STRUCTURE BUILDING FROM BELOW: MORE ON SURVIVE AND COVERT MOVEMENT[1]

Winfried Lechner, University of Athens

(In: Valmala, V. and M. Uribe-Etxebarria (eds.), *Structure Building.* Cambridge: Cambridge University Press, 297-329.)

1 Introduction

In the standard derivational model (e.g. Chomsky 1995, 2000), movement of a category α is contingent upon two conditions. On the one hand, α needs to be endowed with a set of features F_α that can be identified by the syntactic derivation. On the other, the tree must contain a head γ which bears a feature set F_γ compatible with the features on α, thereby facilitating checking or elimination of F_α by F_γ. This constellation, on which features induce dislocation, in turn provides the basis for two possible interpretations of the movement operation, depending on the nature of the forces that are taken to act upon F_α. If it is assumed that the syntactic relation between F_α and the trigger for movement is defined in terms of *affinity* between *compatible* features, one arrives at the standard attract model of displacement schematically depicted by (1), in which affinity between F_α and F_γ causes γ to attract α:

(1) γ *attracts* α:
$\gamma_{F\gamma}$ ... $\alpha_{F\alpha}$ $\Rightarrow$ $\alpha_{F\alpha}$ [$\gamma_{F\gamma}$ ... t_α] (where F_α and F_γ are *compatible*)

But movement can also be described as a consequence of *repulsion* of F_α by an *incompatible* set of features in a designated graph theoretic relation to F_α. On this alternative view, represented by (2), nodes that move are repelled from their local environment and pushed into higher positions of the tree in order to avoid a feature *mismatch*. In (2), repulsion between F_α and F_β forces α to leave the local domain of β (✘ marks incompatibility):

(2) β *repels* α:
$\beta_{F\beta}$ ... ✘... $\alpha_{F\alpha}$ $\Rightarrow$ $\alpha_{F\alpha}$ [$\beta_{F\beta}$ t_α] (where F_α and F_β are *incompatible*)

The most recent incarnation of this concept, which transposes the notion of a *push chain* familiar from phonology into natural language syntax, has gained prominence under the signature of *The Survive Principle* (TSP; Stroik 1999, 2009; Putnam 2009).[2]

The present contribution aims at exploring some aspects and consequences of TSP and the repulsion based approach towards structure building by movement. Central for these purposes, serving as a cynosure guiding the discussion, will be the search for two desiderata: (i) the proper formulation of TSP; and (ii) criteria which aid in distinguishing TSP from orthodox theories in

[1]I am indebted to Klaus Abels, Elena Anagnostopoulou, Mike Putnam, Henk van Riemsdijk, Uli Sauerland, two anonymous reviewers, as well as the audiences of GLOW XXX in Nantes, the Roots 2009 Workshop in Stuttgart, and the members of the *Athens Reading Group in Linguistics* for helpful discussion and comments.

[2]For previous implementations of push chains in syntax see Moro (2007) and van Riemsdijk (1997), among others. As a reviewer points out, the concept of push chains has also been employed by theories that interpret movement as a strategy to avoid local symmetry, e.g. prohibiting two DPs within a single domain (see e.g. Moro 2000; Richards 2001; Lechner 2004).

which movement is modeled in terms of feature attraction. As for the first objective, specifically three questions need to be addressed in order to render the Survive model sufficiently precise for being submitted to empirical verification.

To begin with, the feature sets F_α and F_β on two nodes α and β may vary across different dimensions. Thus, it must be made explicit which types of incompatibility or mismatches trigger dislocation by TSP. In principle, TSP can be formulated in such a way that it either reacts to non-identity, or to the stronger condition that the feature sets do not intersect. These definitions differ inasmuch as only the former one predicts α to be repelled from its local environment if the feature sets are non-identical yet overlap (i.e. if the values are e.g. $\{F_1, F_2\}$ for F_α and $\{F_2, F_3\}$ for F_β). Moreover, the triggers for movement might be restricted to Case, also include Φ-features or even be extended to semantic properties such as the logical type of an expression. While I have nothing to add on the former issue (see Stroik 2009), it will be argued below that an extension along the latter lines leads to desirable results.

Second, it has to be stated precisely *which* nodes qualify as possible landing sites for TSP-driven movement, determining the *density* of the movement paths (to borrow a term from Abels 2003). If only phase edges or cyclic nodes constitute legitimate hosts for intermediate copies, TSP e.g. generates chains that differ substantially from paths legitimated by alternative inceptions on which movement leaves a copy at every possible landing site. A particularly simple view will be defended in section 2.

Finally, the system must specify which concrete action to take if the Survive mechanism detects a feature incompatible constellation. For instance, in the environment $[\beta_{F\beta}\ \alpha_{F\alpha}]$ depicted by (2) above, it must be decided which of the two incompatible nodes α and β has to leave its position. Below, it will be seen that this choice actually does not have to be stipulated, but falls out from general principles of interpretability.

Rendering explicit the assumptions in the three domains outlined above is essential for delineating the contours of a TSP-based theory of movement. But apart from these theory internal considerations, explorations into TSP also need to attain the second, larger objective of finding criteria which aid in distinguishing TSP from competing attract based models. This leads to another set of questions which are more broadly related to differences in strong generative capacity between TSP and theories that use attract. For instance, it should be seen whether the two approaches map complex expressions that arguably involve movement to identical sets of trees. If such a study elicits non-trivial results, one might further ask to which extent there are invariant markers that discriminate between the structural representations produced by TSP and those predicted by attract based models. For instance, do the two systems differ in the number and position they postulate for intermediate landing sites? Another important, partially related issue is whether both theories of movement are equally consistent with representational models of the grammar, or if one of them displays a disposition towards a derivational implementation.

Since isolating sufficiently precise answers for these and related exigent questions depends on various complex factors, which include the choice of axioms for each system and an explicit separation between ancillary and core hypotheses, and since the interaction among these factors generates a large number of combinatorial options to consider, there is to date no comprehensive, systematic contrastive study of Attract vs. TSP. As a result, actual results in this area are sparse. While it has for instance been shown that some restrictions on movement can be reanalyzed in terms of TSP (see Stroik 2009 and contributions in Putnam 2009), evidence that there are phenomena which are *only* compatible with a TSP based approach towards displacement has only been produced to a very limited extent so far.

In Lechner (2009), it was argued that criterial evidence of the type referred to above materializes in the shape of a particular set of restrictions on movement operations, first discussed in combination in Sauerland (2000), which are characterized by two properties. On the one hand, these dislocation operations are not driven by the need to establish a checking relation, but take place in order to avoid mismatches - in this particular case mismatches in the logical type of the expressions involved. Thus, the moved categories react exactly to the kind of incompatibility predicted by TSP to induce dislocation. On the other hand, the interaction between more than one movement operation results in configurations the generation of which requires the assumption of dense movement paths. This provides a strong argument for TSP, as only a TSP based analysis forces movement to stop in each available intermediate landing site. In that paper, I also suggested a particular definition of the TSP which had the effect of providing a unified account of these properties.

The current contribution expands on Lechner (2009), extending the original account in four directions. First, I will propose a simpler and arguably more principled version of the TSP which renders various properties and consequences of the analysis more transparent. Second, new TSP based analyses will be included that have not been part of Lechner (2009). Third, the TSP will be contrasted more sharply with attract based theories of movement, focusing on the role of intermediate landing sites of movement. Finally, I will elaborate on various open ends and contentious issues, none of which were addressed in the original version, and try to clarify some probably less apparent aspects of the analysis. For some of these problems, I will suggest speculative answers, while a systematic investigation of others will have to await another occasion, pointing in the direction of future investigations into the nature of TSP.

2 Defining Repulsion

Assume that two nodes are *feature compatible* just in case all their features match ((3)a)[3], and that matching is understood as in (4):

(3) a. Two nodes α and β are *feature compatible* iff the feature sets of α and β match.
    b. Two nodes α and β are *feature incompatible* otherwise.

[3] It might also turn out that compatibility is better formulated in terms of the proper subset relation. For instance, the discussion in Stroik (2009: 49-53) suggests that α is compatible with some head β if the features of β are a subset of the features of α, but not v.v.

(4) Two feature sets F_α and F_β *match* iff they have the same[4] members.

What both attract and TSP based theories have in common is that they use displacement as a strategy for obtaining feature compatibility between nodes in designated syntactic configurations (sisterhood or spec head relation). The main conceptual difference between the models resides in the way they resolve feature conflicts once a node α ends up in a position where it is feature incompatible with its local environment (sister or head). In attract based definitions of movement, this task falls to a system which searches for a c-commanding feature compatible attractor γ (on most conceptions a head), as expressed by the familiar definition in (5):

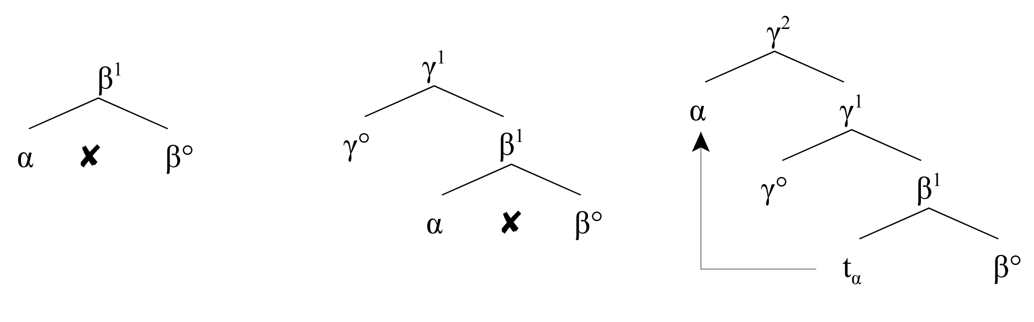
(5) *Movement$_{Attract}$*
For any nodes α and γ:
a. If α is the closest node to γ and α is feature <u>compatible</u> with γ *remerge* α with a projection of γ.
b. A node α is the *closest node* to γ iff γ c-command α and there is no node β, s.t. γ c-commands β and β c-commands α.

But local feature incompatibility can also be resolved by the alternative requirement that nodes with incompatible features leave their position in order to escape feature conflicts. On this view, movement is causally linked to the relation of feature incompatibility instead of compatibility. One implementation of this idea comes in shape of The Survive Principle, which defines movement along the lines of (6) (adapted, with minor modifications, from Stroik 2009):

(6) *Movement$_{Survive}$* (adapted from Stroik 2009: 45, (28))
For any nodes α, β and γ:
If α is contained within β, and α is feature <u>incompatible</u> with the head of β,
(i) merge β with a new head γ and
(ii) remerge α with a projection of γ.

Whenever the context of feature incompatibility is met, (6) regulates movement in two steps. First, a new head γ - henceforth also referred to as *trigger* - is merged with a projection of β ((7)b). Then, α is expelled from its original position, re-merging with a projection of the trigger γ ((7)c):

(7) a. α and β° are incompatible b. Merge new head γ° c. Move α to a projection of γ°



[4]Stroik (2009) argues that the sameness relation ignores whether the features have been checked. Thus, if α and β both bear feature F_1, and F_1 has been checked on α but not β, the two nodes are nonetheless compatible. As far as I can see, nothing bears on that specific choice, though.

For theory-internal as well as empirical reasons, the definition in (6) was generalized in two directions in Lechner (2009). To begin with, restricting triggers to new heads is arbitrary, because not only the addition of higher heads, but also first merger of the local head or specifiers potentially changes the feature composition of the newly created root node. Thus, it was suggested to consider any node that the root is combined with as a potential trigger for TSP induced movement. Second, the notion of *incompatibility* was argued to include semantic type incompatibility in addition to feature mismatches. This change makes explicit a fundamental and arguably non-accidental similarity between TSP and the principle of type driven interpretation, paraphrased in (8), which expresses the widely held view that certain covert movements are induced by the need to repair type incompatibilities (Heim and Kratzer 1998). In both cases, a category is expelled from its local environment due to incompatibility with its sister node.

