WORD ORDER AND SCOPE: TRANSPARENT INTERFACES AND THE ¾ SIGNATURE*

Jonathan David Bobaljik and Susi Wurmbrand
University of Connecticut

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In this paper, we argue for three inter-related conclusions (which we will make more precise below):

i. There exist 'soft' constraints (economy conditions) that value a particular type of correspondence between LF and PF representations (for example, scope at LF matched by precedence at PF).

ii. These constraints are uni-directional: LF (broadly construed) is calculated first, and determines PF (surface word order).

iii. Scope rigidity (the apparent absence of QR) is not a property of languages, but of specific configurations, and the distribution of rigidity effects is (largely) predictable from independent variation in the syntactic resources of various languages (e.g., possibilities for scrambling). There is no ±QR parameter.

Conclusion (i) has been suggested often in the literature under a variety of names. It is in concert with assumption (ii) that we part ways with much of the existing literature. We argue that this combination of assumptions yields a 'signature effect', which we call the 3/4 signature. Taking one LF property (A scopes over or under B) and one PF property (A precedes or follows B), what we frequently find is that three of the four logical combinations are grammatical. We argue that this is precisely as expected, given the logic of the interaction of soft constraints under the general architecture envisaged here. Throughout the paper, we will largely focus on demonstrating that our proposals seem able to unify a range of seemingly disparate phenomena in the economy literature, and in at least some cases, appear to provide a more parsimonious account than standard models in which LF and PF are derived in parallel, or in which PF is determined prior to LF.

1. OVERVIEW

It is often held that there is a correlation between "free" word order and scope rigidity. Languages, like English, which have a fairly limited array of word order permutations in the syntax, allow a range of "covert" scope shifting operations, such as QR. On the other hand, languages like Japanese and German are often said to "wear their scope on their sleeves"—quantifiers in typical examples may take scope no higher than their surface position. A paradigm

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example of this contrast is given in (1)—inverse scope among the quantified DPs is possible in English, but not in Japanese. One way of thinking about this contrast is to relate it to the independent difference that Japanese "freely" allows scrambling, which reverses the order of the DPs on the surface—and the scrambled sentence allows the object to scope over the subject (1c).[1] In other words, inverse scope in (1b) is blocked by the availability of (1c), which is a more transparent reflection of the scope. QR is possible in this context in English, precisely because English lacks scrambling.

(1) a. *Some toddler read every book.* $\exists \text{»} \forall$; $\forall \text{»} \exists$

b. *dareka-ga* *subete-no* *hon-o* *yonda* [Kuroda 1970]
someone-NOM all-GEN book-ACC read
'Someone read all the books.' $\exists \text{»} \forall$; $*\forall \text{»} \exists$

c. *subete-no* *hon-o* *dareka-ga* *yonda*
all-GEN book-ACC someone-NOM read
'Someone read all the books.' $\forall \text{»} \exists$ possible

One of our aims in this paper is to flesh out this line of analysis, and to defend it against alternatives. To our knowledge, although the view just sketched is frequently informally invoked, many hurdles to successful implementation exist. We will not be able to address them all here, but hope to shed light on some, while at the same time calling attention to what we see as the major remaining hurdles. The paper is organized as follows. We begin by setting out the basic proposal, and then examine some cases that illustrate the workings of the machinery, reanalyzing a variety of data from the literature from the perspective presented here. In section 4, we contrast our proposal with a related framework (Reinhart's *Interface Economy*) which explicitly rejects one of our crucial assumptions. We show that the view presented here provides a more parsimonious account of the same range of data, using a proper subset of the assumptions in the alternative. Finally, we note what work remains to be done.

Before proceeding to the meat of the paper, we take a moment to note a few prima facie reasons for exploring this general direction, as opposed to the most common alternative, which is to derive scope relations in German/Japanese-type languages directly form the surface structure (see for example Frey 1989, 1993, Lechner 1996, 1998a, 1998b, Krifka 1998, Huang 1982; Hoji 1985, Aoun and Li 1993). There are both methodological/conceptual reasons and empirical reasons for pursuing an economy account over a surface structure scope account. Perhaps the most obvious of the former is that the postulation of surface structure scope account for German/Japanese merely restates the problem: in some languages, scope is determined at surface structure, in others at LF.[2] Clearly, this view is to be invoked only if the difference cannot be

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[1] We do not discuss 'long' (i.e., inter-clausal) scrambling here. Long Scrambling in Japanese has different properties than short (clause-internal) scrambling. Long Scrambling is often described as semantically vacuous, for example unable to reverse the order among quantifiers in different clauses (this is sometimes referred to as radical reconstruction). This is known to be an oversimplification—the more accurate generalization appears to be that a long scrambled DP cannot be interpreted in the highest clause; but it may reconstruct only part-way down, being interpreted in any of the intermediate positions it moves through. See, e.g., Saito (2003), Otaki (2007) and references therein.

[2] Alternatively, to avoid this kind of QR-parameter, it has been proposed that scope is always determined at surface structure, even in languages like English, and that scope ambiguity in subject-object contexts arises due to the

deduced from some independent point of variation among the languages, and is thus a position of retreat. More importantly, on the empirical side it is simply incorrect (so far as we know) that there are *languages* that are strictly rigid in their scope, i.e., in which scope always corresponds to the surface structure. Certainly, this is not true of languages that are frequently described as 'scope rigid'. Thus, both Japanese and German allow scope reconstruction, providing for a scope that is distinct from the surface hierarchical representation and requiring the stipulation that traces 'count' for the computation of scope. Japanese examples with the structure of (1c) can be shown to be ambiguous (i.e., with suitable replacement of quantifiers to avoid methodological issues having to do with entailments among readings). In addition, even within languages described as lacking QR in contexts such as (1b), raised readings for quantifiers are available in other contexts. This is shown for German in Sauerland (2000, 2001, 2005), Sauerland and Bott (2002), and elsewhere. Contexts in which inverse scope is available in Japanese are discussed in Goro (2007). We return to such contexts briefly below—for a fuller treatment of German scope facts within the perspective pursued here, see Wurmbrand (2008).

2. SCOPE TRANSPARENCY

Our first claim is that UG includes an economy condition which favours isomorphism between LF (scope) and PF (linear order) representations. We will dub this *ScoT* (for Scope Transparency). Similar ideas have been proposed in a variety of forms, see Pesetsky's (1989) *Earliness Principle,* Bobaljik's (1995, 2002) *Minimize (PF:LF) Mismatch*, Diesing's (1997) *Scope Principle,* Müller's (2000, 2002) *Shape conservation*, and the general frameworks of Williams (2003), Reinhart (2005) and Broekhuis (2008). The general idea is not new, but we will depart from many of these authors in the way in which we attempt to cash in on the idea, in particular in conjunction with the assumption, encoded here, that the principle is asymmetric, regulating the choice among PFs relative to a given LF.

(2) *Scope Transparency* (ScoT):

If the order of two elements at LF is A»B, the order at PF is A»B.

We use the symbol » to represent the canonical manifestation of hierarchical order at the relevant level; roughly scope at LF (we will expand this below to encompass information structure notions), and linear precedence at PF (with some qualifications to follow).[3] Two further points to note about this formulation of *ScoT* are (i) that it is asymmetric – requiring the PF to reflect LF, but not vice-versa (we return to this in section 4, below), and (ii) that we take this to be universal, and not a matter of parametric variation. Language variation, in our view, arises due to the violable ("soft") nature of economy conditions—ScoT must be satisfied whenever possible, but may be overridden by other constraints. It is variation in the inventory of other constraints among languages—in the best case independently detectable—that yields variation in the distribution of

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presence of a subject trace below the object (see, for instance, Hornstein 1995). However, this approach, while avoiding a QR-parameter is still faced with the basic question of how German-type languages differ from English-type languages—i.e., one would need to find motivation for the claim that German lacks traces in places where English does have traces.

[3] For all of the examples we will consider, it will suffice to consider » at PF to indicate linear precedence, though we assume that the relationship mapping syntactic c-command to linear order is more complex.

scope rigidity effects. In other words, the appearance of scope rigidity is the "most economical" state of affairs, but scope rigidity effects will or will not emerge in specific configurations in particular languages as a function of the general syntactic resources of each language.

By way of illustration, let us return to the paradigm scope rigidity contrast, as in (1a-b). We will walk through the next tables in some detail, in order to provide a feel for the logic that will run throughout the rest of the paper, and also in order to illustrate notation conventions we will use in more complex examples below. It should be kept in mind that the core point of Tables 1-2 is simply this: ScoT is respected when the LF and PF "match" and violated otherwise; however, the violation is tolerated (as in English) when it is not otherwise possible for word order to faithfully reflect a particular scope relation.

We begin with a scope rigid language such as German or Japanese (see Table 1). Let A and B stand for two scope-bearing elements (in this case, quantified DPs), where A c-commands B in the base order (in this case subject » object).[4]

T 1: German/Japanese	LF	PF	ScoT
✓	A»B	A»B	✓
* (QR)	B»A	A»B	*
✓	B»A	B»A	✓
[See below]	A»B	B»A	*

In the simplest case (first row of Table 1), the scope relations reflect the base order among the elements A»B. If there is no movement, then the PF order directly mirrors the LF relation and ScoT is respected. (The marks in the first column represent the relevant judgments, those under the ScoT column represent satisfaction/violation of the economy condition).

The second row of Table 1 evaluates an attempt at a derivation with QR. Recall that in our view QR is available in principle in German and Japanese (there is no ±QR parameter) and thus the derivation must be considered. In this row, there is no overt reordering (PF is A»B) but the scope order (LF) is B»A. Such a mismatch between LF and PF is in violation of ScoT, and indeed, is (normally) judged unacceptable in these languages. Descriptively, ScoT in this case appears to amount to the absence of QR. The third row of the table represents scrambling of the object across the subject (1c). The overt order is the inverse of the base order, and the LF corresponds to the "inverted" PF (B»A). ScoT is respected, and the sentence is judged acceptable on this reading. The final line of Table 1 involves overt movement (PF: B»A) with reconstruction (LF: A»B). Reconstruction of overt movement violates ScoT. We set aside the

[4] It seems prudent to note at the outset that, although we find tables a convenient means of representing constraint interaction and the computation that evaluates competing representations/derivations, we do not intend to imply a commitment to a theoretical framework such as Optimality Theory (OT). In particular, we do not invoke alternative rankings of constraints as a theory of language variation, nor do we commit ourselves to the relevance of all constraints in all languages, or the absence of hard constraints, or any of various other tenets of OT. Clearly, our proposals can be expressed within such a framework, but we choose to remain agnostic about these devices to the extent possible—our results are intended to be compatible with the *Economy* framework (Chomsky 1991 et seq), where what is sufficient is the postulation of violable conditions, that may, in principle, come into conflict with one another. In the *Economy* writings, Chomsky posited various economy conditions, which are soft by definition, but writings within the framework at the time did not generally explore the potential for constraint interaction and the resolution of conflicts among competing economy conditions.

issue of reconstruction here. A more extended treatment of reconstruction in German and Japanese as it intersects with ScoT is presented in Wurmbrand (2008). The conclusion presented there, extending results from Lechner (1996, 1998b), is that, despite superficial appearances, syntactic (LF) reconstruction is indeed unavailable in German and Japanese A-scrambling, as we predict, but that this is masked by the availability of semantic reconstruction (i.e., the interpretation of the trace as a higher-type). Furthermore, reconstruction in A'-scrambling is shown to interact with information structure, which, as we will see below, can balance out a ScoT violation.

