Intervention effects arise from scope-taking across alternatives*

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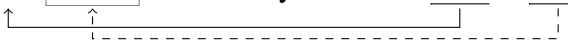
1. Introduction

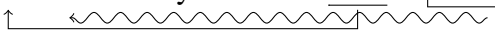
This paper sets out to investigate the syntax and semantics of *wh*-in-situ, using multiple *wh*-questions in English as its main testing ground. Broadly speaking, two types of approaches have been developed for the interpretation of *wh*-in-situ — one involving covert movement, and the other involving in-situ composition, using Rooth-Hamblin alternative computation, unselective binding, or choice functions.

(1) *Who did Mary introduce to* [*whom*]*?*[1]

a. LF: *Who* [*whom*] C did Mary introduce ____ to ____? *covert movement*



b. LF: *Who* C did Mary introduce ____ to [*whom*] ? *in-situ composition*



The pressing question is how the usage of these mechanisms might be diagnosed, given that this is not obvious from the surface form of the question. Over the years, the literature has provided us with several diagnostics: syntactic islands, parasitic gaps, and Antecedent Contained Deletion all diagnose the presence of movement. On the other hand, so-called 'focus' intervention effects diagnose in-situ composition.[2]

This paper focuses on the distribution of intervention effects in English questions. Building on previous work in Pesetsky (2000) and Kotek (2014), I argue that intervention

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[1]Throughout, solid arrows indicate overt movement, dashed arrows indicate covert movement, and curly arrows indicate areas of alternative computation. These arrows are used as a notational convenience only.

[2]The theories of intervention effects currently dominating the literature assume that this in-situ composition involves Rooth-Hamblin alternatives composition (e.g. Beck 2006, Cable 2010, Kotek 2014). I will continue to adopt this assumption here, which — as we will see — will become crucial later. As no theory of intervention has been developed based on a choice-function mechanism or using unselective binding, I will leave to future work the question of how (or if) my proposal can be adapted and reframed using these tools.

effects are the result of a movement operation targeting a position where focus-alternatives (projected from an in-situ *wh*-phrase) are being computed. This claim, that intervention is the result of scope-taking across regions of alternative computation, will have wide-reaching implications across various domains of grammar.

2. Background: intervention effects

Intervention effects are most easily observed in *wh*-in-situ languages, such as Japanese. Example (2a) shows an in-situ question with a canonical word-order. When an intervener (here: the NPI *daremo*) c-commands the in-situ *wh*-phrase, the result is degraded. This ungrammaticality can be avoided by scrambling the *wh*-phrase above the intervener, (2b).

(2) *Japanese: Intervention effects avoided through scrambling*

a. ✓Hanako / ?*__Dare-mo__ *nani-o* yom-ana-katta-no?
Hanako no one what-ACC read-NEG-PAST-Q
'What did Hanako/*no one read?'

b. *Nani-o* __dare-mo__ ____ yom-ana-katta-no?
what-ACC no one read-NEG-PAST-Q
'What did no one read?' (Tomioka 2007)

A similar phenomenon is observed in German, for *wh*-in-situ in multiple *wh*-questions. Here we use the negative quantifier *niemand* as the intervener:

(3) *German: intervention above wh-in-situ, avoided by scrambling*

a. *Wer* hat ✓Luise / ??__niemanden__ *wo* angetroffen?
who has Luise no one where met
'Who didn't meet Luise/*anybody where'?

b. *Wer* hat *wo* __niemanden__ ____ angetroffen?
who has where no one met
'Who didn't meet anybody where'? (Beck 1996)

Descriptively, intervention effects affect *wh*-in-situ. Theoretically, I adopt here the idea that intervention effects affect alternative computation but not (overt or covert) movement: interveners disrupt the interpretation of alternatives projected by *wh* which must be interpreted by C (Beck 2006, Beck & Kim 2006, Kotek 2014, 2016, Kotek & Erlewine 2016).

(4) *The Beck (2006) intervention schema:*

a. * [$_{CP}$ C ... __intervener__ ... *wh*]

b. ✓ [$_{CP}$ C ... *wh* __intervener__ ... *t*]

Alternative theories have tied intervention to focus (Kim 2002, Beck 2006, Beck & Kim 2006), quantification (Beck 1996, Mayr 2014), topichood (Grohmann 2006), prosody (Tomioka 2007), and semantic type-mismatch (Li & Law 2016). I return to this issue in §3.