(8) *Type driven interpretation*
If a node α is type incompatible,
move α to the next higher position <u>type compatible with α.</u>

(9) a. A node α is *type compatible* iff the denotation of α and its sister can be combined by the principles of semantic composition (Function Application, Predicate Modification, etc...).
b. α is *type incompatible* otherwise.

In Lechner (2009), it is therefore suggested to formulate TSP in such a way that it forces any feature *or* type incompatible node to be pushed up the tree in the smallest possible incremental steps. A definition which renders more precise this generalized concept of Survive, and at the same improves on the version proposed in Lechner (2009), can be found in (10). Observe that just like (8), the final definition of TSP in (10) uses an intransitive variant of feature (in)compatibility, as in (11):

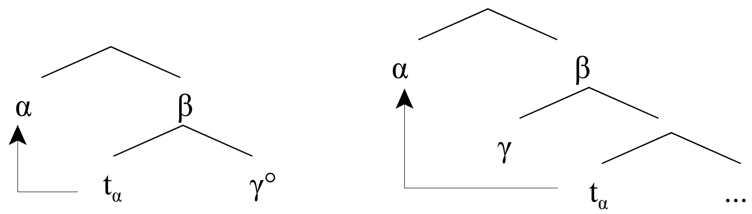
(10) *The Survive Principle*
For any nodes α, β and γ, such that
a. α is feature or type incompatible
b. β is the mother of γ and
c. γ c-commands α
remerge α with β.

(11) A node α is *feature incompatible* iff there is no node β, such that α and β are in a sisterhood or specifier-head relation, and the features of α and β match.

Extensionally, (10) divides instances of TSP driven movement into two subcases both of which have in common that addition of a trigger γ induces dislocation of a locally incompatible α. If α serves as the complement of a head γ°, as in (12)a, α will be pushed to a projection of the trigger γ°. To see how this follows from (10), note that by assumption, α meets clause (10)a.

Furthermore, in accordance with (10)b, β is the mother of $\gamma°$. Finally, $\gamma°$ c-commands α in (12)a, satisfying clause (10)c. As a result, TSP dictates that α be re-combined with β.[5]

(12) Case I: Merging α with head $\gamma°$ induces movement of α Case II: Insertion of specifier or new head γ induces movement of α



In the second possible scenario, depicted by (12)b, α and the trigger γ are not in a sisterhood relation, but γ serves as a specifier or an adjunct that asymmetrically c-commands α. This constellation falls under clause (10)c. Moreover, since β is the mother of γ, α moves and is internally merged with the root β, where it lands in an outer specifier or adjunct position.[6]

Definition (10) primarily differs from Stroik's version (s. (6)) in four aspects. First, for Stroik, the trigger for movement can never be identical to the node that α is feature incompatible with. The new version admits such combinations in the form of (12)a, where both functions are collapsed into the single position occupied by head $\gamma°$. (The trigger and the incompatible node can also be dissociated, as in (12)b.) Second, TSP as given in (10) reacts now to type as well as feature incompatibility. Third, triggers for movement are not restricted to heads but include now also specifiers and adjuncts, resulting in a less artificial system. Finally, (10) treats first merge and second merge (movement) alike in that nodes inserted by either operations can trigger movement. For Stroik, only first merged heads ('new head' in (6)) possess this ability. Taken together, these are important simplifications which remove imbalances and asymmetries from TSP each of which would require independent motivation. In addition, the last triple of properties will be seen to considerably widen the empirical range, thereby increasing the explanatory strength of any TSP based theory.

3 Quantifier scope restrictions

In Lechner (2009), I explored some empirical consequences of TSP in general and (10) more particularly, concluding that (10) receives support from the observation that it offers the first unified analysis of two complex scope restrictions in English. I will briefly describe these two

---

[5]Whether remerger consists in a node traversing movement operation or copying into a buffer (Stroik 2009) is immaterial for present purposes. (10) describes a well-formedness condition on trees that is - at least in isolation - also compatible with a representational framework. Derivational properties will enter with (21) below, though.

[6]Note that (10) does not need to include a minimality clause, limiting the upper bound of γ. Hypothetical cases in which α and γ are separated by an intervening δ, leading to non-local movement of α across δ, do simply not arise, because each intervening δ also constitutes a trigger, and therefore forces local movement.

basic paradigms in turn, and then expand on the treatment of the relevant contrasts in terms of (10). Further details of the analysis and reasons why alternative attract accounts fail can be found in Lechner (2009).

The first scope restriction comes in shape of the well-known observation that in the English double object construction, the indirect object (IO) and direct object (DO) do not permute in scope:

(13) I gave a (different) child each doll. $\exists \succ \forall$/*$\forall \succ \exists$ (Bruening 2001, (2a))

Bruening (2001) pointed out that the prohibition on QR across another quantifier for the DP cannot be expressed as an absolute constraint because DO may scope over the subject, as illustrated by (14). Rather, the condition must be formulated in such a way that it forces IO and DO to move in an *order preserving* fashion in (13).

(14) A (different) teacher gave me every book. $\forall \succ \exists$ (Bruening 2001, (28))

Furthermore, Sauerland (2000) observed that the subject may scopally interfere inbetween IO and DO ((15)). This demonstrates that a successful analysis cannot simply reduce order preservation to a requirement of string adjacency between IO and DO, but must be flexible enough to generate orders in which the subject is free to scope in intermediate positions.

(15) Two boys gave every girl a flower $\forall \succ 2 \succ \exists$ (Sauerland 2000, (49))

In (13), the two quantifiers that were seen to be frozen in scope stand in the relation of c-command. The second configuration that is diagnostic of the virtues of TSP is the Inverse Linking construction, exemplified by (16). Inverse Linking systematically differs from (13) in that it construes two quantifiers in a containment - instead of a c-command - relation. Moreover, as initially noted by Larson (1985), contexts such as (16) are special in that the embedded quantifier *every city* can obtain scope above the direct object it is embedded in ((16)a, b), but only on the condition that the subject does not scopally interfere between the inversely linked quantifier and its container ((16)c; see Sauerland 2000, 2005 and Heim and Kratzer 1998: 234):

(16) [$_{QP1}$ Two policemen spy on [$_{QP2}$ someone from [$_{QP3}$ every city]]]

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

Descriptively, Quantifier Raising (QR) of the lowest object may skip one - but not more - quantifiers in the inverse linking construction, whereas in the double object frame (13), the direct object must not cross even a single quantifier. In what follows, it will be demonstrated that TSP derives these two scope restrictions from two ingredients: (i) a metric that regulates precedence among multiple movement operations; (ii) the existence of intermediate traces in non-edge positions of phrases.

4 TSP and Movement

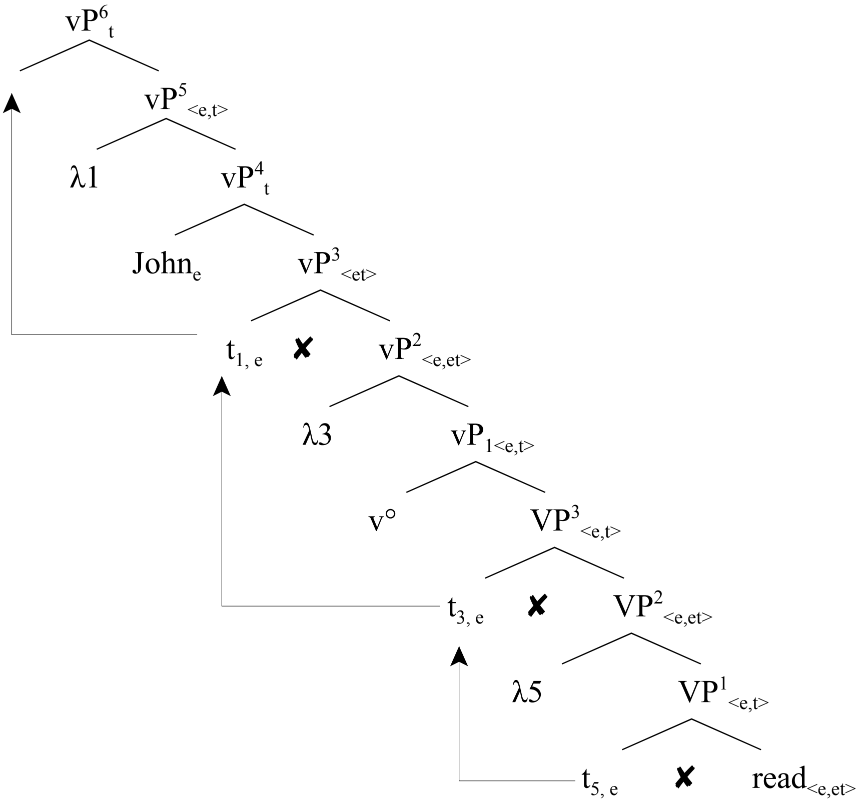
Before turning to a synopsis of the concrete TSP analysis, the current section will spell out in some detail how TSP builds up structure in derivations that involve scope fixing movement operations. To that end, it will be shown first that in a system based on (10), covert, type driven QR results in the creation of dense chains with numerous intermediate landing sites. Subsequently, in section 4.2, a closer look at syntactic schemes in which more than one term has been displaced will reveal that (10) predicts order preservation effects for these contexts of multiple movement. Based on this finding, section 5 proceeds to the TSP account for the two scope restrictions of section 3.

4.1 TSP and single movement

TSP expels a category from its immediately dominating node if that category is not feature or type compatible in its local environment. The current subsection illustrates how TSP accounts for type driven object QR in structures such as (17)a. On standard assumptions (Heim and Kratzer 1998), the object quantifier (*every book*) of (17)a cannot combine with the denotation of its sister node (*read*) because the two meanings are not type compatible. As a result, TSP forces the object to move in small, incremental steps up to a (propositional) node it can combine with. (17)b details the TSP driven derivation.

(17) a. John [$_{VP}$ read$_{<e,et>}$ [every book]$_{<et,t>}$] (type mismatch)

b.



First, *every book* adjoins to VP, triggered by merger of the verb. Given that the generalized quantifier cannot be interpreted as the sister of VP^2, which denotes a two place relation, it must move on, stranding the e-type trace t_3. Observe that while the object itself is not interpretable in this intermediate position, its e-type trace is, ensuring that the representation is compositionally interpretable. Next, v° is merged with VP. This operation induces further movement of the object to $vP^3_{\langle e,et\rangle}$, because irrespective of the precise semantic contribution of v°, the complex [v° VP^3] does not result in a denotation that *every book* can apply to. Such a configuration is eventually created once the subject *John* is merged and *every book* has moved into its final landing site right below vP^6.

Three important points of clarification are in order here. First, given that compatibility is a symmetric relation, one might wonder (as a reviewer did) why type conflict in representation (17) is resolved by movement of the object and not by expelling the verb. Notably, a condition with this effect does not have to be stipulated but follows from the fact that verb movement simply fails to provide a directly interpretable structural representation. There is no standardly sanctioned operation that would allow the verb to bind a trace of a type (<e,t>, or <<et,t>,<et>>) which would be type compatible with the quantified object. Thus, TSP unambiguously and correctly predicts displacement of the object. This interpretability criterion generalizes to all other cases under consideration.

Second, just like all theories that use typed logical forms, the current system presupposes that type information is accessible to the syntactic computation. This claim is not inherently incompatible with the syntactic autonomy hypothesis if is assumed that natural language syntax interacts with a Deductive System (Fox 2000) and that this system also specifies the logical type of the expressions it manipulates. As a result, type driven TSP can apply in syntax, even though it is motivated by properties of the formal meta language.