Having shown how ScoT enforces scope rigidity, let us turn now to English (Table 2).

T2: English	LF	PF	ScoT
✓	A»B	A»B	✓
✓	B»A	A»B	*
Not possible	B»A	B»A	✓
Not possible	A»B	B»A	*

The first line of the table is as above: no overt movement and surface scope. Consider now the second line of the table—no overt movement, but QR applies yielding inverse scope. Clearly, this violates ScoT, just as much as it did in German and Japanese, but in contrast to those languages, an inverse scope reading in an English sentence of this form (1a) is acceptable. What is relevant to the account is the last two lines. English lacks scrambling and thus has no neutral way (we return to this immediately below) for PF to provide the B»A order overtly. We therefore shade these lines of the table. For this reason, although the QR derivation (second line) violates ScoT, this derivation is the only means (all else being equal) of representing the B»A scope. The violation of ScoT is thus tolerated, indeed forced.

The outcome of this reasoning, to repeat, is that in general free word order does indeed correlate with scope rigidity, but that scope rigidity (the absence of QR) hinges crucially on the syntactic possibilities (competing derivations) given a particular input (numeration), and thus scope rigidity is expected to characterize particular syntactic configurations, not (necessarily) languages as a whole.[5] In what follows, we will illustrate the interaction of ScoT with other

[5] Goro (2007:85-87) briefly considers, and rejects, a view like ours which ties the availability of inverse scope to the blocking effects of a competing derivation (Goro suggests a pragmatic version). Goro rejects the approach on two points. The first is the apparent availability of scope reconstruction in putatively scope rigid languages. For German and Japanese, this objection is addressed, and mooted, in Wurmbrand (2008). The second objection that Goro raises is the observation that inverse scope (QR) is apparently available in Japanese, even in some contexts where scrambling is also available. Crucially, in our view, Goro does not consider anything beyond (the equivalent of) ScoT. Most of the current paper is devoted to showing how this constraint interacts with other considerations to yield more subtle predictions, among them, examples in which scrambling is prima facie available, but covert scope shifting is also available, due to some additional factor (such as topic-focus order) favouring an unmoved order; see (13)b for a case in point from German, and additional extended discussion in Wurmbrand (2008). Note that all examples that Goro provides showing inverse scope between two quantifiers in Japanese also involve a verb which is (arguably) scope bearing, and whose contribution to the derivation is not taken into account. At this point, more work is needed to determine whether Goro's specific examples constitute a problem for our approach. What is clear from Goro's work, and consistent with the main thrust of our argument here, is that scope in Japanese, like German, is indeed not rigid, and that a variety of factors come into play in determining whether and when inverse scope is available.

syntactic considerations. In addition, we will broaden the relevant notion of LF to encompass not only scope relations but also information structure relations such as Topic and Focus. At that point, ScoT will become somewhat of a misnomer (since these notions are not about scope), but we will continue to use the term to stress (what we see as) the uniform nature of the relevant economy condition.

2.1 The scope of ScoT

At this point, there are a variety of frequently asked questions to consider. We will make a few brief qualifying remarks, but postpone extended discussion of these points.

First, we have already noted that ScoT (like a hypothetical Rigidity parameter) does not distinguish between QR and reconstruction, yet the judgments reported for languages such as German and Japanese do draw such a distinction. We will leave reconstruction aside in this paper, and refer the reader to the discussion of German and Japanese reconstruction from the ScoT perspective in Wurmbrand (2008).

Second, ScoT is not intended as a replacement for the various other conditions restricting QR (and other scope shifting operations). We assume that QR is still subject to a variety of (hard) constraints (islands, clause-boundedness, additional constraints on specific quantifiers, etc). For example, just because overt movement of some element B across some other element A is impossible does not (under our reasoning) entail that inverse scope will be possible. In (3a), inverse scope is impossible among the quantified DPs, even though scrambling is unavailable. The impossibility of inverse scope is unrelated to ScoT in this case, and is instead due to the fact that the universal is embedded in an island out of which QR is impossible (cf. the impossibility of overt movement in (3b)).

(3) a. *A doctor will examine the suggestion that we sedate every new patient.* $*\forall»\exists$
b. **Which patients will a doctor examine the suggestion that we sedate* t?

Put differently, ScoT is an economy condition regulating choices among convergent derivations. ScoT rules out QR in certain constructions (i.e., when there is a more economical alternative) but does not 'rule in' bad derivations (cf. standard locality on QR). Relatedly, ScoT determines whether in a particular configuration, a certain scope relation is possible *in principle*. ScoT does not regulate aspects of quantifier scope, such as language specific restrictions on whether a particular (type of) quantifier can undergo QR or reconstruction (see, e.g., Lechner 1998b, Pafel 2005 for additional restrictions in German).

Third, we call the reader's attention to the importance of various qualifications about alternative word orders being "freely" available. Our paradigm rigidity contrast was derived from the impossibility of scrambling in English, but of course, there are various other means by which the (underlying, thematic) object may come to precede the (thematic) subject, for example, by topicalization (4b) or passive (4c).

(4) a. *Every detective interviewed exactly two suspects.* $\exists»\forall$; $\forall»\exists$
b. *Exactly two suspects, every detective interviewed.* PF: B»A
c. *Exactly two suspects were interviewed by every detective.* PF: B»A

Our account of the availability of QR in English in examples like (4a) relied crucially on the lack of a PF order that was faithful to the inverted LF B»A. For this to work, there must be some principled reason whereby (4b,c) do not qualify as competing alternatives in the way that scrambling does (in German and Japanese). At this point, we do not have a definitive answer, but we believe that, in particular for passive, what is relevant here is the role of a numeration (or something similar) in restricting the appropriate reference/comparison set. In line with much work in the *Economy* framework, we assume that economy conditions only evaluate competing derivations from the same numeration (input), and thus that corresponding active and passive sentences will simply not compete with one another. For passive, this is fairly straightforward as the morphology relatively clearly supports the idea that the two derivations start from different numerations. For topicalization in English, we will need the assumption (which me make use of throughout the paper) that information structure (topic, focus) is part of LF in the relevant sense, and thus that topicalization structures have a different LF than counterparts without topicalization. This will ensure that (4a) and (4b) do not compete. For now, we beg the reader's indulgence in granting that scrambling is "free" in a way that topicalization is not (this intuitive difference is routinely asserted in the relevant literature), and we will return briefly to the question of how topic and focus structure interacts with scope later in the paper.

3. SCOT AT WORK — THE ¾ SIGNATURE

With the understanding of ScoT (and qualifications) presented above, we are now in a position to look at the interaction of our proposed economy condition with other economy conditions, and to present one of the major reasons for thinking that something like this may indeed be on the right track. In this section, we will present four data paradigms which share the property that, given two LF choices and two PF choices, three of the four logical combinations are judged acceptable. We argue that this is precisely what is expected if ScoT is a soft constraint and interacts with other economy conditions. Specifically, given a particular LF representation and two competing PF representations, if ScoT and the other condition align, respecting both is more economical than violating both, and there will be a pair-wise grammaticality contrast. On the other hand, if ScoT and another condition impose conflicting requirements such that no single PF can simultaneously satisfy both conditions, we expect (all else being equal) a tie: both PFs will be possible expressions of the LF in question. Note that the examples considered will provide key support for the claim that the LF:PF isomorphism condition (ScoT) is asymmetric and gives LF a privileged status. PF representations compete to find the best expression of a given LF, not the other way around (contrast, e.g., Bobaljik, 1995, Reinhart 2005). As before, we start schematically, and then proceed to increasingly more complex examples.

3.1 Evidence for ScoT—¾ Signature effects

Table 3 illustrates schematically an example of the ¾ signature effect. As above, the first column represents the actual (reported) judgments, and A and B stand for two relevant elements, where the base order is A»B. There are two ways of looking at such a paradigm. If we take the PFs first, we would describe this paradigm by saying that one PF (A preceding B) is ambiguous (a., d.) while the other (B preceding A) is unambiguous (b. vs. c.). This is the manner in which such paradigms are standardly described (see below). What we wish to emphasize here is an alternative perspective, where one looks at two possible LFs first. Within the relevant paradigm, one LF (B»A) can be expressed by either of two PF representations, where the other LF (A»B) can only find phonological expression in one way. Note, of course, that either way of looking at things provides a prima facie challenge to ScoT: if the syntax allows for overt movement (of the relevant kind) of B across A, then ScoT would appear to predict that only two LF:PF pairings are possible—those that are faithful to one another. So why is one mismatched representation allowed, but not the other?

T 3		LF	PF	ScoT
a.	✓	A»B	A»B	✓
b.	*	A»B	B»A	*
c.	✓	B»A	B»A	✓
d.	✓	B»A	A»B	*

Our answer is that in such cases ScoT interacts with some other economy constraint (we will specify what this is in each case below). In the schematic example here, we could consider the effects of an additional constraint which privileges the A»B order at PF, independently of scope considerations, for example, something as simple as a condition which disfavours overt movement, call it *MOVE. The constraint interaction is schematized in Table 4. Recall that (although we are borrowing some constraint names from the OT literature) we crucially do not adopt any ranking among these economy conditions.

