$_{AgrOP}$ t$_i$ [$_{VP}$ t$_j$ [T$_i$ gesucht haben]]]]]
           that   a unicorn   some   looked for have

In the computation of the *de dicto* construal of (105), *ein Einhorn* will have to be interpreted as a first-order predicate. One way to achieve this is to employ once again Heim's weak (restrictionless) interpretation for determiners, given under (107), and combine it with a simple type-shifting rule as in (108):

(107) $[\![a_{weak}]\!]$ = a function of type $<et,t>$, such that for any $f \in D_{e,t}$
      $[\![a_{weak}]\!]$ (f)   = 1 iff $\exists x [f(x) =1]$

(108) $[\![\uparrow]\!]$ = $\lambda S_e \lambda y[S \& y=y]$

The two definitions above interpret the object *ein Einhorn* as a formula in the first place and type-shift this fomula to a predicate in the next compositional step. The full semantic derivation of the *de dicto* reading of example (105) accordingly looks as follows:

(109) *De dicto* reading of (105)

    $[\![CP]\!]$ = [↑(**a unicorn**) [λi [some people [λj [t$_j$ look for **T**$_{i, <e,t.>}$]]]]]
             = [some people [λj [t$_j$ look for ↑(a unicorn)]]]
             = [some people [λj [t$_j$ look for [λSλy[S & y=y] ($\exists x$[unicorn(x)])]]]]
             = some people look for (λy [$\exists x$[unicorn (x) & y=y]])

In essence, SemR not only allows us to lower a QP into the scope of another QP, but it makes it equally possible to construe a quantifier within the c-command domain of a verbal predicate sensitive to scope.[52]

A non-trivial question to ask now is whether the *de dicto/de re* ambiguity interacts with the weak/strong distinction. Interestingly, Zimmermann (1992) indeed notes that if a QP is construed as

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[52]Opaque contexts therefore constitute a second piece of empirical evidence (the first one came from English existentials) that higher type traces can also be located within VP.

de dicto, it also has to be interpreted as weak and/or cardinal. Take for instance example (110) below:

(110)   daß Maria viele Lösungen gesucht hat
        "that M. looked for many solutions"

(110) is three ways ambiguous, it can be read cardinal *de dicto*, cardinal *de re* or proportional *de re*, but the strong, proportional *de dicto* interpretation for the object is missing. Zimmermann accounts for the absence of the strong *de dicto* reading by pointing out that a proportional reading and a *de dicto* construal trigger incompatible type requirements on the object: While the object has to be assigned a Generalized Quantifier type under the former, it has to be of type <e,t.> under the latter reading.

How can we now account for the three potential readings of (110) listed below?

(111)   *Possible interpretations of (110):*

        a.   Weak (cardinal) *de dicto*
        b.   Weak (cardinal) *de re*
        c.   Strong (proportional) *de re*
        d.   *Strong (proportional) *de dicto*

The derivation of the cardinal *de dicto* interpretation has already been discussed in connection with example (105): A higher type trace within VP forces the object in AgrOP to reconstruct in form of a cardinality predicate. For reasons of concreteness, the determiner *viele*/'many' in its weak reading will be assigned the lexical entry in (112), which allows one to arrive at the correct interpretation given under (113):

(112)   ⟦viele$_{weak}$⟧ = a function of type <et,t>, such that for any f∈De,t
        ⟦viele$_{weak}$⟧ = 1 iff ∃x [f(x) = 1 & many(x)]

(113)   *Cardinal* de dicto *reading of (110):*

        LF: [$_{AgrSP}$ Maria$_j$ [$_{AgrOP}$ viele Lösungen$_i$ [$_{VP}$ t$_j$ T$_i$ sucht]]]
        ⟦CP⟧ = look-for(λy[∃x[solution(x) & many(x) & y=y]]) (Mary)

In opaque contexts, the verb requires the object trace to be of type <e,t>. This can be achieved in one of two ways: either the object strands a higher type trace and the antecedents of this trace is type-shifted by '↑', as demonstrated above; alternatively, the object NP binds an individual variable that is shifted to type <e,t.> by a type lifting operation along the lines of '↑↑' below:

(114)   ⟦↑↑⟧ = λxλy[y=x]

Zimmermann (1992) shows now that if this second option (the one in terms of '↑↑') is chosen the object will receive a *de re* reading, since the object is construed with higher scope than the intensional predicate. Moreover, the object binds an individual variable in such a derivation, and is necessarily construed as strong and proportional. The derivation of the proportional *de re* reading of (110)

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accordingly looks as follows:

(115) *Proportional* de re *reading of (110):*

> LF: $[_{AgrSP}$ Maria$_j$ $[_{AgrOP}$ viele Lösungen$_i$ $[_{VP}$ t$_j$ t$_i$ sucht$]]]$
> $[\![CP]\!]$ = [Mary [λj [many$_{proportional}$ solutions [λi $[_{VP}$ t$_j$ look for t$_{i, e}$ $]]]]]$ =
> = many$_{proportional}$ (solutions) (λi [look for ($\uparrow\uparrow$ (t$_i$))(Mary)]) =
> = many$_{proportional}$ (solutions) (λi [look for(λy[y = t$_i$]) (Mary)])

Finally, I would like to propose to treat the cardinal *de re* construal in terms of SynR (by an account alongside the one developed for weak NP's). At LF, Determiner Raising provides the context for noun incorporation, as shown below:

(116) *Cardinal* de re *reading of (110): Syntax*

> a. $[_{AgrSP}$ Maria$_k$ $[_{AgrOP}$ [viele Lösungen] $[_{VP}$ [viele Lösungen] suchen$]]]$
> b. $[_{AgrOP}$ viele$_i$ $[_{AgrOP}$ [t$_i$ Lösungen] $[_{VP}$ [viele$_i$ $[_{VP}$ [t$_i$ Lösungen] suchen$]]]]$
> c. $[_{AgrOP}$ viele$_i$ $[_{AgrOP}$ [t$_i$ Lösungen] $[_{VP}$ [viele$_i$ $[_{VP}$ [t$_i$ t$_j$]] Lösungen$_j$-suchen$]]]]$
> d. $[_{AgrOP}$ viele$_i$ $[_{AgrOP}$ $[_{VP}$ [t$_i$ t$_j$] Lösungen$_j$-suchen$]]]$

Intuitively, DR provides the *de re* part of the reading by moving the determiner out of the scope of the intensional verb, while the interaction of DR and noun-incorporation furnish the basis for a weak, cardinal interpretation in terms of GPM, along the by now standard procedures.

In semantics, the trace left by Determiner Raising has to be type shifted to type <e,t.>, as we deal with an intensional verb. Next, GPM interprets the incorporation structure as a complex predicate.[53] The semantic translation in a bottom-up fashion accordingly looks as follows:

(117) *Cardinal* de re *reading of (110): Semantics*

> $[\![$solutions-seek$]\!]$ = λxλy[solution(x) & look for($\uparrow\uparrow$(x))(y)] =
> = λxλy[solution(x) & look for(λz[z=x])(y)]
> $[\![$t$_i$ solutions-seek$]\!]$ = λy[solution(t$_i$) & look for(λz[z=t$_i$])(y)]
> $[\![$many$_i$ [λi [t$_k$ t$_i$ solutions-seek$]]]\!]$ = ∃x[solution(x) & look for(λz[z=x]) (Mary) & many(x)]

One prediction inherent in the current system is now that we expect scrambling to interfere with the availability of the cardinal *de re*, but not the cardinal *de dicto* reading of the scrambled NP. This is so since scrambling has been shown to inhibit SynR, on which the cardinal *de re*, but not the cardinal *de dicto*, reading is dependent. SemR is not affected by scrambling. Thus, although scrambling generally bleeds weak readings of NP's, we predict that scrambling in this special case should not affect the weak *de dicto* interpretation. The prediction appears to be borne out, the example below lacks a cardinal *de re* reading, but can be read cardinal *de dicto* and proportional *de re*:

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[53]In fact, GPM combines here a predicate of type <<e,t.><e,t.>> with a first order predicate of type <e,t.>; we would therefore have to slightly change the definition of GPM to allow for this case.