Third, TSP does not work in isolation but is part of a larger group of conditions that regulate the logical syntax of scope relations. For instance, the representations generated by TSP are also evaluated by other, independent components of the interpretive system such as Scope Economy (Fox 2000), which admits scope shifting operations only if they produce truth conditionally distinct readings. Thus, TSP *overgenerates* by creating representations which are then weeded out by independent principles.

Finally, there are also contexts in which TSP *undergenerates*. On a commonly held view, the ambiguity of the Antecedent Contained Deletion in (18) is related to structural factors (Fiengo and May 1994).[7] While QR of the object QP *every book John did* to the embedded clause produces the narrow ellipsis reading ((18)a), wide ellipsis correlates with long object shift into the matrix clause ((18)b):

(18) I wanted to read every book John did ⌂
  a. I wanted to [[every book John did ⌂]$_1$ read t_1] ⌂ = [$_{VP}$ read]
  b. I [[every book John did ⌂]$_1$ wanted to read t_1] ⌂ = [$_{VP}$ wanted to read]

[7]Danny Fox (p.c.) raised the related question whether TSP resolves ellipsis in (simple) ACD. Here, the answer is positive, given that absence of QR results in an uninterpretable structure (endless regress).

Evidently, the TSP analysis, which only inspects the logical syntax of the object language, lacks the capacity to generate the wide ellipsis representation, indicating that there must be an additional mechanism (such as Scope Economy) at work which carries certain quantifiers into higher domains. I have to relegate a more thorough study of the interaction between TSP with independent components to another occasion.

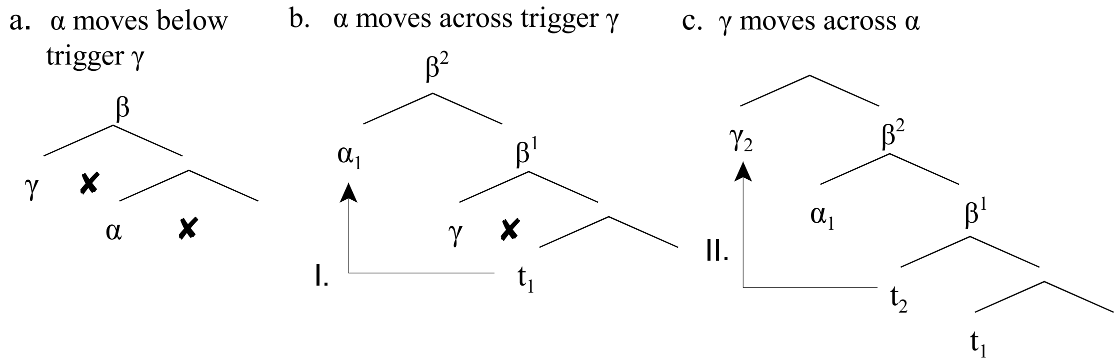
4.2 TSP and multiple movement

The contexts which are of interest for present purposes involve scope restrictions on the relative order of more than one QP, and accordingly involve more than one application of QR. Given that syntax is an informationally encapsulated system, the theory of movement must contain all the information necessary to determine the order of these operations and the positions in which the quantifiers land.

In general, TSP generates two different types of multiple movement configurations and it will be convenient to keep these two types apart for expository reasons. In the first case, to be referred to as *trigger movement*, an incompatible node α moves. Then, a trigger γ is added which itself is not type or feature compatible. As a result, both α and γ have to undergo further movement. In the second scenario, which will be identified by the term *multiple target movement*, two nodes α_1 and α_2 move. In a second step, the tree is expanded by a trigger γ. Finally, both α_1 and α_2 raise across γ. The two constellations crucially differ in that the trigger γ is displaced in contexts of trigger movement, but remains immobile with multiple target movement.

(19) details how the derivation of trigger movement unfolds. In (19)a, α has moved and a trigger γ is merged above α.[8] Assuming that both α and γ are incompatible in their local environment, TSP induces two order preserving movement steps. First, α crosses over the trigger γ, as illustrated by (19)b. Next, in (19)c, γ is expelled from its base position, with α serving as the trigger for TSP induced movement:

(19) *Trigger movement (low - high signature)*



At this point, a problem emerges. Evidently, something must prevent configuration (19)c

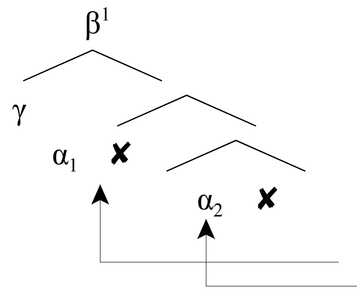
[8]It is irrelevant whether the trigger is first-merged or has been moved into that position. In fact, an instance of the latter option will be encountered in (22)d below.

from feeding further movement of α across γ, followed by another application of TSP to γ, and so on, leading to endless regress. One plausible venue to pursue in order to avoid this halting problem consists in adopting the assumption that iterative application of TSP to one and the same pair of nodes in one and the same environment is banned. Intuitively, this prohibition can be seen as a more general consequence of (i) feature based theories of movement, on which the derivation essentially tests *hypotheses* about featural environments and (ii) the conjecture that for every context and set of features, every hypothesis is only tested once; this second requirement presumably falls out from economy. For TSP, the above implies that if a (pair of) node(s) has moved into a particular context and if this context has been found incompatible with the specific featural requirements of the nodes involved in all possible structural constellations, indicating that further movement does not improve compatibility, the computation is halted. The derivation proceeds then to the next higher level, at which the tree is expanded by new nodes, distinct from α and γ, which potentially entail changes in the feature/type composition of the expression. On this conception, to be adopted here, the TSP does accordingly not induce further movement once it has reached (19)c. As a result, endless regress can be avoided.

Trigger movement preserves the original order of the expressions involved, and it does so by moving the lower category - in this case α in (19)b - first, followed by movement of the higher one. Thus, this type of multiple dislocation displays what will also be referred to as a *low - high signature*. It contrasts in this respect with the order of movements in the second possible configuration of multiple movement, viz. multiple target movement.

In the initial step of multiple target movement, schematically rendered by (20), two nodes α_1 and α_2 have moved, followed by insertion of an immobile trigger γ. Moreover, movement of α_2 precedes movement of α_1.[9]

(20)



At this point, a decision has to be made concerning the future development of (20). Since both α_1 and α_2 are incompatible, and since both reside within the c-command domain of γ, either of them is eligible for movement across γ. Thus, the derivation must be guided as to which of the two nodes is targeted by the next application of TSP. I will assume that order of movement is determined by the simple, natural algorithm in (21):

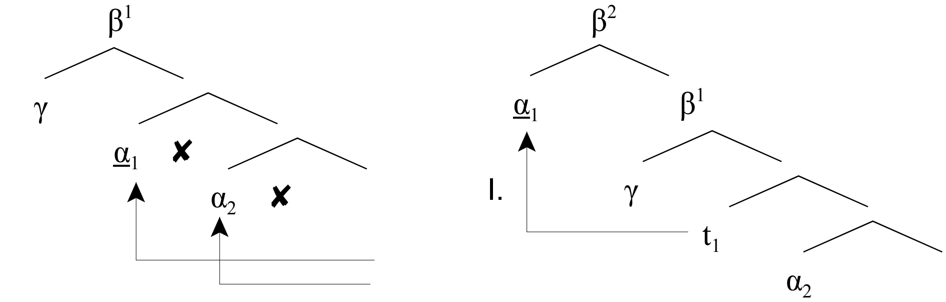
[9]Typically, the initial configuration (22)a is provided by the output of trigger movement ((19)c); this property is immaterial for the further development of the derivation, though.

(21) *Last in - First out Edict* (*Lafite*)
Move the category that was last manipulated by the derivation first.

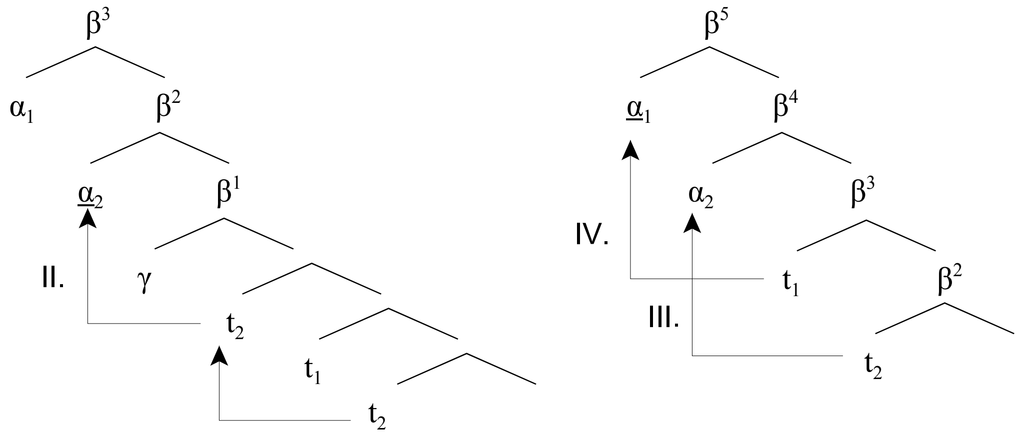
In essence, the *last in - first out* principle (*Lafite*) (21) encodes the claim that movement is modeled in terms of a push down automaton, that is a computational device that can remember and manipulate the last input signal, but not reach into the derivational history of the tree. For present purposes, this entails that the rules which generate movement keep track of the last category they have applied to and retrieve this category, resolving potentially ambiguous contexts such as (20). With this instruction and given that α_1 has been merged last, TSP forces displacement of α_1 first, as illustrated by (22)b. (For ease of readability, the node which has been manipulated last is marked by underlining.)

(22) *Multiple target movement (high - low signature)*

a. α_1 and α_2 land below γ, and α_1 moved last b. Move α_1 first (due to (21))



c. Move α_2 across t_1 and across γ d. Trigger movement of α_1 and α_2 (above γ)

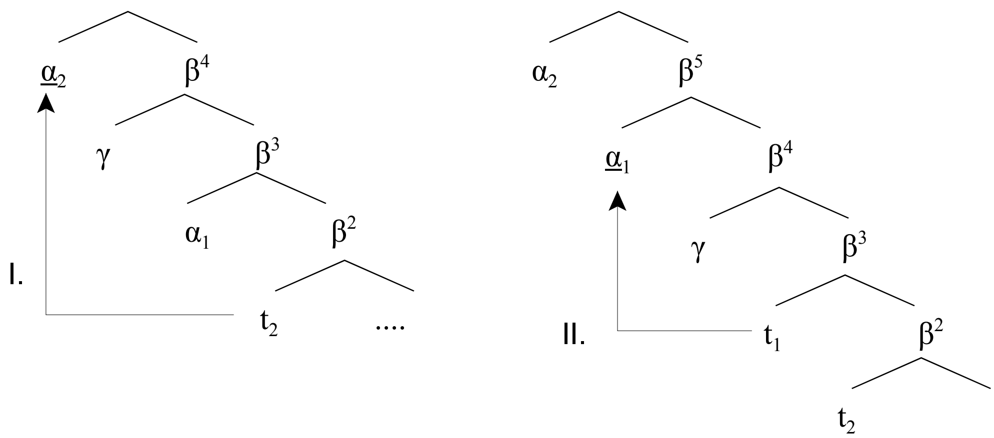


In the next step (22)c, α_2 moves across γ, presumably after having crossed over the lower copy of α_1. (The latter depends on whether copies are taken to be legitimate triggers of movement.) Note that the definition of TSP given in (10) forces this second application of movement to land below, and not above, the landing site of the first one, resulting in order preserving 'tucking-in' (Richards 2001). More precisely, tucking-in follows because (10) requires movement to proceed in the smallest possible steps and because at the point of the derivation depicted by (22)c, the values for the trigger of movement for α_2 are limited to t_2 and γ. Thus, the definition of TSP adopted here derives order preservation effects.