T 4		LF	PF	ScoT	*MOVE
a.	✓	A»B	A»B	✓	✓
b.	*	A»B	B»A	*	*
c.	✓	B»A	B»A	✓	*
d.	✓	B»A	A»B	*	✓

It is essential to this account that there are two, independent, pairwise competitions, anchored to a given LF representation. That is, the LF representation constitutes the input, and the "best" PF representation is chosen to realize it (cf. Pesetsky 1998, Broekhuis 2008).[6] In the competition to express the scope relation A»B, two PF representations are considered: A»B and B»A (T4, lines a-b). In this case, ScoT and *MOVE both favour the same representation, and there is a clear winner and a clear loser. However, in the case of the scope B»A (lines c-d), neither PF simultaneously satisfies both conditions. ScoT can be satisfied at the expense of *MOVE, or overt movement can be avoided at the expense of requiring QR. As we will see below, in exactly such configurations, both LF:PF pairings are acceptable. The logic we have developed here thus predicts that in situations of (potential) constraint conflict, if ScoT privileges LF over PF, we will find paradigms in which exactly three of the logical possibilities are in fact grammatical, while one is excluded. And that is indeed what we find. Note that the effect emerges only if, as we have suggested, ScoT regulates the choice of PF to express a previously given LF. If the competition were to take the PF as given, and assign an appropriate LF (as in Reinhart's 2005 *Interface Economy* model, which we discuss further below), then only two of the four combinations would be predicted to be acceptable, not three (the reader can verify this by pairwise comparison of lines a. and d. (a. would win), and b. and c. (c. would win). Similarly, if

[6] Our approach is therefore most compatible with theories in which PF spells out the LF representation (Brody 1995, Bobaljik 2002) as opposed to more traditional "Y" models in which PF and LF are each derived from a common, but more abstract, level of S-structure.

ScoT simply valued matching and the reference set for the competition included all four pairings, then the expectation would be that only a. would be acceptable, as it is the only pairing that simultaneously satisfies both constraints.

At this point, we turn to examples of the ¾ signature effect.

3.2 'There' insertion

Our first example is taken from the discussion of *there*-insertion in English in Bobaljik (2002), a precursor to the line of analysis we are generalizing in this paper. As is well known, an existentially quantified DPs in a raising construction may scope above the raising predicate (itself a scope-bearing element), or it may reconstruct beneath *seem*.[7] The PF in (5a) is ambiguous. On the other hand, if raising fails to apply and expletive *there* occupies the matrix subject position (as in (5b)), the scope relations are unambiguous, and the existential quantifier can only be interpreted beneath the raising predicate. This is particularly surprising in light of the fact that English normally allows QR, and that if anything, existentials tend to be somewhat freer in having wide scope than other quantifiers. Why is that disallowed in (5b)?

(5) a. *Someone from NYC seems to be at John's parties.* $\exists$»*seem*; *seem*»$\exists$
b. *There seems to be someone from NYC at John's parties.* *$\exists$»*seem*; ^{OK}*seem*»$\exists$
c. **Seems to be someone from NYC at John's parties*

The account suggested in Bobaljik (2002) is predicated on the further observation that English respects the "classic" EPP. That is, it is a language-particular property of English that the finite subject position must be overtly filled.[8] As the constraint refers to phonological overtness, this must be a condition on PF representation, and not the "narrow" syntax. As (5c) demonstrates, the EPP is a hard constraint in English – violation leads to ungrammaticality. Now, English offers two possibilities for "repairing" or avoiding an EPP-violation, one is overt movement, the other is insertion of a dummy-element, the expletive *there*. Crucially, we assume that *there* is not part of the (syntactic) numeration, but is inserted at PF, to satisfy the EPP (compare CP-expletives in languages like German and Icelandic, which are inserted to satisfy another PF-condition, the verb-second requirement). We make the familiar assumption that insertion of an expletive is "costly", a matter of "last resort", and express this by means of the economy condition in (6):

(6) DEP (Economy Condition): Don't insert Expletive Pronoun

With *DEP* now in our arsenal, we have two economy conditions to consider, *DEP* and *ScoT*. Table 6 schematizes their interaction. Again, as with Table 4, following our hypothesis that competition regulates the choice among PFs for a specified LF, there are two pair-wise comparisons to make, and the table is just like Table 4. Note of course that failure to insert *there* in b. and c. will cause a fatal EPP violation, and PFs with an empty subject position are thus not considered (recall that economy conditions only evaluate convergent derivations).

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[7] Examples here do not control for the full range of interfering factors, such as equivalences among certain readings; see the literature cited, especially Fox (1999), for more careful establishment of this point.

[8] See Wurmbrand (2006) for renewed arguments that this is indeed a point of cross-linguistic variation, even within Germanic, and that the EPP is not universal

T 4: English raising		LF	PF	ScoT	DEP
a.	✓	∃»*seem*	∃»*seem*	✓	✓
b.	* (QR)	∃»*seem*	*there seem*»∃	*	*
c.	✓	*seem*»∃	*there seem*»∃	✓	*
d.	✓ (reconstruction)	*seem*»∃	∃»*seem*	*	✓

For the wide-scope of the existential, there is only one possibility—the PF corresponding to overt movement (no expletive). This PF satisfies both ScoT and DEP. On the other hand, narrow scope yields a quandary. The syntactic resources of English permit the DP to remain in situ, satisfying ScoT, but this requires a costly expletive to occupy the subject position. On the other hand, overt movement in order to satisfy the EPP avoids the need for an expletive, but the cost is a ScoT violation: a PF that is non-transparent with respect to scope relations. The result: both are possible (neither is more economical than the other). These are indeed the facts, as laid out in (5). Keep in mind, again, that our presentation of the observations started with the overt strings (PFs), but our analysis of the account starts from the LFs. A given PF is "ambiguous" only in the sense that it happens to be the legitimate outcome for more than one LF.

There is undoubtedly far more to say about English raising and expletive constructions, and we would be surprised if the choice between c. and d. (in table 6) for the representation of narrow scope turned out to be "free".[9] We proceed on the assumption that adding additional factors (topic-focus structure, etc) into the picture presented will pose no special challenge for our account, as opposed to competing accounts.

3.3 English focus and HNPS (Williams 2003)

Consider now one aspect of the interaction of Heavy NP Shift and focus in English. Williams (2003:34) presents the following paradigm. What is of particular interest to us is that there are two variables to consider: in terms of overt order, the DP object may either precede or follow the PP, and in terms of information structure, either the DP or the PP may be (or include) the focus. Of the four possibilities, exactly three are acceptable. Sound familiar?

(7)	a.	*John gave to Mary all of the money in the SATCHEL.*	HNPS
	b.	**John gave to MARY all of the money in the satchel.*	*HNPS
	c.	*John gave all of the money in the satchel to MARY.*	no HNPS
	d.	*John gave all of the money in the SATCHEL to Mary.*	no HNPS

As Williams notes, one account that can be immediately set aside would be an account treating HNPS as an obligatory operation placing focus in final position. The pair (7a) vs. (7d) shows that, with focus held constant, HNPS is optional; the constituent containing the focus need not be final, and thus (7b) cannot be excluded simply because focus is non-final. Williams argues that there is indeed a desideratum in English that focus be final, but that this is not an absolute requirement. HNPS may apply, altering the canonical order (DP»PP), but only when application

[9] Note for example the relevance of our assumption, contrary to OT, that not all constraints are active in all languages; the hypothetical *MOVE used for illustrative purposes above cannot be a part of this competition, else it would serve as a tie-breaker (no mater how lowly ranked), yielding incorrect results.

of HNPS yields a better focus representation. In Williams's theory, there are various levels of representation, among which are a level of focus structure (FS) in which the Focus should be at the right periphery (in English), and a level of Case Structure (CS) in which a DP argument should precede PPs within the VP. The comparison of (7a) and (7d) shows an inherent tension: when the DP argument contains the focus, it is impossible for surface structure to be faithful to both FS and CS simultaneously, and optionality emerges. On the other hand, (7b) is faithful to neither FS nor CS, and this order, with focus as indicated, is excluded.

Williams's account finds a straightforward translation into our terms, if we allow for a broadening of our notion of LF to include a representation of (topic and) focus; we will designate the relevant representation LF_{IS} (for Information Structure, taking no stand just yet on how the representations for scope and information structure are related to one another). We contend, following Williams, that one aspect of (English) LF_{IS} is that the relation X»FOC obtains, whatever "»" means at this level of representation.[10] With this assumption, ScoT then fulfills the role of an SS:FS faithfulness condition, in Williams's terms: the more optimal PF representations are those in which the focus constituent is final. What, then, of the SS:CS faithfulness condition? The substantive content of this condition is to favour the order NP » PP within the VP, work that was done by Case Adjacency in early GB models (compare also languages like French, in which this condition is also readily observed). Pending deeper understanding, we simply stipulate the observation as a condition that "Canonical Complement Order" (CCO) be respected. HNPS in our terms is thus a "free" movement (like scrambling)—it is not feature-driven or required for convergence—but it is costly, as it violates this economy condition. Leaving the DP object in its base position is preferred, all else being equal. Table 7 shows how Williams's intuition is now recast in our system. As with the previous discussions of ¾ signatures, there are two pair-wise competitions, taking a particular $LF_{(IS)}$ as input, and regulating the choice among competing PFs, relative to two economy conditions. Where the conditions align, there is a winner and a loser, but where the conditions conflict, optionality emerges.

T 5: English HNPS & focus		LF_{IS}	PF	ScoT	CCO
(7)c	✓	NP » PP [FOC]	NP » PP [FOC]	✓	✓
(7)b	* (HNPS)	NP » PP [FOC]	PP [FOC] »NP	*	*
(7)a	✓ (HNPS)	PP » NP [FOC]	PP » NP [FOC]	✓	*
(7)d	✓	PP » NP [FOC]	NP [FOC] » PP	*	✓

[10] This is a lacuna in Williams account, and thus in ours. For Williams, it appears that he intends Focus Structure to have a linear order, so that one may speak of the focus constituent as being final at FS, even when it is not final in the surface string. Alternatively, we might take » to be a notion derivative of constituent structure (i.e., c-command) which would amount to the claim that a focus may be contained in a topic constituent, but not vice versa. This view will play an important role in our adaptation of Neeleman and van de Koot (2008), below, and constitutes one reason why we invoke an isomorphism condition here (ScoT) rather than positing a more direct PF economy condition: focus-final (though that would certainly work for the cases at hand). Our approach raises non-trivial questions about the interaction of constituency in cases where IS and LF (scope and binding) conflict. We also do not discuss here the interaction of these constraints with focus projection, and why, for example, HNPS in (7a) obligatorily pied-pipes the whole DP when only SATCHEL is in focus. See section 4.2 for some remarks on focus projection within the system outlined here.

3.4 Dutch A'-Scrambling (Neeleman and van de Koot 2008)

In the preceding section, we were not particularly specific about the nature of focus, as a rather loose sense was sufficient to make our point. It behooves us, in extending the program further, to be more careful with notions such as focus and topic. As it happens, in doing so, we find yet another range of data in the literature which we may rather straightforwardly recast in our terms, and in which yet another ¾ pattern emerges. The domain of interest is A'-scrambling in Dutch, as presented in Neeleman and van de Koot (2008; henceforth NvdK).

NvdK argue that a particular sense of topic and focus is important to an understanding of word order variation in Dutch.[11] For focus, it will suffice for present concerns to take the focus in a question:answer pair to be the constituent in the answer that corresponds to the *wh*-operator in the question. There may, but need not, be additional material that signals (certain sub-types) of focus, such as *even* (for scalar focus) or *only* (for contrastive focus).