The most comprehensive study of intervention effects in English comes from Pesetsky (2000). Pesetsky observes a correlation between superiority and intervention in multiple questions with D-linked *wh*-phrases: superiority violating questions are sensitive to intervention effects, while superiority obeying questions appear to be immune from them.[3]

(5) *A Pesetsky intervention effect:*

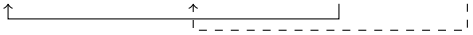
a.	*Which student* ____ read *which book*?	*obeying*
b.	*Which book* did *which student* read ____?	*violating*
c.	*Which student* **didn't** ____ read *which book*?	*obeying*
d.	* *Which book* **didn't** *which student* read ____?	*violating*
	(cf *Which book* did *which student* **not** read ____?)	

Adopting the analysis in Pesetsky (2000), this pattern is explained by assuming different syntactic derivations for superiority-obeying vs violating multiple questions. First, we assume that the interrogative probe on C multiply probes for all interrogative phrases in its c-command domain. Second, adopting Relativized Minimality (Rizzi 1990, cf. Chomsky 1995), we assume that the *wh*-phrase base-generated higher in the question (throughout: wh_1) is always found by the probe before the lower one (throughout: wh_2) can be.

In the case of superiority-obeying questions, we assume that the probe finds wh_1, Agrees with it and attracts it to Spec,CP. The probe then goes on to find and Agree with wh_2, attracting it to an inner specifier of CP, tucking in below wh_1 (Richards 1997), (6). A pronunciation rule ensures that the highest *wh*-phrase in Spec,CP is pronounced at the head of its movement chain (hence, in its moved position), and all other *wh*-phrases are pronounced at the tail of their respective chains (hence, in-situ).

In the case of superiority-violating questions, the interrogative probe finds wh_1, Agrees with it, but must leave it *in-situ* in order to allow wh_2 to be attracted to the highest Spec,CP, ensuring the correct word-order given the pronunciation rule, (7).

(6) LF: *Which student*$_1$ *which book*$_2$ C ____ read ____?



(7) LF: *Which book*$_2$ C did *which student*$_1$ read ____ ?

As a result, in superiority-obeying questions, all *wh*-phrases are above TP at LF, hence above any interveners. The structure is not sensitive to intervention effects. Superiority-violating questions, on the other hand, contain a *wh*-phrase that is in-situ at LF; hence, if an intervener separates the *wh*-in-situ from C, we predict an intervention effect.

[3]For many (perhaps all) speakers, intervention is diagnosed by the loss of the pair-list reading of the question (A2). A single-pair answer reading may survive (A1). This has been reported for superiority-violating questions in English and for German questions in footnotes in previous work (Pesetsky 2000, Beck 2006, cf also Beck 1996). See discussion in Kotek (2014).

(i) Q: *Who* ate *what*?

A1:	Fred ate the beans.	*single-pair*
A2:	Fred ate the beans, Mary ate the eggplant, and Sue ate the broccoli.	*pair-list*

3. Proposal: intervention as scope-taking across alternatives

In the remainder of this paper I will motivate the idea that intervention is the result of scope-taking across alternatives. The generalized intervention schema looks as in (8):

(8) *The new intervention configuration:*
* C ... **λ** ... *wh*

This builds on the ideas in Kim (2002), Beck (2006), Beck & Kim (2006) that intervention should be related to focus interpretation. However, these previous authors propose that interveners themselves are focus-sensitive operators; they cause intervention by being the first operator to interpret the alternatives projected by *wh*-in-situ, blocking interpretation by the interrogative complementizer, leading to semantic incompatibility. As a result, these authors are led to claim that all interveners associate with focus — a welcome result for interveners such as *only*, *even*, and perhaps negation, but less obviously so for interveners like *every*, *no one*, or *never*. Instead, I propose that the cause of intervention is rooted in a much more basic fact about grammar: going back as far as Rooth (1985), with the very inception of the theory of Association with Focus, it has in fact been known that Predicate Abstraction is not well defined in regions where focus alternatives are being projected.

The crux of the matter is that there is no way to correctly define the focus-semantic value of predicate-abstracted nodes. Consider the question *Who saw nobody?* (assuming $[\![\text{who}]\!]^f = \{\text{Mary, Dana, Lynn}\}$, and QR of the quantified object). PA requires us to append the λ-binder to the set of alternatives generated by *who saw t* in (9a); however, the result is a function into sets, which is of an incorrect type, (9b).