Finally, once α_1 and α_2 have reached their position above γ, they end up in a configuration that matches the profile of trigger movement (19) (where α_1 substitutes γ in (19), and α is rewritten as α_2). Moreover, since α_1 and α_2 have crossed over γ, the nodes have been transported into a new syntactic environment, satisfying the restriction discussed in connection with the halting problem. The constellation consequently triggers one final round of TSP induced dislocation. Specifically, movement targets first α_2 and then α_1, as in (22)d, yielding an output configuration that preserves the order and c-command relations of the initial input representation (22)a.

Even though these last two steps might seem innocuous or vacuous at first sight, because they do not contribute to a change of the relative order between α_1 and α_2, they have an important consequence in conjunction with the *Lafite* ((21)). In (22)c, it was the lower node α_2 that was underlined and that had moved last. Without (22)d and all things being equal, Lafite would therefore lead one to expect that α_2 is targeted by TSP next, as illustrated by the counterfactual derivation in (23). Thus, the lower node α_2 would have to relocate prior to α_1 (see (23)a), with subsequent movement of α_1 in (23)b:

(23) a. Merge γ, move α_2 (after (22)c) b. Move α_1 (non order preserving output)



This alternative derivation crucially differs from (22) in that it leads to a order *reversing* configuration. It becomes obvious now why the two trigger movement steps in (22)d are essential. Trigger movement reassigns the underline mark to the higher node α_1, since in (22)d, it is α_1 which has been last manipulated by the derivation. As a result, Lafite demands that any further displacement operation apply to α_1 first. Merging a trigger with β^5 at a later step of the derivation accordingly sets in motion once again the battery of operations (22)b to (22)d, producing an order preserving output in which α_1 attaches above α_2. And this is, as will be seen shortly, the way it should be. Thus, the final application of trigger movement predicted by the TSP is instrumental in capturing order preservation effects.

To recapitulate, both trigger and multiple target movement preserve order, but they do so for slightly different reasons. In the former contexts, the lower node, that is the node that moves up to the trigger, moves first, followed by movement of the trigger itself to the root. In the latter case, in which two nodes characteristically move close to a trigger, the TSP derivation specifies that the higher node moves first, followed up by the lower one. A final pair of movements renders the higher node the one which was manipulated last, opening up the possibility of further order preserving movement.

The section to follow applies the abstracts results gained so far to the analysis of the two interpretive restrictions introduced in section 3. In addition to providing a more systematic and thorough exposition of the TSP account of Lechner (2009), section 5 expands the empirical scope of the analysis in two directions by (i) including the DP-PP frame and by (ii) addressing scope freezing with VP-fronting. The latter aspect of the analysis is of independent interest, as it renders possible speculations about the source for cross-linguistic variation in the mapping from structure to interpretation.

5 Analyzing scope restrictions with TSP

In what follows, I will adopt a *single output model* of the grammar (Bobaljik 1995; Groat and O'Neil 1996; Pesetsky 2000), in which overt and covert movement operations do not differ in their relative timing (pre vs. post-Spell-Out), but apply in a single cycle and are distinguished only by whether the higher or the lower movement copy is pronounced. QR accordingly proceeds in overt syntax, the only difference to regular movement being that it does not have any phonological consequences. For evidence in support of the phonological theory of QR see also Fox and Nissenbaum (1999).

5.1 The double object construction

All known accounts of scope freezing in the double object constructions (13), repeated from above, rest on the assumption that both internal arguments undergo QR to a position above the base position of the subject.

(13) I gave a child each doll. $\exists \succ \forall$/*$\forall \succ \exists$ (Bruening 2001, (2a))

As this requirement is most straightforwardly expressed by adopting an ordered argument approach towards verb denotations, it will be assumed that *give* denotes a three place relation. Situation and/or event variables will be ignored throughout.[10] Furthermore, the predicate and its internal arguments are parsed into a tree that maps precedence to c-command in the familiar way (Larson 1988).

The goal of the further exposition consists in establishing that the full paradigm of possible and impossible scope readings fall out from the TSP-based algorithm presented in section 4. In short, it will be seen that the order preserving property of TSP is essential for understanding why IO and DO do not permute in scope in the double object frame (13). Moreover, the observation that subjects may be construed with scope inbetween IO and DO ((15)) provides support for the core assumption underlying the TSP that all movements proceed in smallest possible steps.

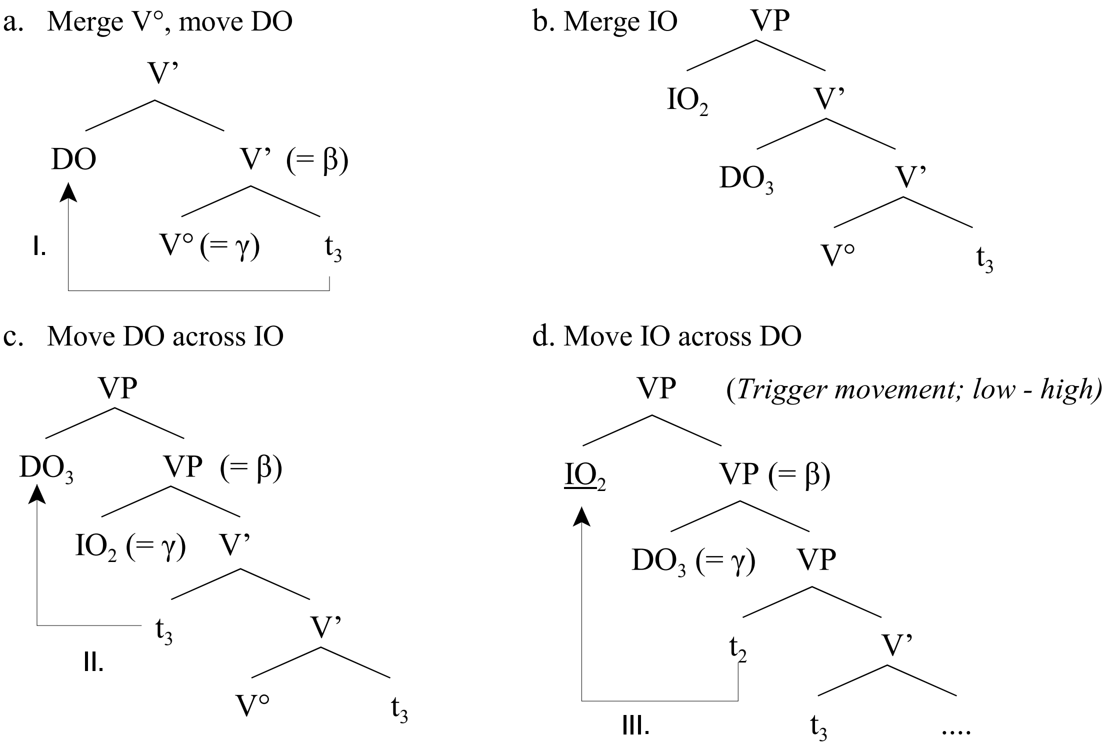
(15) Two boys gave every girl a flower $\forall \succ 2 \succ \exists$ (Sauerland 2000, (49))

---

[10]In Lechner (2009), I assumed a decompositional analysis for double object constructions, following Beck & Johnson (2004), without providing details of the semantics, though.

The derivation of the double object frame exemplified by (15) starts in (24)a. V° and DO are merged, and since DO is type incompatible, TSP requires it to move to the mother of V°. (Bracketed Greek letters refer to the variables in definition (10)). Next, as illustrated by (24)b, IO is added, resulting in a tree that contains now two type incompatible nodes (IO and DO). This configuration has been shown to give rise to *trigger movement* (cf. (19)).

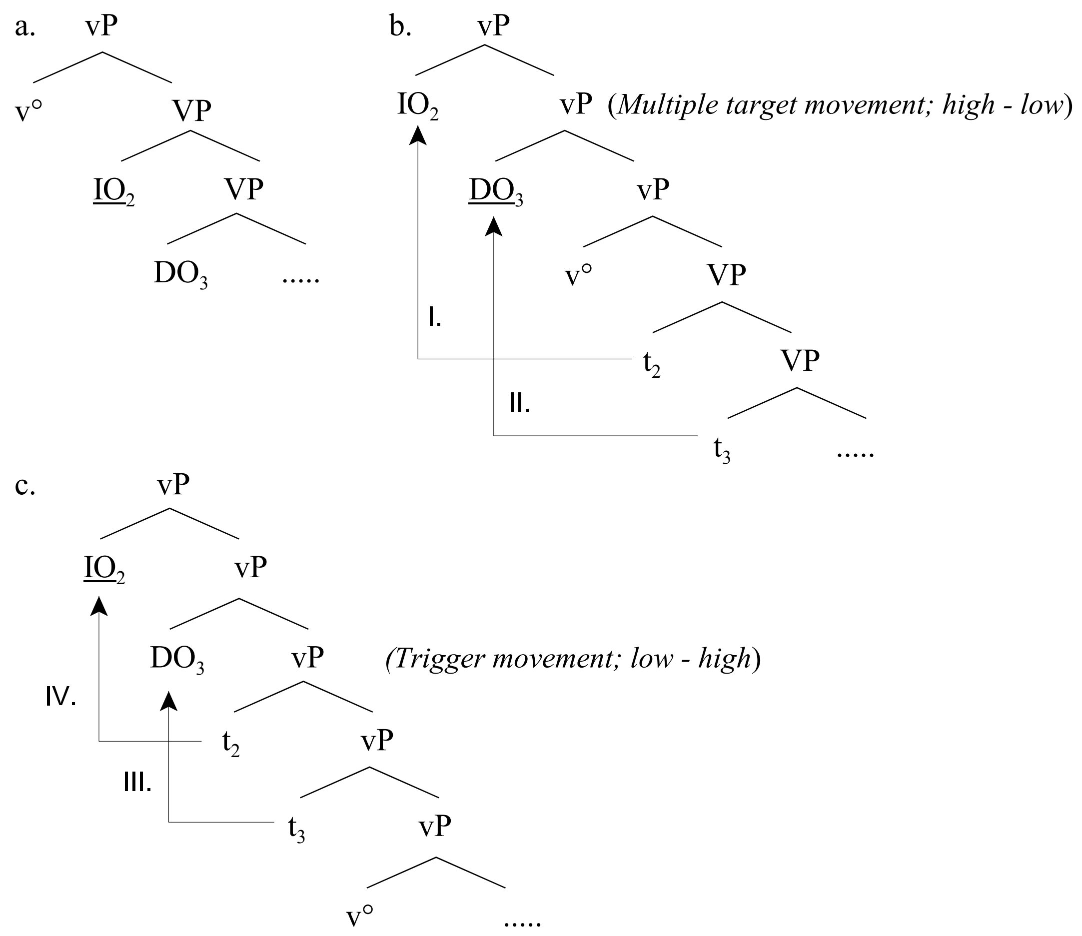
(24)



As detailed by the graphs in (24)c and (24)d, trigger movement ejects the lower of the two nodes (DO) first, followed by movement of the higher one (IO). Thus, (24)c and (24)d display the *low - high signature* typical of trigger movement.

The next triple of representations in (25) captures the evolution of the tree subsequent to merger of v°, but before the subject has joined the derivation. Adding v° in (25)a results in a constellation which triggers *multiple target movement* ((22)), because the tree contains an immobile node (v°) above two mobile ones. Moreover, IO was the last node to be manipulated by the derivation in (24)d. According to Lafite ((21)), IO therefore has to cross over v° first, followed by order preserving movement of DO, as shown by (25)b.