The relevant notion of topic is narrower than often used in the literature; in particular, simple givenness (old information) is not sufficient for a DP to count as a topic in the sense needed to understand scrambling patterns. Rather what is needed is a shift in topic – a DP counts as a topic in this sense if it either narrows or otherwise changes the current discourse topic. One context that makes this usage clear is in question answer pairs where the responding party answers a different question than the one posed, shifting/changing the topic in the process (see Büring 1997a, 1997b, 2003). Note that a further useful diagnostic of topichood is that a topic DP cannot be substituted for by a negative quantifier.[12] These notions can be illustrated in the following mini-dialogues (all data in this section from NvdK). The example in (8) sets up a baseline.

(8) A: *Hoe zit het met FRED? Wat heeft HIJ gegeten?*
'What about Fred? What did he eat?'

B: *Nou, dat weet ik niet, maar...*
'Well, I don't know, but...'

a.	*ik*	*geloof*	*dat*	[*Wim*]$_T$	[*van de BONEN*]$_F$	*gegeten*		*heeft*
	I	believe	that	Wim	from the beans	eaten		has
	'I believe that Bill has eaten from the beans.'							
b.	*#ik*	*geloof*	*dat*	[*van de BONEN*]$_F$	[*Wim*]$_T$	t_F	*gegeten*	*heeft*
	I	believe	that	from the beans	Wim	t	eaten	has

[11] One may clearly dispute the validity of the NvdK notions, and/or use different terminology to describe them. Our goal here is to show that the NvdK data are amenable to an analysis within our general framework, preserving their key insights, and not to argue the pros and cons of the subtleties of competing diagnostics of topic and focus. See NvdK and references therein for relevant discussion.

[12] In addition, NvdK refer to intonational clues to focus structure: a contrastive focus is marked in Dutch (as in English) by a so-called A-accent (Jackendoff 1972) consisting of plain high tone (H*), often followed by a default low tone (see Büring 2003 among others). A topic bears a B-accent (Jackendoff 1972), maximally realized as L+H* followed by a default low tone and a high boundary tone (L H%).

The focus is the constituent that answers the *wh*-word in the question, in this case, *the beans*. Speaker A's lead-in to the question establishes *Fred* as the discourse topic and asks what he ate. B's response changes the topic to *Wim* (and thus answers a different question, namely what Wim ate). In this context, NvdK report that scrambling of the object across the subject is infelicitous.[13]

The dialogue in (8) should be contrasted with the one in (9). As linear strings, the sentences in (9a-b) are the same as those in (8), but the context has been changed, and the judgments are accordingly different. In this case, the subject in the response answers the *wh*-question, where it is the object that marks a change in topic. In contrast to (8b), scrambling in this context is acceptable, but notably, not obligatory. In sum, of the four possible pairings of word order to context in (8)-(9), exactly three are acceptable.

(9) *Hoe zit het met de SOEP? Wie heeft DIE gegeten? Nou, dat weet ik niet, maar...*
'What about the soup? Who ate that?' 'Well, I don't know, but...'

a. *ik geloof dat [WIM]*$_{\mathrm{F}}$ *[van de bonen]*$_{\mathrm{T}}$ *gegeten heeft*
I believe that Wim from the beans eaten has
'I believe that Bill has eaten from the beans.'

b. *ik geloof dat [van de bonen]*$_{\mathrm{T}}$ *[WIM]*$_{\mathrm{F}}$ t_{T} *gegeten heeft*
I believe that from the beans Wim t eaten has
'I believe that Bill has eaten from the beans.'

NvdK argue that this paradigm is representative of A'-scrambling in Dutch generally, and propose the following account. They assume that information structure representations are hierarchical, with the complement / sister of a focus interpreted as a background (relative to that focus), and the complement of a topic interpreted as its comment. This is shown in (10a).[14] NvdK claim moreover that focus-background structures can be part of a comment, but topic-comment structures cannot be embedded in a background, hence the representation in (10b) is ill-formed.

(10) Information structure.

a. topic [$_{\mathrm{COMMENT}}$ FOCUS [$_{\mathrm{BACKGROUND}}$ ...]]
b. ***FOCUS [$_{\mathrm{BACKGROUND}}$ topic [$_{\mathrm{COMMENT}}$ ...]]**

NvdK next propose a pair of mapping rules, that interpret A'-movement structures. With reference to the structure in (11a), the two rules are given in (11b-c). Note that a crucial

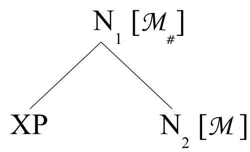
---

[13] Dutch has two operations that move DPs in the clause, both discussed under the rubric of *scrambling* in the literature. One shows A-properties and the other A'-properties. Only the latter, A'-movement, permits the reordering of DPs, thus the movement of the object across the subject in (8b) must be an instance of A'-scrambling. Some authors reserve the term 'scrambling' for the A' operation, calling the A-movement *object shift*. For general discussion of Dutch in this regard, see Neeleman (1994) and Zwart (1993).

[14] NvdK further assume that topics may iterate, but that the focus may not. This is not relevant to the examples considered here and is ignored for reasons of simplicity. Note that material in the background in the NvdK structure is more deeply embedded than the focus, which makes a straightforward extension of their hierarchical structure to the English cases discussed above difficult, without reference to linear order. See note 10.

assumption in the NvdK account is that the mapping rules in (11) only apply to movement structures. We will return to this below.

(11) a.



b. *Comment Mapping Rule*: If XP in a. is interpreted as topic, then interpret N_2 as comment.

c. *Background Mapping Rule*: If XP in a. is interpreted as focus, then interpret N_2 as background.

The facts are then accounted for as follows. Take first the (b) examples, which involve scrambling: In (8b) the moved XP *van de BONEN* 'from the beans' is interpreted as a focus, and thus the mapping rule (11c) applies, mapping the remainder of the clause to its right to the background. However, this background contains a (contrastive) topic, and that is disallowed (10b). The resulting structure is therefore ill-formed, with the topic-focus interpretation as indicated. Compare this to the same word order in (9b); there the moved XP *van de bonen* 'from the beans' is interpreted as a (contrastive) topic, and thus the mapping rule (11b) applies — the comment constituent contains a focus, and this is allowed under (10), hence in this context, the structure is well-formed. Why then is there no contrast in the (a.) examples? By stipulation, the mapping rules only apply to the output of A'-movement. When the word order is the base order, mapping rules fail to apply and there is no (relevant) constraint on the relative order of topic and focus. There must be some other means of mapping overt structure to information structure—in NvdK's account, mapping when there has been no movement is "free".

While we think that the account is on the right track, the specific implementation leaves open an important question: Why should the mapping rules care whether a particular structure is generated by movement or not? That is, why should there be two different mapping mechanisms, one for movement structures, an the other for structures without movement? Our perspective, like the approach of Williams (2003), provides an answer. The canonical (base) order among arguments is privileged in a particular sense. We assume that movement is "costly" and thus requires a motivation in order to offset those costs, an assumption we expressed above as *MOVE (cf. the idea of movement as a Last Resort in Chomsky's version of Minimalism). Movement is permitted when it provides a better reflection of some aspect of interpretation than the sentence would without movement. In the cases at hand, just as with the "satchel" examples discussed above, the topic-focus structure may or may not align with the canonical order. When the two are misaligned, movement provides a better reflection of the topic-focus relations, but the trade-off is a non-canonical, and thus costly, word order. Under our approach, such a trade-off generally results in the appearance of optionality. But in the case of (8b), there is no trade—movement is unmotivated, and hence disallowed.

Table 8 illustrates the NvdK paradigm from our perspective, in a manner we hope is now familiar. The derivation is entirely parallel to the English HNPS discussion above: the relevant LF notion here is Information Structure (where we adopt (10)—in our terms this would be written TOP » FOC), ScoT values faithfulness of PF to this structure, and A'-scrambling is "free" (not feature-driven or required for convergence), but costly (*MOVE). The now familiar ¾ paradigm emerges again. [15]

T 6: Dutch		LF_{IS}	PF	ScoT	*Move
(8)a	✓	A [TOP] » B [FOC]	A [TOP] » B [FOC]	✓	✓
(8)b	* (A'-scrambling)	A [TOP] » B [FOC]	B [FOC] » A [TOP]	*	*
(9)a	✓	B [TOP] » A [FOC]	A [FOC] » B [TOP]	*	✓
(9)b	✓ (A'-scrambling)	B [TOP] » A [FOC]	B [TOP] » A [FOC]	✓	*

3.5 Interim summary

At this point, we have considered three domains in which ¾ patterns emerge as the result of the interaction of ScoT with another economy condition. The examples and conditions invoked are summarized in the following table.

Construction	Hard constraints (not violable)	Soft constraints (violable)
German, Japanese scope rigidity	Locality of QR	ScoT
English subject movement	EPP	ScoT (Q-scope) DEP
English HNPS	LF_{IS}: […] » FOC	ScoT (information structure) *Move
Dutch A'-scrambling	LF_{IS}: TOP » FOC (universal?)	ScoT (information structure) *Move

Although we have contended that ScoT is doing the work in each case, we have used ScoT in two different, but related ways. On the one hand, we have used ScoT to value isomorphism between linear order and LF qua quantifier scope, and on the other hand, we have taken ScoT to enforce transparency with respect to LF qua Information Structure. The important question to ask, then, is whether there are really two isomorphism conditions (as in Williams 2003, whose theory has a variety of isomorphism conditions relating seven or so discrete levels of representation). Of obvious relevance is the interaction between quantifier scope and information structure, when both are at issue in the same sentences. This issue is investigated in a detailed study of German in Wurmbrand (2008), who concludes that we are indeed correct to posit a single constraint ScoT, that looks simultaneously at both information structure and a more traditional LF (scope and binding relations). The mater is complicated by a variety of factors, including interactions with intonation, the A/A' distinction, and especially a distinction between syntactic and semantic reconstruction, but as Wurmbrand shows, these can be controlled for, and

15 Williams's (2003:45-50) analysis of scope in Hungarian and its interaction with word order and focus, can also be seen as a ¾ pattern and can be readily translated into our system. We note, though, that Williams's account does not (so far as we can tell) cover all of the data points in Brody & Szabolcsi (2003), the source on which he draws. In light of this, we leave an exploration of Hungarian scope for future work.

the system sketched here seems to make delicate but apparently correct predictions even in some complicated examples. We present one representative paradigm here (as we will refer back to this example later), but in the interests of space, we invite the reader to consult that paper for additional facts and analysis. This paradigm illustrates the interaction of scope and information structure, from the ScoT perspective, but does not resolve the issue of whether this is one isomorphism constraint or two, tied ones.