(9) *A naive application of Predicate Abstraction which doesn't work:*
a. LF: nobody$_i$ λ_i C *who* saw t_i?
b. $\lambda x\,.\,\{\text{Mary saw } [\![\text{i}]\!]^{w,g^{x/i}}, \text{Dana saw } [\![\text{i}]\!]^{w,g^{x/i}}, \text{Lynn saw } [\![\text{i}]\!]^{w,g^{x/i}}\}$ ☹ $\langle e, \langle st, t\rangle\rangle$

To facilitate Function Application above, (9b) must be transposed into a set of functions, of type $\langle\langle e, st\rangle, t\rangle$. However, we over-generate: we get uniform functions (10a) as well as non-uniform ones (10b), with no way of pruning the undesirable functions, keeping only the uniform ones. I refer the reader to Rooth (1985, p.45–59), Shan (2004) and Novel & Romero (2009) for a more detailed illustration of this problem.

(10) *Uniform and non-uniform functions both generated by transposing (9b):*
a. $\left\{ \begin{bmatrix} x_1 \mapsto \text{Mary saw } x_1 \\ x_2 \mapsto \text{Mary saw } x_2 \\ x_3 \mapsto \text{Mary saw } x_3 \end{bmatrix} \begin{bmatrix} x_1 \mapsto \text{Dana saw } x_1 \\ x_2 \mapsto \text{Dana saw } x_2 \\ x_3 \mapsto \text{Dana saw } x_3 \end{bmatrix} \begin{bmatrix} x_1 \mapsto \text{Lynn saw } x_1 \\ x_2 \mapsto \text{Lynn saw } x_2 \\ x_3 \mapsto \text{Lynn saw } x_3 \end{bmatrix} \right\}$
b. $\left\{ \begin{bmatrix} x_1 \mapsto \text{Mary saw } x_1 \\ x_2 \mapsto \text{Lynn saw } x_2 \\ x_3 \mapsto \text{Dana saw } x_3 \end{bmatrix} \begin{bmatrix} x_1 \mapsto \text{Dana saw } x_1 \\ x_2 \mapsto \text{Mary saw } x_2 \\ x_3 \mapsto \text{Lynn saw } x_3 \end{bmatrix} \begin{bmatrix} x_1 \mapsto \text{Lynn saw } x_1 \\ x_2 \mapsto \text{Dana saw } x_2 \\ x_3 \mapsto \text{Mary saw } x_3 \end{bmatrix} \right\}$

Although this issue has largely been ignored, it has been noticed recently by several authors. Shan (2004) argues that this problem cannot be overcome, and hence motivates the

adoption of a variable-free semantics without any movement.[4] Novel & Romero (2009), on the other hand, show that the problem *can* be solved, by assuming that *wh*-phrases are definite descriptions and type-lifting the entire semantic system, taking assignment functions to be a part of the denotations of all lexical items (see also Charlow 2017 for a solution along similar lines). Ciardelli et al. (2017) show that another solution is possible if we adopt the framework of Possibility Semantics (building on Inquisitive Semantics) instead of the traditional Roothian Alternative Semantics.

I propose instead that none of these amendments should be adopted — there is in fact no way to interpret alternatives across Predicate Abstraction in our system, and intervention happens precisely when we try to do so anyway.

(11) *Intervention effects as scope-taking across alternatives*:
Intervention is the result of movement into a part of structure where non-trivial alternatives are being computed — because Predicate Abstraction, necessary to compose the movement step, is not well-defined in such cases.

This leads to two predictions, which I will substantiate below: (a) that we should find intervention in more places than identified in previous literature, since movement is used in many corners of the grammar, and (b) that we should find more interveners than previously recognized. In particular, I will concentrate on showing that we can 'turn on' and 'turn off' intervention behavior by forcing items to take scope via movement or through other means.

4. Intervention is the result of scope-taking across alternatives

I begin by addressing the question of the set of interveners. As discussed above, there is disagreement about the correct characterization of this set, and whether it is cross-linguistically stable (e.g. Beck 1996, 2006, Grohmann 2006, Tomioka 2007, Haida 2007, Mayr 2014). A point of agreement across all previous account of intervention, however, is that certain elements — indefinites, bare plurals, existentials, and definite descriptions — never act as interveners. In what follows, I will show that in fact these elements *do* intervene, when they are forced to take scope via movement and not via other means.