(25)



At this point, IO and DO are neighbors in a new local environment, above v°. But this time, DO is underlined. As a result, the TSP induces the two additional movement steps shown in (25)c. These two operations are crucial in that they pass back the underline mark from DO ((25)b) to IO ((25)c). Hence, it will be IO that moves next.

Tracing the further development of the tree, (26) depicts the consequences of combining (25)c with the subject. Once the external argument is merged in (26)a, IO and DO move by the now familiar pattern of multiple target movement. IO moves first, as it was merged last ((26)b), and DO tucks in ((26)c). What is of particular significance is that both quantifiers are now for the first time located in type compatible positions. Thus, TSP ceases to force further displacement for the internal arguments:

(26)
a. $[_{vP}\ SUB_1\ [_{vP}\ IO_2\ [_{vP}\ DO_3\ v° \ldots$
b. $[_{vP}\ IO_3\ [_{vP}\ SUB_1\ [_{vP}\ t_2\ [_{vP}\ DO_3\ v° \ldots$
c. $[_{vP}\ IO_2\ [_{vP}\ DO_3\ [_{vP}\ SUB_1\ [_{vP}\ t_2\ [_{vP}\ t_3\ v° \ldots$ ⇨ scope order $2 \succ 3 \succ 1$

Since the lowest position in which quantifiers are compositionally interpretable is the position the subject is first merged in, and since no other mechanism (such as QR) licenses scope reversal in the present system, IO and DO can only be assigned scope in that order. It follows that TSP correctly derives scope freezing for the internal arguments of the double object construction.

But the derivation is not complete, yet. More specifically, the subject still bears Case and

Phi-features that cannot be checked in vP. In a final series of movements, the subject is therefore ejected from its base position due to feature incompatibility, moving in small steps up to T. First, it stops inbetween IO and DO, as shown by (26)d. Then, in (26)e, it raises up to T.

(26) d. $[_{vP}$ IO$_2$ $[_{vP}$ SUB$_1$ $[_{vP}$ DO$_3$ $[_{vP}$ t$_1$ v° ... ⇨ scope order 2 ≻ 1 ≻ 3

e. [SUB$_1$ $[_{vP}$ IO$_2$ $[_{vP}$ t$_1$ $[_{vP}$ DO$_3$ $[_{vP}$ t$_1$ v° ... ⇨ scope order 1 ≻ 2 ≻ 3

Crucially, the subject is interpretable in all positions that is has passed through, because all copies are type compatible. As a consequence, the subject can be construed with widest scope ((26)e), intermediate scope ((26)d) or narrowest scope ((26)c). Thus, TSP does not only account for scope freezing, but is also successful in deriving the flexible scope of subjects.

Two remarks on this corollary of the theory are in order here. First, on current conceptions, all scope ambiguities that are to be accounted for in structural terms are derived by optional reconstruction in syntax. This view resonates with ideas articulated, among others, in Hornstein (1995), Johnson and Tomioka (1998) and Lechner (1996).

Second, the ability of TSP to derive scope flexibility of subjects is contingent on the assumption of a single output model in which all operations apply in one cycle. In a conservative model which postpones all QR to LF, overt subject raising would at most strand a trace in a vP adjoined position, as shown in (27)a.

(27) a. $[_{vP}$ SUB$_1$ $[_{vP}$ t$_1$ $[_{vP}$ t$_{1,\ base}$ [v°

b. $[_{vP}$ SUB$_1$ $[_{vP}$ t$_1$ $[_{vP}$ t$_{1,\ base}$ [IO$_2$ [DO$_3$ [v°

c. $[_{vP}$ SUB$_1$ $[_{vP}$ t$_1$ [IO$_2$ [DO$_3$ $[_{vP}$ t$_{1,\ base}$ ... [v°

(27)b schematically represents the point in the hypothetical derivation at which the two object quantifiers have moved across v°. Finally, in (27)c, IO and DO land inbetween the base position of the subject and the vP-adjoined trace. However, since the subject has already reached its overt position by spell-out at this point, there is no way to generate the intermediate scope reading (2 ≻ 1 ≻ 3; cf. (26)d). Thus, the analysis is not compatible with the traditional T-model of the grammar. Conversely, the interaction between conditions on overt and covert movement, which was seen to be responsible for licensing (26)d, can be taken to provide novel support for a single output architecture.

5.2 The prepositional frame

Unlike the IO DO frame, ditransitive predicates that are parsed into a prepositional construction are not subject to scope freezing (Aoun and Li 1993, a.o.)

(28) I showed a picture to every student ∃ ≻ ∀/∀ ≻ ∃

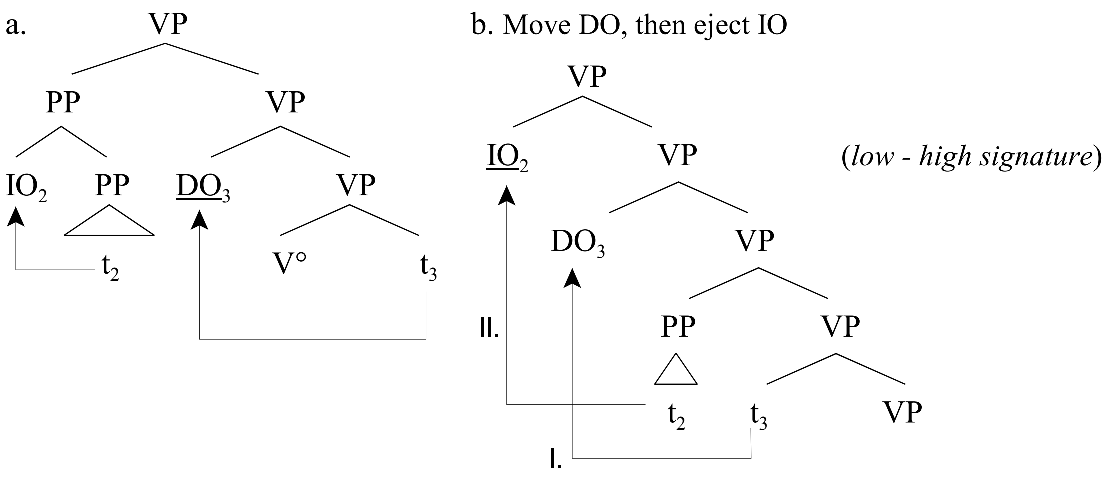
Following Aoun and Li (1993), it will be assumed that (28) obfuscates the base order of the two internal arguments, and that PP is generated above IO, as in (29)a (see also Pesetsky 1995). The surface order is then derived by movement of DO across PP and verb raising. (29)b and (29)c track the relevant parts in the evolution of (28):[11]

(29) a. I to every student$_2$ showed a picture$_3$ (base order)
b. I a picture$_3$ to every student$_2$ showed t$_3$ (move DO across IO-PP)
c. I showed$_4$ a picture$_3$ to every student$_2$ t$_4$ t$_3$ (verb movement)

There is one specific property which is essential for a TSP analysis to be able to account for the inverse scope reading of (28): the reversal between DO and IO-PP has to take place above the subject, i.e. in a position in which quantifiers are interpretable. This requirement is e.g. compatible with the widely accepted view articulated by Johnson (1991) that there are functional projections inbetween vP and TP and that these additional nodes may host overtly moved categories, among them the PP in (29)b. In what follows, I will remain agnostic about the details of the derivation and restrict myself to spelling out the steps in more detail which lead to the conclusion that inversion must take place high, i.e. above the base position of the subject.

In the PP-frame, DO is generated as a sister to V°, while PP originates in some higher c-command position. Since DO denotes a quantifier in (28), it climbs up the tree in search of a type compatible position. The tree includeing DO and PP accordingly looks as in (30)a. (30)a also depicts a second, independent movement operation, which separates the quantificational IO from the preposition. Since this step, which is also motivated by type mismatch, takes place in a separate part of the derivation ('work space') it is DO-movement, and not P-stranding that counts as the last operation performed on the tree.[12] Lafite ((21)) therefore dictates that the trigger movement configuration is resolved as in (30)b by moving DO first, followed by IO-raising:

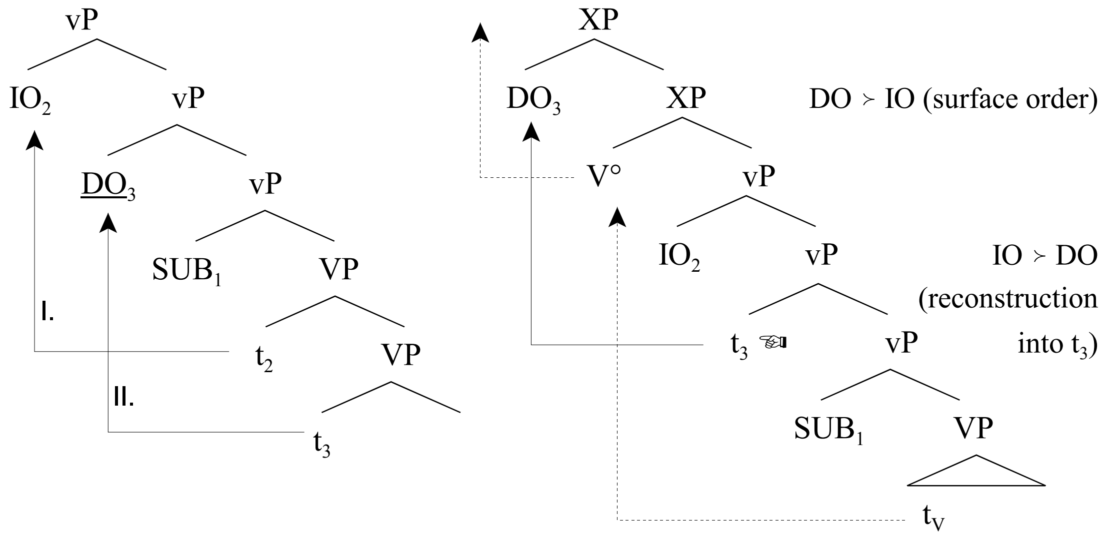
(30)



[11]The question whether the IO DO frame and the DO PP construction are derivationally related is orthogonal for present purposes. Note incidentally that the two analytical options are not mutually exclusive: some IO DO (or DO PP) orders could be derived, while others could be base generated.

[12]The relations between IO and DO are structurally identical to the ones which hold between the inversely linked object and the subject in (31)b and (32)a.

c. Move IO and DO across subject d. DO and verb move to XP



Merging the subject followed by multiple target movement yields (30)c (v° and subject raising suppressed). In the crucial inversion step (30)d, DO moves across the indirect object. Shifting the verb to the left of DO finally results in the surface order V°^DO^PP.[13]

The final order reversing movement of DO in (30)d entails an important consequence. Since inversion between IO and DO takes place in an area of the tree in which quantifiers are interpretable, DO may be assigned scope either above or below IO, depending on whether DP reconstructs into its vP-adjoined trace (marked by ☜) or not. Scope freezing effects are therefore correctly predicted not to be attested in the DO-PP frame.

To recapitulate so far, the TSP based system correctly derives the distribution of scope restriction in the double object construction and the prepositional frame. Below, in section 5.4, it will be seen that in particular the ability of TSP to provide an explanation for scope freezing is critical, because at the moment, a comparable attract based account is missing. (The analysis of the prepositional frame was contingent on an assumption shared by competing attract theories - viz. an additional movement step - and does therefore not help in distinguishing between the competing theories.)