The relevant paradigm is presented schematically in Table 7. Some of the judgments are rather subtle since it is fairly easy to make implicit accommodations to the context, that will alter the information structure (see also Neeleman and van de Koot 2008 for a discussion of the methodological hurdle of this topic-focus swap). Nevertheless, it appears on preliminary investigation that the contrast predicted in Table 7 is detectable in (12) vs. (13).

T 7: QR		**LF**	**IS**	**PF**	**ScoT**
(12)b	* (QR)	B»A	B [TOP] » A [FOC]	A [FOC] » B [TOP]	* [LF, IS]
(12)a	✓	B»A	B [TOP] » A [FOC]	B [TOP] » A [FOC]	✓
(13)b	✓ (QR	B»A	A [TOP] » B [FOC]	A [TOP] » B [FOC]	* [LF]
(13)a	✓	B»A	A [TOP] » B [FOC]	B [FOC] » A [TOP]	* [IS]

The first pair is presented in a context where the subject is in focus and the object the topic. When we consider the reading in which the existential is in the scope of the universal, there is a contrast in acceptability between the word orders, with movement of the object across the subject (12a) preferred.[16] This is a simple case of scope rigidity—in this case, the scope relation (B»A) and the IS relation (B [TOP] » A [FOC]) align with one another, and the PF that reflects these transparently wins (see the first two rows of Table 7).

(12) *Jetzt zu den Gedichten? Wer hat jedes Gedicht gelesen? Das weiß ich nicht, aber…*
Let's talk about the poems? Who read every poem? I don't know, but…
A [FOC]; B [TOP]
Intended scope: B»A

a. *jeden Roman* *hat* *mindestens ein Schüler* *gelesen*
every novel (B) has at least one pupil (A) read
'at least one pupil read every novel' ∀»∃

b. *mindestens ein Schüler* *hat* *jeden Roman* *gelesen*
at.least one pupil (A) has every novel (B) read
'at least one pupil read every novel' #∀»∃

However, if we reverse the alignment of topic and focus to subject and object, we are left with a scenario in which the PF cannot be simultaneously transparent to both the LS (scope) and the IS. ScoT will be violated no matter which PF is chosen. In precisely this context, both word orders are acceptable as a means to express the reading in which the focus scopes over the topic.

[16] The order in (12b) is acceptable with surface scope of the existential over the universal. This sentence only allows inverse scope in the context in (12) if the information structure is adjusted roughly to "I don't know the answer to your question, but if we are speaking of pupils…", i.e., when the subject (A) is turned into a topic. Needless to say that further research is necessary to find ways to better control for this interfering factor.

(13) *Jetzt zu den Studenten. Was hat mindestens ein Student gelesen? Das weiß ich nicht, aber…*
Let's talk about the students. What did at least one student read? I don't know, but…
A [TOP]; B [FOC]
Intended scope: B»A

a. *jeden Roman* *hat* *mindestens ein Schüler* *gelesen*
every novel (B) has at least one pupil (A) read
'at least one pupil read every novel' ∀»∃

b. *mindestens ein Schüler* *hat* *jeden Roman* *gelesen*
at.least one pupil (A) has every novel (B) read
'at least one pupil read every novel' ∀»∃, ∃»∀

Note importantly that (13) emerges, as we predict, as one environment in which QR becomes available in German. QR is licensed here under the ¾ effect logic: since scope and IS conflict, the surface order can only be faithful to one; when the surface order is faithful to information structure, inverse scope (in (13b)) is thereby permitted.

4. LF-FIRST

We have presented above a case for recognizing a signature pattern reflecting the interaction of two economy conditions. The distinctive pattern consists of paradigms in which three of four logical possibilities are grammatical. Crucial to our account of these patterns is the assumption that the choice of PF is relative to a particular LF. This is compatible with theories in which PF "spells out" LF (cf. Brody 1995, Bobaljik, 1995, 2002, Groat & O'Neill 1996, Pesetsky 1998), but is at odds with approaches that start from a given surface (i.e., overt) structure and determine the LFs available to it. Notable in this latter group is in Reinhart's (2005) *Interface Economy* model, with which we otherwise share a general perspective. We turn now to a comparison with that approach, and an attempt to defeat the arguments presented there in favour of a PF-first approach to economy computations. Reinhart discusses two operations in particular: QR and focus projection in English. We examine each of these in turn, arguing that neither provides a compelling motivation for taking the reference set to include varying LFs—the results can be directly implemented in a framework with our general architectural commitments.

4.1 Interpretive Economy and QR

Reinhart, drawing on Fox (1995) and Fox (2000), presents an economy model intended to account for some restrictions on QR in English. In Reinhart's model, competing derivations are evaluated relative to an economy condition that licenses QR only if it generates an interpretation distinct from the interpretations available without QR (cf. Fox's *Scope Economy*). Reinhart's model appears to conflict with ours, in that the *reference set* for the economy competition consists of a set of representations, each a pairing of a PF and an LF, where the PFs (overt structure) are held constant, and the LFs differ (specifically, as to whether QR has or has not applied). In our model, derivations with distinct LFs do not compete with one another—the ¾ signature effects would not arise (or not in the form that they do) if ScoT were not asymmetric, and LF-privileging.

Closer inspection though reveals the apparent conflict here to be an artefact of the presentation. Specifically, as Fox (2000) discusses, the real work being done by Scope Economy can be (or perhaps must be) done in the "narrow syntax." Scope Economy, on Fox's presentation, relates two stages in a possible derivation. It is a condition that applies locally during the course of a derivation, and determines whether or not a particular operation may apply at that point in the derivation. In a GB-style architecture, in which covert operations (including QR) necessarily apply after overt word order is determined ("Spell Out"), the Reinhart ordering is more or less forced—Scope Economy, even construed derivationally, will determine a choice among competing LFs derived from a shared surface structure. To the extent the determination of PF from surface structure is trivial, this amounts to a reference set with a shared PF and divergent LFs. The GB-architecture is, however, no longer the 'only game in town', and a variety of alternative models have been presented in which (some) covert movement may precede (some) overt movement. One way of implementing this ordering invokes the copy theory of movement, and treats 'covert' movement as regular syntactic movement, but where the lower rather than the higher) copy is pronounced (see Brody 1995, Bobaljik 1995, 2002; for arguments that QR works in this manner in English, see Fox & Nissenbaum 1999). By invoking the copy theory approach to covert movement, the Scope Economy paradigms may be carried over without change into the general architecture we propose here. The appearance of an incompatibility with Reinhart's framework in particular arises for the most part by taking the overt PF as a stand in for the level of representation (stage of derivation) immediately preceding QR, e.g., s-structure of the GB model. While this simplifies exposition, there is no compelling reason to incorporate this assumption into the theory. Without it, there is no conflict. In what follows, we spell out some details of this topic, and then note a real point of variation between our approach and the Fox-Reinhart approach, presenting preliminary results which we believe indeed go our way.

4.1.1 Scope Economy

Paradigm cases illustrating Scope Economy are examples such as the following (see Fox 2000):

(14) a. *A doctor will examine every patient.* (ambig)
b. *A doctor will examine every patient, and Lucy will, too.* (unambig)

Example (14a) shows a typical case of QR (in English) where an inverse scope reading is available.[17] However, a puzzle originally noted by Sag (1976) and Williams (1977) is that the inverse scope reading available in (14a) disappears when this sentence forms the first part of a (certain type of) ellipsis structure, as in (14b). Fox's account of this paradigm has two pieces. The first is a(n inviolable) *Parallelism* constraint, requiring that the scope relations in the two conjuncts track one another. This is independently necessary, as (15) shows. This sentence is ambiguous, but only in 2 of 4 possible ways. If the universal takes scope over the existential in the first conjunct, then the universal must also be interpreted as taking scope over the existential

[17] In our discussion of Fox and Reinhart's proposals, QR is taken to mean those instances of Quantifier Raising that are not required by the grammar, for example, to resolve type mismatch for a quantifier in object position. As Fox notes throughout, it is important to keep these types of QR distinct, and Scope Economy constrains only 'optional' or 'long' QR. In the interests of space, we make various other simplifications in the discussion below. The reader is referred to Fox (2000) for discussion.

in the second conjunct. Conversely, surface scope in the first conjunct entails surface scope in the second conjunct. Mismatches are disallowed.

(15) *A doctor will examine every patient, and a nurse will too.*

Possible: $\exists$ doctor > $\forall$ patient & $\exists$ nurse > $\forall$ patient
$\forall$ patient > $\exists$ doctor & $\forall$ patient > $\exists$ nurse

Impossible: $\exists$ doctor > $\forall$ patient & $\forall$ patient > $\exists$ nurse
$\forall$ patient > $\exists$ doctor & $\exists$ nurse > $\forall$ patient

In addition to parallelism, Fox proposes an economy condition: *Scope Economy*. This condition permits QR only if it generates an interpretation the sentence (or conjunct) would not otherwise have. In a sentence like (16), there is only one scope bearing element, the object, and so QR of *every patient* across the subject will generate no distinct interpretation. The economy condition excludes QR in this sentence.

(16) *Lucy will examine every patient.*

These two assumptions thus serve to derive the pattern in (14). In (14a), QR of the object across the subject derives a logically distinct interpretation, and is therefore permitted (the same holds for (15)). However, in (14b), QR is blocked in the second conjunct, since the subject is not quantificational (see (16)). While QR would otherwise be available in the first conjunct, in this particular circumstance, applying QR in the first conjunct, but not in the second, would violate parallelism.

In Fox's elegant account of this puzzle, Reinhart sees an argument for a model that our assumptions are in conflict with. Specifically, Reinhart holds that the calculation involves the competition among the members of a 'reference set' consisting of derivations (LF,PF pairs) with a common PF but different LFs. This is the opposite of what we maintain—our interface economy conditions (ScoT) regulate competitions with a common LF and choose among competing PFs to express that LF. So if Reinhart's interpretation of these effects is correct, we will be in trouble.

However, as Fox argues, all of the effects of *Scope Economy* can be calculated locally, i.e., within "narrow syntax" in Minimalist terms. Scope economy compares two derivations sharing the same numeration, and differing only in the presence or absence of QR. It may thus be stated purely as a syntactic economy condition, with only limited knowledge about the interpretation of syntactic structures. By way of illustration, consider the representation in (17), an intermediate stage in a syntactic derivation. At this point in the derivation, since an IP node has been introduced which is a possible landing site for QR, it must be determined whether QR does or does not apply.

(17) $[_{IP}\ [_{DP}$ SUBJ$]$ will $[_{VP}$ examine $[_{DP}$ every patient$]\ ]]$.