(118) daß viele Lösungen$_i$ jeder in seiner Studierstube t$_i$ gesucht hat
       that many solutions everybody in his study   look-for has
       "that everybody has looked for many solutions in his study"

Hence, Mapping effects can be overridden by Semantic Reconstruction in intensional contexts.

   Note in the end that (118) also possesses a proportional narrow scope *de re* reading of *many*, which is straightforwardly accounted for in the present system. As illustrated by (119), the object binds a Generalized Quantifier type trace in SpecAgrOP that triggers SemR, while the trace in the VP-internal base of the chain is shifted from e to <e,t>.

(119) *Proportional narrow scope* de re *reading of (118):*

   LF: [$_{CP}$ [$_{AgrSP}$ viele Lösungen$_i$ [$_{AgrSP}$ jeder$_k$ [$_{AgrOP}$ T$_i$ [$_{VP}$ t$_k$ t$_i$ sucht]]]]]
   ⟦CP⟧ = [many solutions [λi [everybody λk [T$_{i, <et,t>}$ λj [seek (↑↑(t$_j$))(t$_k$)]]]]] =
          = [everybody [λk [many solutions [λj [t$_k$ seek t$_j$]]]]]⟧ =
          = ∀x [human(x) → many (solution) (λj [seek (λz[z=t$_j$])(x))]

The relevant portions of the derivations of the three potential interpretations of (118) are summarizes in the chart below:

(120)   *Possible interpretations of (118) and their derivation:*

Interpretation	Type of trace in AgrOP	Type of VP-internal trace
every ≻ many (cardinal, *de dicto*)	<e,t>	<e,t> (→ SemR into VP)
*every ≻ many (cardinal, *de re*)		No SynR possible
many (proportional, *de re*) ≻ every	e	e, shifted to <e,t>
every ≻ many (proportional, *de re*)	<<e,t>t> (→ SemR into AgrOP)	e, shifted to <e,t>

   In this closing section, the interaction between SemR and SynR in intensional context was highlighted; it was concluded that Mapping effects be circumvented in these configurations by SemR.

7. CONCLUSION

The main results of the present investigation can be recapitulated in form of the following claims:

○ Scope ambiguities in German can be treated by Semantic Reconstruction. The elegant theory of Semantic Reconstruction developed by Cresti (1995) and Rullmann (1995) for scope reconstructed readings of wh-expressions can be successfully employed in the treatment of other quantificational NP's.

○ Semantic Reconstruction is available only for a subset of NP's (weak NP's and what has been called 'weak partitives') in German.

○ Semantic Reconstruction is independent from syntactic reconstruction.

○ Semantic Reconstruction is constrained both by syntactic and semantic conditions. Higher type traces, which trigger SemR, are restricted to specifier positions of Agr-projections and VP-internal locations - the latter option is available only if the predicate heading the VP is of the appropriate semantic type.

○ The conditions on syntactic reconstruction and on the availability of weak readings of weak NP's coincide. It was therefore proposed to derive weak readings by SynR.

○ Existential closure does not take place in a fixed position of the syntactic tree, a fact that supports Heim's (1992) categorematic treatment of weak NP's.

In course of the investigation, we also encountered a number of open ends. For instance, it remains mysterious how the cross-linguistic variance of languages in their ability to license non-surface word order scopes should be best captured (compare English, which presumably relies on QR as a scope feeding mechanism, with German). In the end, a unifying theory should reduce these asymmetries to more basic ones, like e.g. 'headedness of VP'. Also, no account has been given for the idiosyncratic behavior of syntactic reconstruction in scrambling chains. The syntactic conditions on higher type traces equally require a better theoretical foundation. How does their syntactic behavior for instance fit in the overall taxonomy of empty categories? And to mention a further unresolved conceptual issue in the end: how can Diesing's (1990) hypothesis that restrictive clause formation precedes the semantic component be reconciled with the present assumption that narrow scope readings of NP's derive from Semantic Reconstruction? If the account in terms of SemR advocated here is on the right track, we would be forced to conclude that restrictive clause formation can sometimes (viz. in case of narrow scope readings of proportional NP's) be deferred and take place in the semantic component.

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