5.3 Inverse linking

The first scope restriction was seen to manifest itself in contexts with three quantifiers in asymmetric c-command relation. The second restriction operates on triples of quantifiers, two of which are in a containment relation. Specifically, the goal is to explain why string (16) lacks reading (16)c, on which the subject scopally interferes between the inversely linked QP3 and what will be called the *container*, in this case QP2.

---

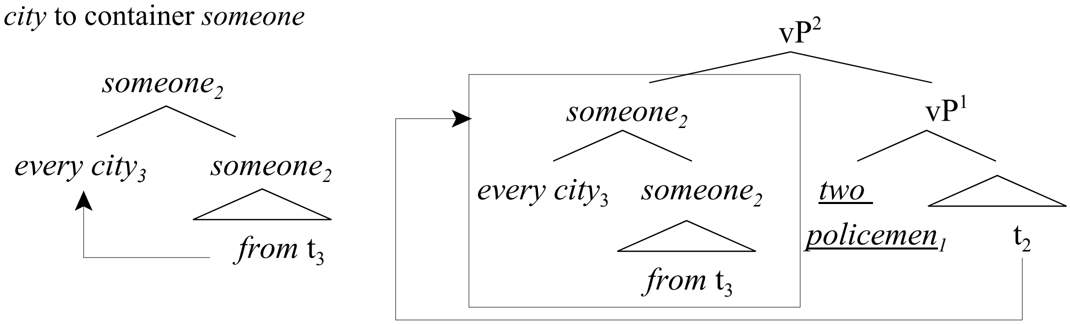
[13]Note that IO raises covertly. Movement of DO is presumably Case driven and lands in a higher functional projection XP.

(16) $[_{QP1}$ Two policemen spy on $[_{QP2}$ someone from $[_{QP3}$ every city]]]

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

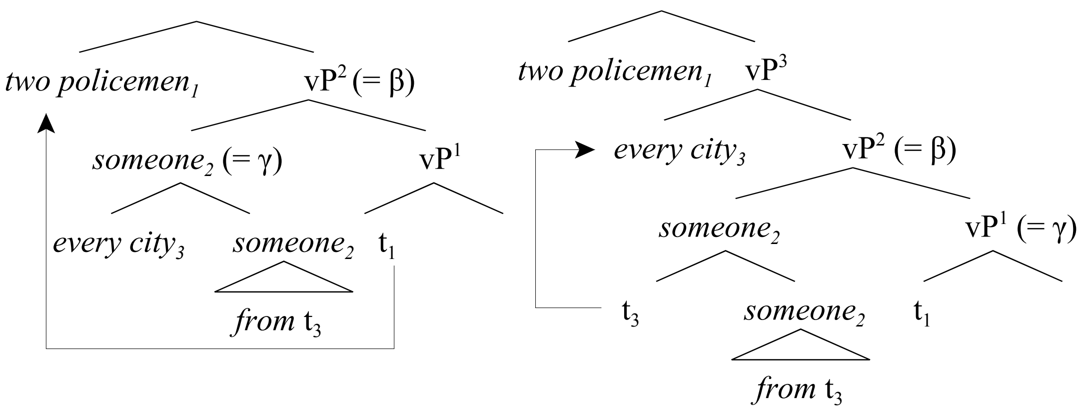
The discussion of the DO - PP frame already revealed that TSP driven movement can affect subparts of the tree that are later joined by a generalized transformation with the spine of the derivation (see (30)a). This type of displacement is also at work in the assembly of *[$_{QP2}$ someone from every city]*. Relevant parts are made explicit in (31)a. Upon insertion of the predicate (*spy on*), the whole object moves to the left of the base position of the subject, as detailed by (31)b:

(31) a. Adjoin inversely linked *every city* to container *someone* b. Merge *two policemen*, move container *someone*



The output of (31)b is followed by two displacement operations. Since subsequent to container movement in (31)b, the subject is the category manipulated last, *two policemen$_1$* is ejected from its base position first, resulting in (32)a:

(32) a. Move subject *two policemen* b. Move inversely linked *every city*



Next, the inversely linked QP *every city$_3$* of (32)a needs to relocate for reasons of type incompatibility. As (33) reveals, the structural relation between *every city$_3$* (α in (33)a) and the trigger *two policemen$_1$* (γ in (33)a) is identical to the one which was seen to hold in standard instances of dislocation, schematically depicted by (33)b. The two trees only differ in the ordering between γ and δ:

(33) a. b.

Due to this structural similarity, the definition of TSP in (10), repeated from above, applies to the inversely linked QP *every city*$_3$ in (32)a just as it does to regular object QPs.

(10) For any nodes α, β and γ, such that
 a. α is feature or type incompatible,
 b. β is the mother of γ, and
 c. γ c-commands α:
 remerge α with β.

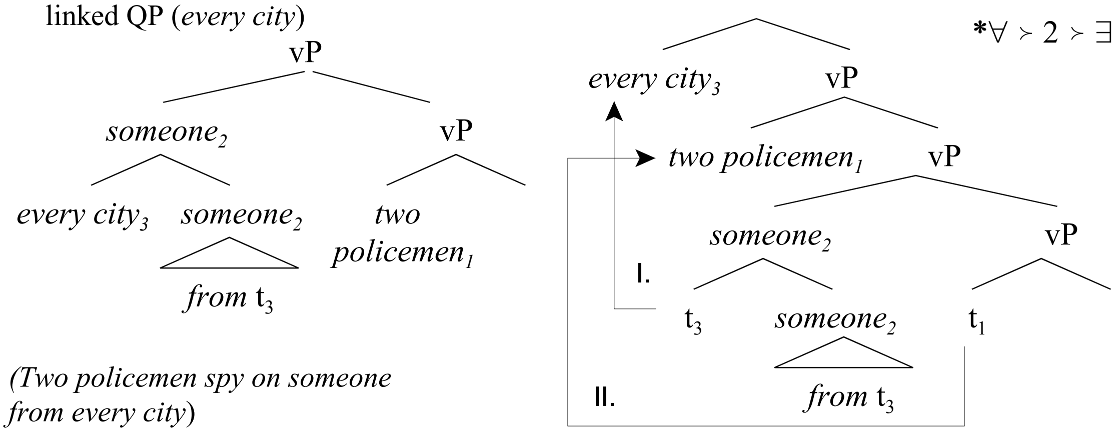
Moreover, (10) also determines the landing site of *every city*$_3$. (10) universally quantifies over occurrences of c-commanding γ's. One such γ comes in the shape of the node vP^1 in (32)a. Hence, *every city*$_3$ has to remerge with the mother of vP_1, yielding the output representation (32)b. Thus, the particular configuration (32), in which a node that is to undergo further movement is transported into its launching site by a container, unveils another, qualitatively new extensional property of (10): TSP leads to tucking-in also if the two movements start from non-commanding positions.

The structural relations encoded in tree (32)b contain all information necessary to generate the attested readings, and all sufficient information to weed out the unattested ones. Concretely, the LF-fragment (32)b maps directly to the scope order *subject ≻ inverse linked QP ≻ container* (= (16)a). Reconstructing the subject into its base yields *inverse linked QP ≻ container ≻ subject* (= (16)b). But as TSP failed to instruct the subject to generate an intermediate trace inbetween the inverse linked QP and its container, it is not possible to map (32)b into the unavailable reading (16)c on which the subject takes intermediate scope.[14]

Inverse linking is not only consistent with TSP, but also exposes the limitations of any account which computes precedence of operations on the basis of some notion of closeness such as the Minimal Link Condition (Chomsky 1995). As shown by (34)a, the two quantifiers *every city*$_3$ and *two policemen*$_1$ are equidistant to the root node - both are separated from the root by a single segment. Alternatively, distance can be is measured in terms of complete containment within a category. On this conception, *every city*$_3$ is even closer to the root than the subject, because the former is only dominated by one of a multi-segment category, whereas both vP segments dominate *two policemen*$_1$.

[14] I assume that the mapping from LF representations to meanings is injective ("into") in order to provide for the possibility that there are scope orders that are not solely determined by the structure of LF. The usual suspects include wide scope indefinites, *de se* like readings and branching quantification.

(34) a. Subsequent to movement of inversely linked QP (*every city*) b. Move subject to closest landing site



(Two policemen spy on someone from every city)

Crucially, no matter which definition is chosen, it is not the subject which qualifies as the closest node to the root. But this entails that derivation (34)b, which underlies the unattested scope order *inverse linked QP* ≻ *subject* ≻ *container* should be legitimized by the grammar. It follows that a decision procedure on the order of movement which relies on the concept of closeness - to be precise: closeness to the landing site - is bound to fail.

Before turning to further empirical extensions of the TSP analysis, it is instructive to stop and pursue the point just taken up further by comparing how TSP and attract based models treat multiple movement configurations. Even though a systematic and complete evaluation of the fundamental differences between these two alternatives strategies for inducing displacement will have to await a future study, the comments in the next subsection aid in eliminating some logically possible theoretical options.

5.4 TSP vs. Attract

The TSP analysis outlined above rests on two generalizations about the way contexts that involve multiple movement are organized. First, if the mobile nodes asymmetrically c-command one another, movement proceeds in an order preserving way. Second, configurations in which one operator is embedded inside another one are subject to the condition that no third operator may interfere.[15] I will briefly comment on some complications these generalizations pose for competing attract based models, addressing the concept of closeness and intermediate traces in c-command and containment configurations in turn.

Attract based models delegate decisions about the order of movement and the location of the landing sites to a metric which requires features to attract the closest compatible target. In principle, it would also be possible to define such a condition for systems that employ feature *incompatibility* as a trigger for dislocation, transposing the closeness requirement into an attract based framework. Suppose more concretely that α_1 is the complement of a verbal γ, and α_2 serves as its specifier (in a conservative phrase structure), and both α_1 and α_2 are incompatible in their

[15]For a (descriptive) generalization that extends beyond quantifiers see below and Lechner, to appear.

local environment, as in (35)a. Since α_2 is closer in tree geometric terms to γ than α_1 is, it is possible to define TSP in such a way that it ejects α_2 prior to α_1:

(35) a. b.

While a closeness condition can at least in principle be formulated for *feature* mismatches, it is harder to see how the concept of closeness can be employed in a meaningful way when dealing with *type* incompatibilities. Imagine that α_1 and α_2 are both generalized quantifiers which are type incompatible with their sister nodes, as in (35)b, and that movement of α_1 precedes movement of α_2. Is it not possible to express this relation in terms of relative closeness to a given node that induces type incompatibility. This is so because compositionality imposes the requirement that all semantic composition target sister nodes. Hence, the type theoretic well-formedness conditions only hold for the pair α_1 and β^2, and the pair α_2 and β^1. But these relations are trivially equally close. If TSP is to be given its most natural formulation, in which it subsumes type and feature mismatches under a single principle, a closeness metric is therefore at most a partially successful guide for the properties of movement.

Next, consider the different predictions which attract based models and TSP generate for the position of intermediate movement copies. More precisely, there are two structures to consider. The first context comes in shape of the intermediate scope representation for the double object construction in (26)d, repeated below:

(26) d. $[_{vP}$ IO_2 $[_{vP}$ SUB_1 $[_{vP}$ DO_3 $[_{vP}$ t_1 v° ...

Without additional assumptions, an attract model leads one to expect that the subject, which originates in SpecvP, directly moves to the next functional projection in the tree. What is entirely unexpected is that the subject lands inbetween IO and DO as in (26)d. Feature attraction approaches have at least not demonstrated yet that they are capable of replicating the results attained by TSP without stipulation.[16]

In a second relevant set of contexts, two nodes to be reigned by some version of a minimality principle dominate one the other. As dominance relations cannot be translated into scope relations, the two nodes need to be unfolded into a structure that repositions them into a c-command relation. This is exactly what was seen to be at work in inverse linking. However, the discussion of inverse linking above also revealed that a closeness algorithm fails because it cannot predict the order of movement that results in the only acceptable interpretation. The

[16]Sauerland (2000) demonstrated that it is possible to frame a common analysis of double object constructions and inverse linking. For a comparison see Lechner (2009).

challenge is therefore once again with attract based theories to provide a solution to these puzzles.