To show that non-interveners can be 'turned into' interveners, I consider the behavior of English subjects. Under the proposal I sketched above, subjects, which undergo A-movement from *v*P to TP, should always cause an intervention effect in superiority-violating multiple questions. The fact that they don't, I propose, is due to the fact that under normal circumstances, subjects are able to reconstruct to their base position, avoiding intervention. We thus predict that if reconstruction is blocked, we should observe intervention effects. I will show that this prediction is borne out using two distinct test cases.

The first test case is the comparison between stage-level and individual-level predicates. Going back to Diesing (1992), a.o., we know that subjects of the latter predicates (but not the former) must vacate *v*P in order to receive a proper interpretation. Hence, subjects of individual-level predicates always undergo some non-reconstructable movement; we thus predict — and observe — intervention effects in superiority-violating questions.

[4] He also points out problems for solutions proposed in Poesio (1996) and Kratzer & Shimoyama (2002).

Examples (12a–b) provide baselines with stage- and individual-level predicates in superiority-obeying questions. Here, *wh*-in-situ can move to C at LF, and the intervention configuration is avoided. In superiority-violating questions as in (13), on the other hand, covert *wh*-movement is not possible, and instead *wh*-in-situ is interpreted using Rooth-Hamblin alternatives. Here, examples with individual-level predicates become degraded — an intervention effect caused by the non-reconstructable movement of the subject.[5]

(12) *Baselines: Superiority-obeying questions with stage- vs individual-level predicates*

a. ✓ *Which* issue are **counselors** available to discuss ____ with *which* person?
stage-level

b. ✓ *Which* issue are **counselors** careful to discuss ____ with *which* person?
individual-level

(13) *Intervention effect caused by A-movement of subject of individual-level predicate:*

a. ✓ *Which* person are **counselors** available to discuss *which* issue with ____?

b. * *Which* person are **counselors** careful to discuss *which* issue with ____?

A second test case in blocking subject movement comes from considering the effects of binding. Examples (14a–b) below involve a raising predicate, which, all things being equal, should allow the matrix subject to reconstruct to a lower position. However, this reconstruction step can be blocked by binding from the subject into a bindee along the path of reconstruction. This introduces impossible requirements on the subject: either it reconstructs, avoiding intervention but undoing the binding relation, or it does not, preserving the binding relation but creating an intervention configuration. Either way, the example in (14b) shows that this leads to ungrammaticality. Example (14a) provides a baseline of similar complexity lacking the binding configuration, which is judged by speakers as quite complex, but acceptable.

(14) *Intervention caused by blocking of subject-reconstruction through binding:*
Context: The lawyers seem to be likely to appeal different decisions to different courts. Tell me,

a. ✓ *Which court* did **the lawyers** seem **to the reporters** to be likely to appeal *which decision* to ____?

a'. LF: *Which court* did ____ seem **to the reporters** to be likely **the lawyers** to appeal *which decision* to ____?

b. * *Which court* did **the lawyers** seem **to each other** to be likely to appeal *which decision* to ____?

[5]Note the importance of using singular *which*-phrases, to ensure that we are dealing with a pair-list reading. If plural *which*-phrases are used, e.g. *which boys read which books?*, it is possible to give a single-pair answer where each member of the pair is a plurality: *John, Bill, and Fred read Robinson Crusoe, Moby Dick, and Don Quixote, (respectively)*. A prediction, then, is that minimally changing the examples I present in the text to ones with plural *which*-phrases should lead to improved acceptability. This indeed appears to be the case for all the examples I present in this paper. I thank Jane Grimshaw (p.c.) for this observation.

We thus see bare plurals and definite descriptions can cause intervention effects: These are elements that can normally be interpreted without movement, or whose A-movement can be reconstructed, avoiding intervention.

Other elements in natural language that can normally be interpreted without movement and are hence traditionally thought not to intervene include existentials and indefinites. I will show that these non-interveners can be turned into interveners by forcing them to take scope through movement, as in Argument Contained Ellipsis (ACE) configurations (Kennedy 1994, 2004). Following Kennedy and other work on Antecedent Contained Deletion, such structures require movement in order to reach an interpretable structure. Hence, even elements such as definite descriptions, that don't otherwise require movement, are forced to move if they occur in an ACE structure.