Scope Economy may apply at this stage, and must make one calculation. It must check whether the quantifier in the object position (the one to undergo QR) is scopally non-commutative with the subject DP. If the subject DP is a non-quantificational DP or a universal quantifier, then Scope Economy will block QR at this point. On the other hand, if the subject DP is, say, an existentially quantified DP, then QR will be allowed (but not forced). At this point, there is a fork, and two distinct derivations will continue, one in which QR applied, and one in which QR did not apply, yielding distinct LFs. In our model, it is these LFs that serve as the input to the ScoT competition, which determines the appropriate PF form for each admissible LF. For this reason, together with whatever accounts for the lack of scrambling in English, the inverse and surface LFs (QR and no QR) will receive identical pronunciation (see Table 2), above. Representations that violate Scope Economy (by containing illicit applications of the syntactic operation QR) are simply not part of the input to ScoT. As it happens, QR in English is 'covert' in the sense that the copy in the higher (moved) position is unpronounceable. Scope Economy is a derivational, syntactic constraint, while ScoT is a representational constraint on LF:PF pairings.

4.1.2 Economy and overtness – a preditcion

It is worth noting, though, that there is one point on which our model does differ from the implementation of Scope Economy as put forward by Fox and Reinhart, and which should yield a testable prediction. This has proven to be extremely delicate, but we believe that the contrasts we have looked at do appear to support our prediction. The question has to do with the range of Scope Economy and the overt/covert distinction. Fox and Reinhart explicitly propose that Scope Economy only restricts covert operations (see in particular Fox 2000:74-76). However, in light of the preceding discussion, it should be clear that we make no such prediction. For us, Scope Economy is a constraint applying in the syntactic derivation (which culminates in an LF representation) and applies before that representation is matched to PF. To the extent that overt scrambling (in German and Japanese) is a proper analogue of QR, Scope Economy should constrain *overt* application of quantifier movement, just as much as it will restrict *covert* application thereof. However, this prediction is qualified, in that scope economy should only constrain movement whose sole effect (or motivation) is to establish a new scope relation. Very loosely put: the topic/focus relationships that enter into the evaluation of scrambling (via ScoT) will serve as "new interpretations" in the sense that is relevant to bleed the restrictive nature of Scope Economy. Thus, the effects of Scope Economy on overt movement will be detectable only when topic/focus considerations are very carefully controlled for. The following examples constitute an attempt to test this prediction for German; the preliminary results appear to go our way, but the judgments are exceptionally delicate (see Wurmbrand 2008 for related paradigms and discussion).

As a baseline example, consider example (13a) above, repeated here.

(13) *Jetzt zu den Studenten. Was hat mindestens ein Student gelesen? Das weiß ich nicht, aber…*
Let's talk about the students. What did at least one student read? I don't know, but…
A [TOP]; B [FOC]
Intended scope: B»A

a. *jeden Roman* *hat* *mindestens ein Schüler* *gelesen*
every novel (B) has at least one pupil (A) read
'at least one pupil read every novel' ∀»∃

This example shows that movement is permitted even when it makes the topic>focus isomorphism worse, but where (as predicted) this order more transparently reflects the scope relations. It is precisely in this type of context where we expect the effects of Scope Economy to appear. That is, since the object movement in (13a) is permitted solely for the purpose of establishing a quantifier scope distinct from the base order (subject > object), such movement should be prohibited in a context that is otherwise analogous to (13a), but in which the subject is non-quantificational. This appears to be correct: (18b) appears to be less felicitous in this context than the unscrambled version.[18]

(18) A: *Was ist mit dem Hans? Was hat er gelesen?*
What about John? What did he read?

B: *Das weiß ich nicht, aber...*
I don't know, but…

a. *der Leo* *hat* *jedes Feuerwehrbuch* *gelesen*
the Leo (A) has every Firetruck.book (B) read
'Leo read every fire truck book.'

b. #*jedes Feuerwehrbuch* *hat* *der Leo* t_{OBJ} *gelesen*
every Firetruck.book (B) has the Leo (A) t_{OBJ} read
'Leo read every fire truck book.'

The key contrast here is between (18b) and (13a). Both show overt movement of a quantified focus across an in-situ topic; the contrast in acceptability arises since it is only in (13a) that this movement finds a motivation from establishing a quantifier scope relationship that is logically distinct from the unmoved counterpart. Note that, if our initial assessment of the (rather subtle) judgments is correct, we can push this prediction one step further. As Fox shows, Scope Economy blocks QR of a quantifier across another quantifier in case the two are scopally commutative. In other words, Scope Economy is not simply a ban on movement of a quantifier across a non-quantificational NP, rather, the logical properties of the quantifiers come into play. If we are right, then this should happen in the overt movement cases as well. Replacing the in situ subject in examples like those just considered with a universally quantified DP, for example, should pattern with (18b) and not (13a) and fail to license the movement. That appears to be correct, with the minimal pair in (20) and (21) illustrating.

(19) A: *Was ist mit den Buben? Was haben die gelesen?*
What about the boys? What did they read?

B: *Das weiß ich nicht, aber ...*
I don't know, but…

[18] See also Williams 2003 for a similar conclusion, but note that the qualification in note 16 regarding the judgment applies equally here.

(20) a. *jedes Mädel* *hat* *jedes Feuerwehrbuch* *gelesen*
every girl (A) hat every Firetruck.book (B) read
'every girl read every fire truck book.'

b. #*jedes Feuerwehrbuch* *hat* *jedes Mädel* t_{OBJ} *gelesen*
every Firetruck.book (B) has every girl (A) t_{OBJ} read
'every girl read every fire truck book.'

(21) a. *mindestens ein Mädel* *hat* *jedes Feuerwehrbuch* *gelesen*
at.least one girl (A) has every Firetruck.book (B) read
'at least one girl read every fire truck book.' ∀»∃

b. *jedes Feuerwehrbuch* *hat* *mindestens ein Mädel* t_{OBJ} *gelesen*
every Firetruck.book (B) hat at.least one girl (A) t_{OBJ} read
'at least one girl read every fire truck book.' ∀»∃

Note that it is this latter contrast, between (20b) and (21b) that provides the strongest evidence that we are dealing with Scope Economy as a condition distinct from ScoT. Although we attribute the deviance of (18b) to Scope Economy, that example could in principle also be accounted for just with ScoT, or a similar constraint. For example, if one assumed that ScoT only enforced PF reflection of the hierarchical relation among scope bearing elements (and ignored all others), then ScoT (LF) would be irrelevant in (18) as there is only one quantified NP. Only ScoT (IS) would come into play, and would yield the right result in that example.[19] However, this alternative would not serve to draw the distinction in (20b) vs. (21b)—in both cases, two quantifiers are involved, and the LF representations A»B and B»A are thus structurally distinct. What matters evidently is something more subtle, namely the (non)-commutativity of the quantifiers. By incorporating Scope Economy into our framework, we make precisely the right cut here: in (20b), movement of a universal across another universal fails to derive a distinct interpretation and is thus blocked. The derivation is thus excluded from the ScoT competition, but only, and interestingly contra Fox (2000), if Scope Economy constrains overt movement of the relevant kind, as well as covert movement.

In sum, we contend that it is clear that the Scope Economy facts do not challenge the basic architecture we propose, so long as Scope Economy can be construed as a derivational economy constraint, precisely as Fox (2000) argued. In this section, we have, rather more tenuously, suggested that incorporating Scope Economy into our model in this way does yield a prediction that other approaches do not make, and we have suggested that the initial evidence seems to bear this out.

4.2 The PF interface: Focus projection

We now turn to Reinhart's other argument in favour of an PF-first approach, in which she more explicitly argues that the PF (including truly phonological properties such as sentential/phrasal

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[19] It seems to us that Williams (2003) might in spirit endorse such a tack, although Williams explicitly collapses quantificational structure and topic structure together, so that quantified and definite DPs are, in fact, part of the same representation, precluding the alternative sketched in the text.

stress) must be generated prior to the choice among possible LFs. Her discussion of the PF interface revolves around the phenomenon of 'focus projection' in English. Reinhart proposes that (semantic) focus (at LF) is determined from the PF representation, via an economy condition which selects an optimal LF from among a 'reference set' of competing LFs, matched to a single PF. We argue that the specific phenomena she considers find an equivalent (and arguably simpler) account in a model in which PF is projected from LF, and thus there is no compelling argument here against our general approach. We note at the outset that there is a rich literature on the relationship between prosodic prominence and (semantic) focus, to which we cannot do justice. On our reading of this literature, originating with Chomsky (1971) and Jackendoff (1972), the majority of authors present algorithms that differ in detail but share with Reinhart the view that prosody determines or constrains possible semantic focus interpretations.[20] Our argument here is that the same facts may be captured by running the system the other way, by allowing focus interpretation to determine the placement of prosodic prominence, consistent with our general architecture in which LF (including IS) precedes PF.

The basic facts of focus projection are illustrated in (22), cf. Reinhart (2005:140). In (22a), stress falls on (the head noun of) the direct object; this is the predictable locus of main sentential stress in English under the *Nuclear Stress Rule* (NSR), or some more refined extension thereof (cf. Cinque 1993, Selkirk 1996, Zubizarreta 1998).[21] This sentence, with this stress contour, is an acceptable answer to the question in (22b). Using the question-answer diagnostic for focus, this indicates that main stress on *desk* may correspond to NP focus. The sentence in (22a) is also acceptable as an answer to either of the questions in (22c-d). These latter examples constitute focus projection, where the focus of the sentence is a larger constituent containing the main stress, e.g., VP in (c) and IP in (d). Reinhart introduces a notion of *focus set*, which is the set of constituents that may be in focus, for a particular sentence under a particular stress contour. The focus set of (22a) is thus: { $[_{\text{DP}}$ *a desk*], VP, IP}.

(22) a. *My neighbour is building a* DESK.

b. A: *What's your neighbour building?*
B: *My neighbour is building* $[_{\text{FOC}}$ *a* DESK].

c. A: *What's your neighbour doing?*
B: *My neighbour is* $[_{\text{FOC}}$ *building a* DESK].

d. A: *What's this noise?*
B: $[_{\text{FOC}}$ *My neighbour is building a* DESK]

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[20] See especially Selkirk (1996). Our view is thus closer to that of Zubizarreta (1998). Although she states, for example, that "the F[ocus]-structure of a sentence is constrained by the location of the main prominence" (p.21), rules that she gives work by proceeding from a known focus structure and assigning prosodic prominence on the basis of that focus (see, e.g., her *Focus Prominence Rule* (p.21), to which our *Focus Stress Rule* below corresponds).

[21] Our point here is to demonstrate that our account is extensionally equivalent to Reinhart's, and not to contribute to debates about the formalism of the English sentential stress algorithms. Just as with the various phenomena discussed in section 3, the work we are responding to does not capture the whole array of data that characterizes the English focus-projection puzzle, and we leave ourselves open to any empirical problems that Reinhart's account faces.