To recapitulate, the TSP model offers two advantages over orthodox systems which motivate dislocation by feature attraction: it offers a natural explanation for the observation that overtly moved subjects are flexible, while covertly moved objects are not; and its derives the generalization that movement of embedded, inversely linked quantifiers is strictly local.

5.5 VP-Fronting

Returning to further empirical ramifications of TSP, there is yet another aspect of the system that has not been recognized in previous versions of the theory. The inverse linking construction related three nodes that all underwent silent movement. Interestingly, it is also possible to identify movement triads that obey the same rules as inverse linking, but which offer the additional benefit of making one of these operations overt. In English, this configuration manifests itself in the form of scope freezing with predicate fronting, first discussed in Barss (1985). Just as with inverse linking, VP-topicalization in (36) involves three components: a subject (*no one*$_1$), a container that moves (the VP), and a node that needs to scope out of the container in order to ensure type compatibility (*every student*$_2$; example from Huang 1993).

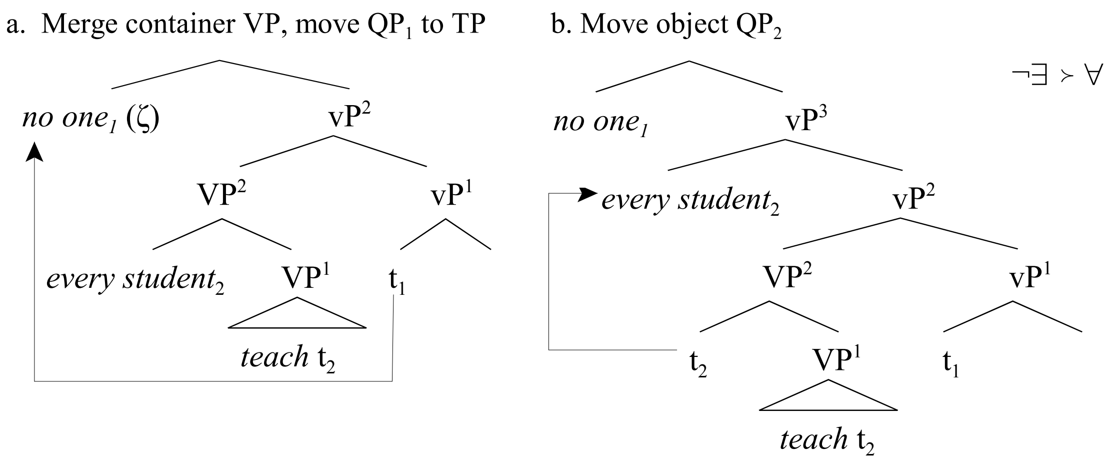
(36) a. .... and [$_{VP}$ teach every student$_2$]$_3$, no one$_1$ will $\neg\exists \succ \forall$ / $*\forall \succ \neg\exists$

Furthermore, the QP embedded in the container cannot be assigned scope over the subject. This restriction is strongly reminiscent of the condition operative in contexts involving inverse linking, which limited the scope options of the quantifier embedded inside the container. Descriptively, these similarities between VP-fronting and inverse linking can be captured as in (37):

(37) If β contains α, and β moves across γ, then α and β cannot be separated by γ.

On current views, which include the assumption that all movement proceeds in overt syntax, the differences between the two constructions that fall under (37) reside solely in phonological properties. Scope freezing with predicate fronting is therefore a direct corollary of the theory presented so far. The single output model generates structures for (36) which look for all means and purposes just like the ones for inverse linking (cf. (32)). As a comparison between the fragmentary representation for (36) given in (38) and the tree in (32) reveals, the two derivations are identical up to the values of labels and lexical items:

(38)



Just as in (32), a quantifier - in this case the object *every student* - embedded inside a node that itself undergoes movement - in this case VP - is instructed by TSP to shift to the left edge of the container in order to escape a type incompatible environment.[17] In the next step, represented by (38)a, the container VP^2 adjoins to vP. At this point, the derivation needs to decide whether the subject (*no one$_1$*) or the node adjoined to the container moves next. Once again, this procedure is familiar from inverse linking. Given that *no one$_1$* has been manipulated last, the subject raises locally across the VP, driven by feature incompatibility. In a final step, depicted by (38)b, the object moves to a position below the subject. In semantics, representation (38)b can then be transparently mapped to the overt scope order $\neg\exists \succ \forall$.

While similar in many respects, there is one important difference between inverse linking and VP-fronting, though. The subject of the former construction is flexible in scope, and may be interpreted in any position it has moved through. By contrast, *no one$_1$* in (36) must not reconstruct into its base.[18] Even though this difference at first sight poses an obstacle to a common analysis, it arguably follows from another, independent restriction on predicate fronting. Concretely, in order to account for the absence of inverse scope readings for VP-topicalization and related constructions, two operations must be banned: wide QR of the object across the surface position of the subject, and subject reconstruction into its base, as stated by (39) (for discussion see Sauerland and Elbourne 2002, among others):

(39) In contexts of predicate fronting, the subject cannot reconstruct into its base position.

As was seen above, TSP provides a theory of the former restriction, while (39) must be attributed to an independent source.

[17]The analysis is also compatible with the view that predicate fronting applies to vP, and not VP. In this scenario, the derivation involves an additional step of short subject movement.

[18]In this particular example, the absence of a narrow scope reading for the subject might also be due to the general resistance of negative quantifiers to reconstruct. (Partee 1971; Lechner 2006, 2007; Iatridou and Sichel 2009). But scope freezing is also attested with indefinites:

(i) They promised that someone will answer every letter, and answer every letter, someone will.

Although I cannot offer a complete analysis at the moment, the absence of subject reconstruction with predicate fronting fits into the broader typological generalization noted in Adger (1994) that (certain) optional movement operations result in representations that are bi-uniquely mapped to interpretation. Thus, if an operation is optional, interpretation is fixed, while obligatory processes typically lead to ambiguity. For instance, languages that admit optional rearrangement of the middle field by scrambling such as German, Korean or Japanese are typically scope rigid. By contrast, even canonical word orders feed scope inversion in English, which is generally taken to lack scrambling. The same principle correctly predicts that optional operations such as topicalization in English yield unambiguous scope orders. In a way, then, VP-topicalization makes English look like German. The more general question to be answered in the future accordingly is why lower movement copies become unavailable for interpretation in German as well as in English once predicates are placed into topic positions.

Interestingly, this preliminary result dovetails with another, related property of the present account, which also links certain aspects of English and German syntax. In the current TSP system, all scope inversion is the result of the interaction between type and feature driven movement. For subjects, raising to T e.g. creates a scope position above the object. For the DO-PP frame, the additional movement step of the DO is instrumental in that it generates a representation that can be mapped to two distinct interpretations. Moreover, if feature driven movement is taken to be always visible in the overt component, it also follows that all scope ambiguity is dependent upon the application of at least one overt movement operation - which can later be undone by reconstruction. English transitive clauses are ambiguous because the subject moves overtly, and the DO-PP frame displays scope permutation due to overt DO shift.

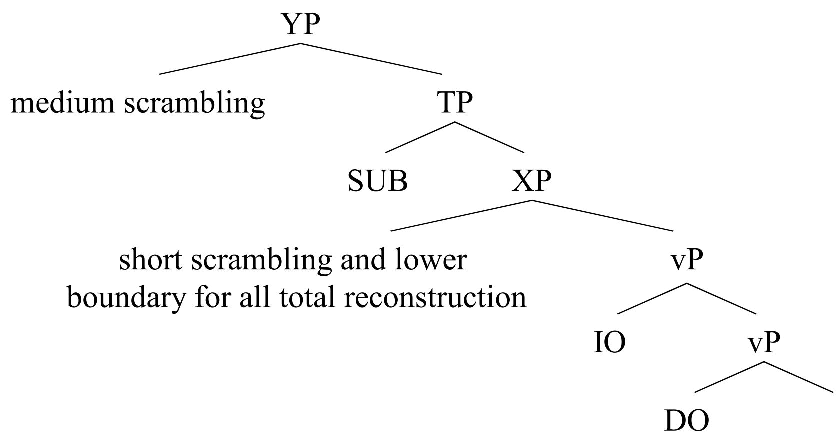
This conception has the intriguing consequence of making English resemble scope rigid languages like German, in which scope permutation is also known to be contingent upon overt inversion of the scope bearing categories. As a result, differences between these two languages in the mapping from syntax to interpretation can be minimized. In addition, it becomes possible to locate more precisely the exact factors responsible for variation. Concretely, what discriminates English from German is the degree to which DPs may undergo total reconstruction in each language.[19] In English, movement is free to reconstruct into all interpretable positions. Subjects and objects in the DO-PP frame can therefore be assigned narrow scope also in configurations that observe canonical word order. By contrast, German limits total reconstruction to the left edge of the vP, such that overt movement across this boundary cannot be undone. Ample evidence for this generalization comes from the study of the interaction between scrambling and interpretation (Frey 1993; Lechner 1996, 1998). In what follows, I will synoptically summarize some findings from the literature which support this assumption.

To begin with, transitive subjects in German sentences with canonical word order do not reconstruct below objects for scope. Given that object quantifiers are parsed into a vP-adjoined

[19] Adger (1995) argues for the same point, based on a different set of observations, though.

position, this observation is compatible with the claim that quantifier lowering by reconstruction must not penetrate the left edge of vP. Furthermore, scrambling reconstructs for the computation of c-command sensitive principles (Binding Conditions, NPI-licensing, and others) into a position just to the right of the subject (Frey 1993). This restriction manifests itself in two configurations, which are collapsed into the single tree (40). (Assuming IO and DO to be quantificational, they occupy VP-external positions; nothing bears on this issue, though.)

(40)



First, short (object over object) scrambling never reconstructs. Thus, if DO moves into XP, coreference and binding relations, among others, are evaluated in that position.[20] Second, in structures involving medium scrambling of an object across the subject, only the step that places the object above the subject is undone. As documented by (40), both restrictions fall out from the generalization that reconstruction must not 'reach into' vP.

The holy grail for research on cross-linguistic variation in strategies for computing meaning is accordingly defined by the question why English and German are subject to distinct conditions on reconstruction (see e.g. discussion in Adger 1995). A possible venue to pursue in future work may proceed along the lines spelled out in the concluding remarks of this section.

Reconstruction restores the descriptive content of categories into lower chain links. Moreover, categories obtain their descriptive content only by lexical insertion. One might therefore try to regulate the 'depth' of reconstruction by restrictions on the specific location in the tree at which lexical insertion takes place. The higher lexical insertion takes place, the fewer positions for reconstruction are made available by the derivation. In fact, such a strategy of delayed insertion has already been exploited successfully at various places in the literature by Late Merge accounts of anti-reconstruction effects (Fox 2002; Lebeaux 1995).