(15) a. The woman who said she would △ bought the tuna.

b. The woman who said she would ~~buy the tuna~~ [*t* PAST buy the tuna].

Below I illustrate that traditional non-interveners forced to move by virtue of occurring in an ACE construction cause intervention effects. In the interest of space I show this only with the existential *someone*, but parallel examples can be constructed and show parallel effects for definites, bare plurals, and indefinites.

First, examples (16) provide elaborate superiority-obeying and violating baselines, setting up the required structure that will host ACE in the test cases below. For some speakers, these examples are too complex to judge; but for those who are able to judge them, both are acceptable. This is due to the fact that *someone* can be interpreted without movement,[6] avoiding the intervention configuration. A contrast is observed between the complex baselines (16a–b), which are grammatical, and the minimally different (17a–b), which contain ACE. In these test cases, only the superiority-obeying question is grammatical, but the superiority-violating question is rejected — an intervention effect due to the forced movement of *someone* into a region where the *wh*-in-situ *which boy* projects alternatives.

(16) *Baselines (superiority-obeying and violating):*

a. ✓ *Which boy* did you tell [**someone** who (really) shouldn't be here] to introduce ____ to *which girl*?

b. ✓ *Which girl* did you tell [**someone** who (really) shouldn't be here] to introduce *which boy* to ____?

(17) *ACE-containing test case cause intervention in superiority-violating question:*

a. ✓ *Which boy* did you tell [**someone** who (really) shouldn't △] to introduce ____ to *which girl*?

b. * *Which girl* did you tell [**someone** who (really) shouldn't △] to introduce *which boy* to ____?

To summarize, ACE forces covert movement of an otherwise in-situ element. As a result, we observe intervention effects in superiority-violating questions. Crucially, we ob-

[6] This could be an in-situ, witness-set analysis, or perhaps using a choice-function bound from further up.

serve intervention effects caused by traditional non-interveners: bare plurals, definite descriptions, indefinites, and existential quantifiers, when reconstruction is blocked or movement is forced. In other words, intervention happens whenever a λ-binder must be used in a region where focus-alternatives are also used. Previous theories assume a fixed set of interveners, with different characterizations, having to do with focus, quantification, topichood, prosody, or a semantic type-mismatch. However, I have shown that anything that moves into a region of focus alternatives computation is an intervener. This new characterization of interveners is incompatible with all existing approaches to intervention effects.

5. Intervention does not correlate with superiority

In this section I return to the reported correlation between superiority and intervention in English questions. I show that although the analysis proposed above in (6)–(7) is correct in predicting that, in general, superiority-obeying questions are immune from intervention effects and superiority-violating questions are subject to such effects, exceptions abound.

In particular, we observe intervention effects in superiority-obeying questions when covert *wh*-movement is restricted in some way, and we find a lack of intervention effects in superiority-violating questions if (a) the intervener is moved out of the way (QRed above the question, or reconstructed below *wh*-in-situ), or (b) *wh*-in-situ is given wide scope through non-interrogative movement (e.g. Right Node Raising or extraposition). In the interest of space I show just a few examples, and I direct the reader to Kotek (2016) and Kotek (to appear), where additional data is discussed.

Here I illustrate two ways to restrict covert movement. The first involves movement, following a logic very similar to the one employed in (14) above: a bindee cannot move out of the scope of a binder. Hence, by introducing a binding relationship into a sentence, we mark the highest possible movement position of the bindee. Examples (18a–b) provide baselines, with a reflexive (*herself* or *himself*) bound by a binder (*daughter* and *Obama*, respectively). The higher binder in (18a) predicts a higher possible landing site for covert *wh*-movement in this example compared to (18b).

(18) *Baselines, with binders underlined:*

a. *Which daughter* showed Obama *which picture of herself*?

b. *Which daughter* showed Obama *which picture of himself*?

Indeed, adding an intervener (here: *only*) into the sentence, we observe an intervention effect in (19b), where the *wh* must be interpreted using alternative computation. On the other hand, there is no intervention effect in (19a), where there is a possible landing site above the intervener but below the binder, leading to a converging LF.

(19) *Intervention in superiority-obeying question (Bob Frank, p.c.):*

a. ? *Which daughter* showed **only** Obama *which picture of herself*?

b. * *Which daughter* showed **only** Obama *which picture of himself*?