It is also possible for primary sentential stress to fall on a constituent other than that picked out by the NSR. This 'stress shift' is shown in (23), which is the way to indicate focus on the subject DP (23b). As (23c) indicates, though, this shifted stress fails to license focus projection to IP. The focus set of (23a) is hence one-membered: {[DP *my neighbour*]}.

(23) a. *My* NEIGHBOUR *is building a desk.*

b. A: *Who is building a desk?*
B: [$_{FOC}$ *My* NEIGHBOUR] *is building a desk.*

c. A: *What's this noise?*
B: # [$_{FOC}$ *My* NEIGHBOUR *is building a desk*]

Note that it is not the case that 'shifted' stress generally fails to license focus projection. As Reinhart notes (2005:157), when the stress-bearing element is inside a complex subject, as in (24a), the sentence may be used in response to questions such as (24b) or (c). The latter represents focus projection, but the projection is limited to the subject DP and the IP cannot be a part of the focus set of (24a).

(24) a. [*The man with the* HAT] *committed the murder.*
b. *Did the man with the apron commit the murder?*
c. *Who committed the murder?*

The intuition at the core of Reinhart's account is that stress shift is special—a costly operation that is licensed only if needed to signal a focus that is not generated by the NSR and focus projection. The IP is not a part of the focus set of (23a) (i.e., focus does not project to IP) because IP is a part of the focus set of (22a), which is the corresponding sentence but in which stress shift has not applied. Reinhart's is explicitly an economy argument: the absence of focus projection to IP in (23a) is a direct consequence of the existence of a more economical alternative for representing that focus, namely, (22a). Stress shift is possible when the subject is in focus, since the subject does not contain the target of the NSR, and thus the subject DP is not in the focus set of the un-shifted sentences. For this same reason, limited focus projection within the subject DP is permitted, as seen in (24a).

Reinhart's implementation works as follows. The account is cast in the framework of Szendrői (2001) including the metrical tree notation of Liberman (1979). In this framework, nodes are marked either S (strong) or W (weak). As a simplification, these prosodic contours are represented directly on syntactic trees. The S-W marks have no absolute value, and are only relative: given two sister terminal nodes, one S and one W, the S is relatively more prominent than the W node. All nodes in the tree (including non-terminals) bear S or W labels, but the primary function of the marking on non-terminals is to regulate the distribution of primary, secondary etc. levels of stress ultimately realized on the terminals of the tree (see below). Note that it is assumed that there is some principle (such as a version of the Obligatory Contour Principle) requiring that the sister of an S node be W. With this much in place, we may now define the following:

(25) a. Generalized (Nuclear) Stress Rule (Reinhart 2005:133)

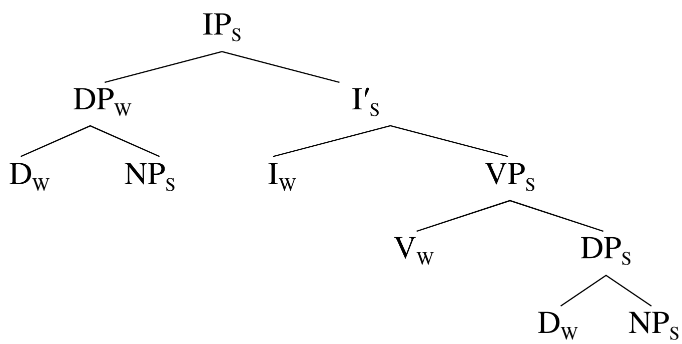
Assign a Strong label to the node that is syntactically more embedded at every level of the metrical tree.[22] Assign Weak to its sister node.

b. Main (primary) stress (Reinhart 2005:132)

Main stress falls on the terminal node that is connected to the root node by a path that does not contain any Weak nodes.

The effects are illustrated in (26), corresponding to (22a).

(26)



My neighbour is building a desk

The NSR algorithm has applied in this tree, providing the S and W labels as indicated, as the reader can verify. Given the ban on SS sisters, there will always be exactly one terminal node that is dominated uniquely by S nodes, in this case the NP *desk*. This terminal element therefore bears main stress. (Secondary stress may also be defined, for example, falling in this case on *neighbour* which is Strong, but the path from it to the root node contains one Weak node).

The rule of Main Stress Shift can now be defined as follows (Reinhart 2005:151):

(27) Main Stress Shift

(i) Assign S to a node α and every node dominating α.
(ii) Change the S sister of any node targeted by (i) to W.

Note further that the ban on adjacent S-nodes must be taken to be pervasive, hence when (27i) applies to affect a W node with an S sister, then the label on that sister must correspondingly become W (27ii). This is illustrated in (28), where the shift rule applies to the circled node (and accordingly changes its sister from S to W. In the resulting representation, *neighbour* now bears main stress, and *desk* bears a secondary stress (if anything).[23]

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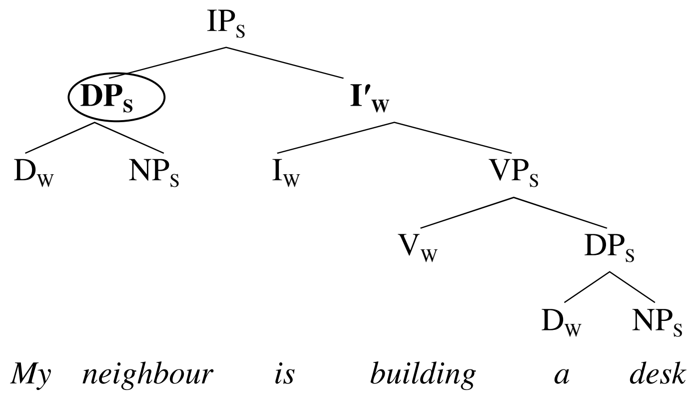
[22] One may quibble about the notion of embedding used here, though this is beside the point. What is relevant is that a complement is generally more prominent than the head selecting it, while a specifier is less prominent than its sister (X'). See the literature cited for refinements, further discussion, and known problems with the NSR.

[23] Note that not all rules overwrite previous information in this manner; we are not considering here an additional rule that Reinhart makes use of, namely *Anaphoric Destressing*, which assigns a W to some nodes prior to the application of the NSR. These W's are not overwritten by the NSR, even where the NSR would otherwise assign an S. Reinhart's system must therefore also stipulate which rules are information preserving and which are information

(28)



Under Reinhart's proposal, the first (relevant) step of any derivation is the application of the NSR and calculation of main stress in (25). The *focus set* is determined next: the set of all constituents that may be in focus, given the locus of main stress. For this part of the derivation then, the PF (stress) is logically prior to the LF (semantic focus set). The next step of the derivation is to determine whether "the focus needed for the context" is or is not in the focus set (p.155). If the intended focus is not in the focus set, then the rule of *Main Stress Shift* (27) applies, assigning a new main stress, and overwriting (parts of) the original stress contour, as needed.

In Reinhart's presentation, the 'reference set' here consists of a set of possible semantic focuses, which are evaluated against a single given PF, and if the intended focus is not in the focus set, further operations are warranted. But note that for the system to work, the intended (i.e., actual) focus must be known *in advance of* the application of the focus shift rule. In our view, this aspect of the proposal undermines the argument for starting with the PF representation. In actual fact, the real work in Reinhart's system is being done by selecting an actual focus first, and then determining which PF will spell out that focus—the PF derived by the NSR alone or the one derived with the main stress shift rule. In other words, we contend that the machinery Reinhart posits by starting from the PF representation in fact serves to mask a simpler LF-to-PF account, consistent with the view we have espoused throughout. Indeed, once this is recognized, there is also (in our view) no compelling argument for an economy computation in this domain.

4.3 LF-first: Recasting Reinhart's proposal

The key aspects of Reinhart's system find a simple and direct translation into a system that beings with the LF representation. Moreover, such a system is arguably simpler than Reinhart's, involving a subset of the mechanisms that she needs to invoke, and with fully deterministic derivations that at no point involve backtracking or the separate computation of competing derivations. We keep to Reinhart's notation in order to facilitate comparison among the approaches, without implying a commitment to this view of the representation of stress over any other. We offer two important changes to the system proposed by Reinhart. First, in place of Main Stress Shift, (27i), we posit the Focus-Stress Rule in (29), which partially determines PF

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changing. In our alternative (even when expanded to include Anaphoric Destressing) all rules are information-preserving.

stress from a given LF.[24] The remainder of the rules (NSR, definitions of Main and Secondary stress, and rules, such as Anaphoric Deaccenting, not discussed here) we leave untouched.

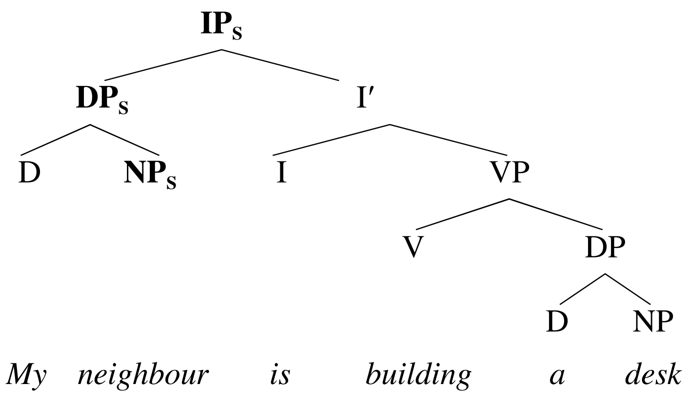
(29) Focus Stress Rule (FSR)

Assign S to a node α that is the (semantic) focus of the sentence and every node dominating α.

Second, we suggest that the Focus Stress Rule precedes the NSR, rather than following it (as in Reinhart's system). The NSR, for us, is then simply the default sentential stress rule of English, applying over those parts of the structure where the FSR has not applied. Our rules are structure filling and structure-preserving, not structure changing.

This account, which precedes from the assumption that the focus is known in advance (as Reinhart's does tacitly) uses arguably a subset of the rules her account uses, but is empirically equivalent in all respects. Consider first our derivation corresponding to "stress shift". Taking the example where *neighbour* is in focus, the first step is the application of (29), the result of which is given in (30).