The specific implementation best suited for present purposes is provided by Takahashi's (2006) theory of Whole Sale Late Merge. On this account, the restrictor argument of a determiner can be inserted subsequent to the application of movement into derived positions, resulting in delayed lexical insertion. In such contexts of Whole Sale Late Merge, the determiner raises on

[20]The observation that in scope rigid languages, all overt inversion feeds ambiguity, is accounted for reconstruction in the semantic component (Lechner 1996, 1998).

its own, schematized in (41)a, followed by merger of the restrictor argument in a higher chain link, as in (41)b:

(41)	a.	Move determiner:	[determiner$_1$	....	[t_1
	b.	Insert restrictor:	[[determiner$_1$ restrictor]	...	[t_1

Suppose now that in German, all DPs that have left vP are - for some reason yet to be exposed[21] - assembled by Whole Sale Late Merge. Then, there will be no lower movement copies of restrictors inside vP, accounting for the absence of reconstruction into vP (see (40)). In English, lexical insertion of restrictors at least optionally starts in the foot of the chain, providing an extensive repository of potential reconstruction sites inside vP. Thus, movement freely reconstructs in English.

While successful in deriving the basic facts, it is evident that this set of assumptions still requires a stronger theoretical foundation as well as further empirical confirmation in order to be propagated to an adequate theory of reconstruction. I will have to relegate this task to future investigations.

6 A note on the density of movement paths

On current assumptions, all movement proceeds in smallest possible steps, resulting in dense movement path. Density might be the property that most radically distinguishes TSP from attract based models. In this final section, I will briefly address one of the many consequences of this assumption that merit further inquiry by considering a piece of evidence against dense movement paths recently discussed in Abels and Bentzen (2008).

Abels (2003) observes that the contrast in (42) generates an argument for the view that movement paths are 'punctuated', and not dense.

(42) a. Which picture of himself$_1$ did it seem to John$_1$ that Mary liked?
b. *Which picture of himself$_1$ did Mary seem to John$_1$ to like?

(42)b can be ruled out by Condition A of the Binding Theory if it is assumed that there in an intermediate landing site for *which picture of himself$_1$* below John in (42)a, but not in (42)b. On this assumption, the pair is parsed into a structure as in (43):

(43) a. Which picture of himself$_1$ did
it seem to John$_1$ [$_{CP}$ ~~which picture of himself~~$_1$ that Mary liked]
b. *Which picture of himself$_1$ did Mary seem [$_{TP}$ to John$_1$ $\underbrace{[_{XP} \text{ to like?}]]}$

No intermediate landing site for *which picture of himself$_1$*

As the string to the right of *John* in (43)b is mapped to a tree (XP in (43)b) that could in principle host movement copies, the analysis entails that movement does not pass through every position

[21]Naturally, it might be tempting to relate this difference to head-finalness of German VPs and properties of the linearization algorithm.

along the movement path. Specifically, (43)b does not contain a copy of *which picture of himself*$_1$ at the left edge of XP. From this, Abels infers that movement paths cannot be dense.

But as pointed out by Gereon Müller (quoted in Abels and Bentzen 2008), (42)b can also be accounted for by a condition which demands that an anaphor be bound by the closest possible binder. Crucially, this requirement derives the correct results also if movement passes through *every* intermediate landing site, as in (44), because in (44), the trace of *Mary* counts as the closest antecedent for the copy *which picture of himself*$_1$. This defuses the argument against density of movement paths.

(44) *[Which picture of himself$_1$]$_3$ did [$_{TP}$ Mary$_2$ seem
[$_{TP}$ to John$_1$ [t$_{Mary}$ [~~which picture of himself~~$_1$]$_3$ [$_{TP}$ t$_{Mary}$ to like?]

In a reply to Müller's objection, Abels and Bentzen (2008) bring to attention the fact that anaphor binding is not always determined by closeness (Barss & Lasnik 1986). Thus, they contend, closeness can also not be at stake in (44), reinstating the original argument against dense movement paths:

(45) a. Mary explained the man to himself.
b. Mary explained the man to herself.

However, although correct for the particular constellation (45), this generalization does not extend to the relevant context in (46), where the relation between the anaphor and its antecedent is interrupted by a subject trace, instead of an object. What (46) demonstrates is that closeness *is* relevant if raising is involved:

(46) *John$_1$ seems to Mary$_2$ [$_{TP}$ t$_1$ to like a picture of herself$_2$]

Moreover, the same condition that a reflexive not be separated from its binder by a subject trace is also violated in (44). It can therefore be concluded that Müller's objection is still valid, and that the argument against density of movement paths is not conclusive. Needless to say, the fact that one particular argument against a corollary of TSP - viz. dense movement paths - apparently fails does, of course, not entail that others will, too.

7 Conclusion

In Lechner (2009), a particular version of a theory of movement was presented in which dislocation is motivated by incompatibility with a local syntactic context (TSP; Stroik 2009). The present contribution expands on TSP in various directions. First, a new definition of TSP was provided in (10), which is both simpler and more natural than the version of Lechner (2009). A second central objective consisted in the search for criteria that distinguish between TSP from competing attract modes. Such diagnostics could be identified in the shape of scope restrictions in two contexts: double object constructions and inverse linking. In both cases, the analysis was contingent upon the interaction of the specific definition of TSP and the assumption of a simple algorithm which informs the derivation about the order operations if TSP is met by more than a single context in the tree. Third, the discussion included new empirical paradigms (the DO-PP frame and VP-fronting) which were seen to lend themselves to a natural analysis in terms of TSP. Finally, I followed up a number of ramifications and consequences of TSP. Among others, it was seen that just like any theory of movement, TSP needs to be supplied by an independent theory of reconstruction in order to guard against generating unattested interpretations. Such considerations led to some speculations about the relation between movement more generally and lexical insertion.

References

Abels, Klaus. 2003. Successive Cyclicity, Anti-locality, and Adposition Stranding. Doctoral dissertation, University of Connecticut.

Abels, Klaus and Kristine Bentzen. 2008. Are movement paths punctuated or uniform? Ms. UCL and University of Tromsø.

Adger, David. 1994. Functional Heads and Interpretation. Doctoral Dissertation, Edinburgh.

Adger, David. 1995. Meaning Movement and Economy. In R. Aranovich et al. (eds) Proceedings of WCCFL 13, Stanford, CSLI Publications, 451-466, 1995.

Barss, Andrew, and Lasnik, Howard. 1986. A Note on Anaphora and Double Objects. *Linguistic Inquiry* **17**: 347-354.

Beck, Sigrid, and Johnson, Kyle. 2004. Double objects again. *Linguistic Inquiry* **35**.1: 97-124.

Bhatt, Rajesh, and Pancheva, Roumyana. 2004. Late Merger of Degree Clauses. *Linguistic Inquiry* **35**.1: 1-45.

Bobaljik, Jonathan. 1995. Morphosyntax: the syntax of verbal inflection. Doctoral dissertation, MIT.

Bruening, Benjamin. 2001. QR obeys Superiority: Frozen Scope and ACD. *Linguistic Inquiry* **32**.2: 233-273.

Chomsky, Noam. 1995. The Minimalist Program: Current Studies in Linguistics. Cambridge, Massachusetts: MIT Press.

Chomsky, Noam. 2000. Minimalist inquiries: The framework. In Step by step: Essay on minimalist syntax in honor of Howard Lasnik, ed. by Roger Martin, David Michaels, and Juan Uriagereka, 89–155. Cambridge, Mass.: MIT Press

Fox, Danny. 2000. Economy and Semantic Interpretation. Cambridge, Mass.: M.I.T. Press.

Fox, Danny. 2002. Antecedent Contained Deletion and the Copy Theory of Movement. *Linguistic Inquiry* **33**.1: 63-96.

Fox, Danny, and Nissenbaum, John. 1999. Extraposition and Scope: A Case for overt QR. In *WCCFL 18*.

Frey, Werner. 1993. Syntaktische Bedingungen für die Interpretation.vol. vol. 35. Berlin: Studia Grammatica.

Groat, Erich, and O'Neil, John. 1996. Spell-Out at the LF Interface. In: Werner Abraham, Samuel David Epstein, Höskuldur Thráinsson and Jan-Wouter Zwart (eds.), *Minimal Ideas*, 113-139. Amsterdam: John Benjamins.

Heim, Irene, and Kratzer, Angelika. 1998. *Semantics in Generative Grammar*. Oxford: Blackwell.

Hulsey, Sarah, and Sauerland, Uli. 2003. Sorting out Relative Clauses: A Reply to Bhatt. Ms., Umass, Amherst.

Iatridou, Sabine, and Sichel, Ivy. 2009. Negative DPs and Scope Diminishment. Ms., MIT and Hebrew University.

Johnson, Kyle, and Tomioka, Satoshi. 1997. Lowering and Mid-Size Clauses. In Katz, Graham, Shin-sook Kim and Heike Winhart (eds.), *Proceedings of the Tübingen Workshop on Reconstruction*, pp. 185-206. Tübingen, Germany.

Kayne, Richard. 1984. Unambiguous paths. In *Connectedness and binary branching*,129–164. Dordrecht: Foris.

Larson, Richard. 1987. Quantifying into NP. Ms., MIT.

Lebeaux, David. 1995. Where does the Binding Theory Apply? Maryland Working Papers in Linguistics 3: 63-88.
Lechner, Winfried. 1996. On Semantic and Syntactic Reconstruction. Wiener Linguistische Gazette 57-59: 63-100.
Lechner, Winfried. 1998. Two Kinds of Reconstruction. Studia Linguistica 52.3: 276-310.
Lechner, Winfried. 2004. Extending and Reducing the MLC. In Stepanov, Andrew, Gisbert Fanselow and Ralf Vogel (eds.), *Minimality Effects in Syntax*, pp. 205-241. Berlin, New York: Mouton de Gruyter.
Lechner, Winfried. 2006. An interpretive effect of head movement. In Frascarelli, Mara (ed.), *Phases of Interpretation*, pp. 45-71. Berlin, New York: Mouton de Gruyter.
Lechner, Winfried. 2007. Interpretive effects of head movement. Ms., University of Stuttgart. [Available at http://ling.auf.net/lingBuzz/000178].
Lechner, Winfried. 2009. Evidence for Survive from covert movement. In Mike Putnam (ed.), *Towards a Derivational Syntax. Survive Minimalism.* Amsterdam: John Benjamins.
Moro, Andrea. 2000. Dynamic antisymmetry. Cambridge, MA: MIT-Press.
Nissenbaum, Jon. 2000. Investigations of covert phrase movement. Doctoral dissertation, MIT.
Partee, Barbara. 1971. On the requirement that transformations preserve meaning. In: Studies in linguistic semantics, ed. Charles J. Fillmore and Terence Langendoen, 1-21. New York: Holt, Rinehart and Winston.
Pesetsky, David. 1989. Language-Particular Processes and the Earliness Principle. Ms., MIT.
Pesetsky, David. 2000. *Phrasal Movement and its Kin*. Cambridge: MIT Press.
Putnam, Michael T. 2007. *Scrambling and the Survive Principle.* Amsterdam: John Benjamins.
Putnam, Michael T. (ed.). 2009. *Towards a derivational syntax.* Amsterdam: John Benjamins.
Richards, Norvin W. III. 2001. *Movement in Language.* Oxford: Oxford University Press.
Richards, Norvin. 2001. A Distinctness Condition on Linearization. Ms., MIT.
van Riemsdijk, Henk. 1997. Push chains and drag chains: Complex predicate split in Dutch. In *Scrambling*, ed. Shigeo Tonoike, 7-33. Tokyo: Kurosio Publishers.
Sauerland, Uli. 2000. Syntactic Economy and Quantifier Raising. Ms., University of Tübingen.
Sauerland, Uli, and Elbourne, Paul. 2002. Total Reconstruction, PF-Movement and Derivational Order. Linguistic Inquiry 33.2: 238-319.
Stroik, Thomas. 1999. The Survive Principle. *Linguistic Analysis.* 278-303.
Stroik, Thomas. 2009. *Locality in Minimalist Syntax*. Cambride, Mass: M.I.T. Press.
Takahashi, Shoichi. 2006. Decomposition and Identity. Doctoral dissertation, MIT.