The next argument comes from the behavior of Association with Focus (Rooth 1985, 1992, a.o.). The interpretation of focus-sensitive operators such as *only* depends on the

presence of an F-marked constituent within the scope of the operator. F-marking that occur outsides the scope of the operator does not contribute to the evaluation of that operator. This is explained through the *Principle of Lexical Association* (PLA): An operator like *only* must be associated with a constituent in its c-command domain at LF (Tancredi 1990 p. 30, Aoun & Li 1993).

Evidence motivating this structural restriction on Association with Focus is shown in (20)–(21). The *wh*-question in (20a) is ungrammatical with the intended interpretation. The corresponding echo question in (20b), with F-marking within the scope of the operator, is grammatical. Similarly, the topicalization example in (21a) is ungrammatical, but the corresponding example with in-situ focus is grammatical, (21b).

(20) *F-marked constituents may not move out the scope of only:*

a. * *Who*$_{\text{F}}$ do you **only** like ____?
Intended: Who *x* is such that you like only *x*?

b. ✓ You **only** like *who*$_{\text{F}}$?

(21) a. * Mary$_{\text{F}}$, John **only** likes ____.
Intended: 'As for Mary, John only likes her$_{\text{F}}$ (and no one else).'

b. ✓ John **only** likes Mary$_{\text{F}}$.

Next we use the PLA to restrict covert *wh*-movement, by introducing F-marking into *wh*-in-situ, with the focus operator also serving as the intervener. Example (22a) provides a baseline, superiority-obeying multiple question that is able to have a pair-list answer. Example (22b) shows that intervention effects re-emerge when F-marking is introduced inside the (phonologically) in-situ *wh*-phrase in this question, as predicted.[7]

(22) *The PLA restricts covert movement of wh-in-situ, causing an intervention effect:*

a. Baseline: I can tell you *which* student read *which* book.

b. Context: The students in the class were supposed to read one book *and* one article about syntax. However, everyone got confused and read one book *or* one article. I've been reading everyone's squibs. I've finished all the ones about books, so:
*I can tell you *which* student **only** read [*which* book$_{\text{F}}$ (about syntax)].

Other means of restricting the highest landing site of movement include NPI licensing and syntactic islands. I refer the reader to Kotek (2016, to appear) for details. The results parallel the ones shown here: when covert *wh*-movement is restricted, so that *wh*-in-situ must be interpreted using Rooth-Hamblin alternatives, we observe intervention in superiority-obeying questions when an intervener takes scope along the path of alternatives.

Finally, I briefly discuss the status of intervention effects in superiority-violating questions. Following the analysis adopted in (7) above, intervention happens in violating questions because *wh* is truly LF-in-situ. In Kotek (2016, to appear) I show three ways of undoing the intervention configuration in such cases: by allowing the intervener to scope above

[7] This example is slightly modified from Erlewine (2014), with an added context. Erlewine reports that this question retains its single-pair reading but loses its pair-list reading.

the question or reconstruct below *wh*-in-situ, or by allowing *wh* to take wide scope above an intervener through non-interrogative movement:

(23) *Ways of undoing the intervention configuration in superiority-violating questions:*

a. ✓ LF: **intervener** [$_{CP}$ C ... **intervener** ... *wh*] QR

b. ✓ LF: [$_{CP}$ C ... **intervener** ... *wh* ... **intervener**] reconstruction

c. ✓ LF: [$_{CP}$ C ... *wh* **intervener** ... ____] non-interrogative movement

Here I illustrate data only for the third case — allowing *wh* to take wide scope through non-interrogative movement, specifically, Right-Node Raising (RNR).[8] It is well known that RNR allows exceptional *wh*-movement out of certain islands (Bachrach & Katzir 2009, a.o.). Example (24a) illustrates a canonical relative clause island, which is dramatically improved in (24b), when it occurs as part of an RNR construction.[9]

(24) *RNR allows exceptional extraction of wh-phrases out of islands:*

a. * *Which* book did John meet the man who wrote *t* ?

b. ✓ *Which* book did [John meet the man who wrote ____], and [Mary meet the man who published ____] *t*?

Building on this observation, we predict that RNR should give *wh*-in-situ in a multiple question exceptionally wide scope, allowing it to evade intervention despite being in a superiority-violating structure. This is indeed the case: Example (25a) is a classic intervention example modeled after Pesetsky's original examples. Example (25b) adds an RNR configuration, and the result is much improved and is no longer subject to intervention.