(30)



The FSR (like the Main Stress Shift Rule) by brute force marks the focus-bearing constituent with main sentential stress. Since our rules are information-preserving, this will not be undone or over-written in the course of the derivation. After the FSR applies, remaining unmarked nodes will be marked by the NSR. As the reader can verify, applying the NSR to the unmarked nodes in (30) (along with the assumption that the NSR cannot assign an S to a node that is sister to a previously assigned S) will yield precisely the representation in (28). So, there is equivalence in the representation the systems generate for stress shift examples, even though they are derived in a different manner. [25]

Now, in our approach, the FSR has much wider application than Main Stress Shift. Return to an example like (22a). For us, since the FSR applies first, the derivation cannot begin until focus is known. Assume first that it is the NP *desk* that is in focus. The first step of the

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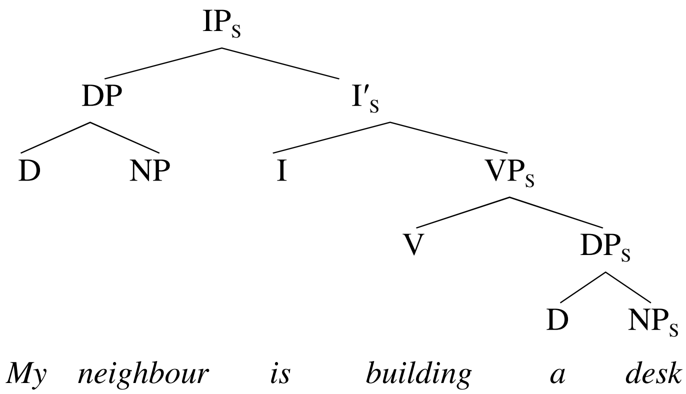
[24] Compare the *Focus Prominence Rule* in Zubizaretta (1998:21).

[25] Reinhart (2005:136-7), following Szendrői (2001), objects to versions of this approach which posit a [+Focus] feature in the syntax. As Reinhart notes, this is a coding trick, used to make a property of the LF representation (semantic focus) visible to PF. This trick is necessary on the Y-model since Spell Out occurs at a point in the derivation prior to LF. On our model, no such feature is needed, since we are arguing that PF is derived from the LF representation, and thus any information in the latter is visible to the mapping to phonological form.

derivation (the FSR) is given in (31). The NSR will subsequently apply to assign labels to the unmarked nodes in (31), and the result will be identical to (26) above.

(31)



Assume instead that it is the VP that is in focus. The output of the FSR will look just like (31), except that the two lowest S nodes (DP, NP) will remain unmarked at that point in the derivation. However, subsequent application of the default rule (NSR) will mark those, along with the other unmarked nodes, once again yielding the fully specified representation in (26). Similarly, if it is the entire IP that is in focus (or equivalently, there is no focus), the FSR will begin by marking only the topmost node, but the default application of the NSR will again generate (26). In sum, from this perspective, focus projection is a misnomer, as is stress shift. There is neither projection, nor shift, involved in these examples. The appearance of focus projection is instead the result of the fact that various derivations, starting from distinct LFs, will converge on indistinguishable surface (PF) representations. So long as the semantic focus is a constituent anywhere along the path that would be marked S anyway (by default), the result is a main stress on the most deeply embedded constituent (all else being equal). Note that we also have, automatically, an account of Reinhart’s primary concern, namely why the range of focus interpretations allowed under “stress shift” is limited to the complement of the focus interpretations allowed under nuclear stress. The contour in (28) (=(23a)) cannot be used for IP focus, not because there is a competing derivation against which it is evaluated, but instead simply because when IP is in focus (28) is not the output that is generated, rather (26) (=(22a)) is. We leave it to the reader to verify that our system is precisely equivalent in its empirical scope to Reinhart’s, even when supplemented with additional rules, such as *Anaphoric Destressing*, not considered here.

We conclude, therefore, that the facts of focus projection and the connection between focus and stress in English provide no argument in favour of a system in which LF is projected from PF, and in particular, no hurdle to the view we advocate in which the flow of information runs in the opposite direction. Although this is sufficient for our purposes, we actually believe a stronger conclusion is warranted, namely, that the LF-first view is superior on parsimony grounds, and is in fact implicitly embedded in Reinhart’s own analysis. Note that in our view there is no focus set, no focus projection, no stress shift, no evaluation of competitors, no backtracking in the derivation and no overwriting of previously assigned structure/labels. The effect of a focus set/projection arises because distinct derivations may converge on identical PF representations. Such convergence occurs when the constituent in focus is one that would be marked S by the default rule in any event. There is no meaningful notion of ambiguity or competition internal to the grammar of focus, from our perspective. The derivation from LF (focus) to PF is deterministic; it just happens that the semantics has more distinctions available to it than the phonology does. Since primary stress is typically manifest on a single terminal node, and the terminal nodes are proper subset of the terminal and non-terminal nodes, it follows that there will necessarily be neutralization in the PF representation of meaningful semantic distinctions. Apparent ambiguity thus arises, but as a matter of empirical observation, where the system is run backwards, as it were: the hearer/observer starts from the PF, but the grammar starts from the LF.

4.4 Postscript – markedness and acquisition

In a subsequent chapter, Reinhart indicates that she may in fact be willing to concede (something like) the above.[26] Even so, she makes two arguments that the reference set theory she proposes is superior to deterministic alternatives (such as ours). One argument is made somewhat implicitly in passing, and the other is an explicit argument from acquisition. The first we may dispense with straightforwardly. Reinhart repeatedly refers to the "shifted" stress as "marked", and appears to imply that speakers perceive a difference between "marked" and "neutral" stress contours. She appears to take this as prima facie evidence for setting up a special operation (Main Stress Shift) that yields (all and only) the marked outputs. On our view, the FSR derives both shifted and (some) non-shifted interpretations, as detailed above, so there is no single operation that draws this division. But this does not decide the issue in any way that we can see. What is at stake in speakers' intuitions here is the ability to take a given stress contour and to evaluate whether it is the same as, or different from, the contour that would be generated if there were no constituent (other than IP itself) in focus. Under both systems (ours and Reinhart's) this is well-defined, and can be taken to underlie the feeling of "markedness" associated with some contours (in fact, precisely the same class of contours on both approaches).

The more interesting argument given by Reinhart comes from acquisition evidence, as presented in Reinhart (2005:238-272). We note from the outset that Reinhart herself acknowledges the incompleteness of the evidence, but we may grant all data points and assumptions for the purposes of the argument. The upshot of (her interpretation of) the evidence is this: Children can be shown experimentally to be sensitive to stress, and to be able to use stress information in various types of disambiguation tasks. Nevertheless, when children are presented with examples involving stress shift, where they are required to demonstrate an awareness of the focus associated with this shift, they behave in a manner interpreted as guessing. In Reinhart's view, this selective inability to comprehend the focus associated with stress shift constitutes evidence for a special processing cost associated with reference set computation. However the same results (if indeed this is what the experimental evidence shows) are straightforwardly consistent with the view presented here. We need only assume that children do not have full mastery (at the relevant age) of the adult FSR. As far as we can see, all the results presented by Reinhart are consistent with an interpretation under which children have mastery of the NSR, the definition of main stress, and (perhaps) a sense that focus normally is on a constituent including main stress. Lacking the FSR, they will perform fine on sentences in which the FRS and NSR converge, but when stress lands elsewhere, they are only able to process the sentence as having an unexpected stress contour (compare remarks in the previous paragraph on "marked" stress).

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[26] "The empirical evidence that [reference set computation] is needed is not huge. In most instances, an alternative simpler theory would capture the facts just the same." (Reinhart 2005:246).

We refrain from pushing this line further, as the results presented by Reinhart are too sketchy to permit more refined conclusions, but we submit that, for the reason just noted, the acquisition results, while consistent with Reinhart's view, do not appear to compel one to accept anything more than the possibility that the FSR and the NSR may not be acquired at the same time.[27]

5. SUMMARY AND OUTLOOK

In this paper, we have argued for the following points:

i. There exist 'soft' constraints (economy conditions) that value a particular type of correspondence between LF and PF representations (for example, scope at LF matched by precedence at PF).
ii. These constraints are uni-directional: LF (broadly construed) is calculated first, and determines PF (surface word order).
iii. Scope rigidity (the apparent absence of QR) is not a property of languages, but of specific configurations, and the distribution of rigidity effects is (largely) predictable from independent variation in the syntactic resources of various languages (e.g., possibilities for scrambling). There is no ±QR parameter.

We have focused in particular on the interplay between (i) and (ii). We have argued that there is a (possibly universal) constraint favouring transparent reflection of LF properties (scope, information structure) in PF precedence relationships, but that this constraint may be overridden when it is at odds with other economy conditions. The tell-tale signature of this constraint interaction, we submit, lies in what we have called the ¾ signature effect. That is, when two constraints stand in conflict, derivations may satisfy either of the two conditions and a particular type of optionality emerges. However, when conditions align, they must be satisfied. An observation that we take to be of architectural import is that, for the range of constructions surveyed, the effects are properly characterized only if different PF representations (word orders, in the general case) compete for the realization of a fixed LF, and not the other way around. This model stands in conflict with common proposals that inherit (sometimes tacitly) the GB ordering of covert operations after "spell-out". By giving up that commitment, we believe we offer a fresh, and possibly simpler, perspective on these interactions. We have examined in some detail one particular instantiation of the competing proposal (Reinhart's *Interface Economy*) and argued that none of the facts presented there compel a grammatical model in which a single PF determines possible LFs, as opposed to our view.

In an attempt to flesh out the common intuition that freedom of word order is correlated in some manner with scope rigidity, we have proposed a means to derive cross-linguistic and language-internal differences in the distribution of covert scope shifting operations (QR) from

[27] It is worth noting that Reinhart suggests that children's deficient performance is limited to comprehension, and that they are able to perform stress shift (to the subject) in production (p.250). Reinhart concludes: "In actual language use, then, reference-set computation of stress shift is involved only in comprehension." As we read it, this sentence appears to assert that the Reinhart model should be construed as a model of parsing, and not of competence (or production) grammar. This is of course fully consistent with the view we have been espousing throughout, but seems at odds with the general thrust of Reinhart's theoretical proposals, and thus we do not feel this quote should be over-emphasized.

the independently attested differences in the freedom of word order variation (scrambling). At the same time, we have left open the characterization of this more fundamental point of variation, the nature of the scrambling operation. In addition, we have made somewhat opportunistic use of some constraints, as a stand-in for a fuller understanding of the relevant processes. Our use of *MOVE (in Dutch), and the question of its relation to Canonical Constituent Order (in English) stands to be improved upon in subsequent developments of these ideas. We have also argued here in somewhat programmatic terms for a general model, primarily through examination of paradigms in the existing literature. In related work, Wurmbrand (2008) presents an extension and application of this model to thorny puzzles in German (and Japanese) scope, including a careful evaluation of the nature of reconstruction (a topic left open here). In sum, we suggest that we have offered some incremental progress towards a theory of the interaction of word order and scope, but it will take a good deal of further work to see just how far one can make good on the promise of this particular approach.

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Susi Wurmbrand
susi@alum.mit.edu
http://wurmbrand.uconn.edu/

Jonathan Bobaljik
jonathan.bobaljik@uconn.edu
http://bobaljik.uconn.edu