(25) *No intervention in superiority-violating question with RNR:*

a. * *Which* book did **only Sue** allow *which* student to read ____?

b. ✓ *Which* book did [**only Sue** allow ____], and [**only Mary** require ____], *which* student to read *t*?

6. Implications and conclusion

I have proposed that intervention effects are the result of a fundamental inability of grammar to correctly λ-abstract over sets of alternatives, (8). The evidence in support of this claim came specifically from movement into regions of alternative computation, but this proposal has wide-reaching implications. In what follows I briefly consider consequences for successive-cyclic movement, Association with Focus, the analysis of tense and modality, and the nature of basic scope-taking mechanisms available to the grammar.

[8] See Branan (2017) for two other cases of exceptionally wide scope for *wh*-in-situ in English superiority-violating questions achieved through non-interrogative movement: extraposition and high attachment of a parasitic gap. Just like in the cases here, when *wh*-in-situ is given wide scope, intervention effects disappear.

[9] For notational convenience, I illustrate the base positions of the shared material in each conjunct with ____, and the shared RNR-ed position (which feeds *wh*-movement) with a *t*(race).

6.1 Successive-cyclic movement

Under the proposal sketched here, it must be the case that intermediate landing sites of movement behave differently than the final landing site of movement — specifically, they must not "count" for the purposes of intervention. To illustrate this, consider example (26).

(26) *Simple multiple question with embedding and no intervener:*
Which book λ_i C did Mary think that [$_{CP}$ t_i $\boldsymbol{\lambda_i}$ *which kid* read t_i]?

This is a simple multiple *wh*-question, which does not contain an intervener and is judged by speakers as grammatical. The *wh*-phrase occupying the matrix Spec,CP position has moved from an embedded clause, and therefore under standard assumptions it would undergo successive-cyclic movement, stopping off at the edge of the embedded CP.[10] Again, under standard assumptions, movement leaves behind a trace, which is bound by a λ-binder abstracting over the movement. Notice, in addition, that the question in (26) is superiority-violating, and hence also involves a *wh*-phrase which is interpreted in-situ at LF. The result of this configuration, however, is an intervention configuration, which would predict the question to be ungrammatical due to an intervention effect, contrary to fact.

To predict questions such as (26) to be grammatical, we must admit the possibility that intermediate landing sites of movement behave differently than final landing sites. In particular, notice that nothing goes wrong if the λ-binder introduced in the intermediate landing site is deleted from the structure along with the intermediate trace — the trace corresponding to the base-position of the moved *wh* will be bound by the higher λ-binder, introduced below the final landing site of *which book*. Once we have this structure, the in-situ *which kid* can be successfully interpreted using Rooth-Hamblin alternatives, without creating an intervention configuration.

(27) LF: ✓ *Which book* $\boldsymbol{\lambda_i}$ C did Mary think that [$_{CP}$ *which kid* read $\boldsymbol{t_i}$]?

6.2 Why do some interveners intervene?

A question may arise specifically about the interveners *only* and sentential negation. The standard analysis of *only* takes it to associate with in-situ focus, without movement (Rooth 1985). If this is correct, we would not predict *only* to intervene, as there is no scope-taking through movement in such constructions. As a result, many of the examples illustrated in this paper will remain unexplained.[11] However, the correct predictions are made if we assume that *only* associates with focus through covert movement with pied-piping (Drubig 1994, Krifka 2006, Wagner 2006, Erlewine & Kotek 2014, to appear). Therefore, this proposal provides another argument in favor of the movement theory of *only*.

[10] And perhaps also at the edges of *v*P, but it suffices that it moves through CP to make my point.

[11] Curiously, Beck's (2006) influential focus intervention analysis greatly *over*-predicts intervention in sentences with *only*, again contrary to fact. See Beck (2006) for details and Erlewine & Kotek (2014) for a solution using the movement theory of *only*.

We are left with a second important question: why does negation intervene? At this point I see two possible answers. First, the idea that negation *does* undergo (head) movement is not out of the question, although this would crucially rely on head movement being an LF operation, a debated issue. Alternatively, it may be that here, the original Beck (2006) analysis may yield the correct result: the idea here is that only the interrogative complementizer is able to correctly interpret alternatives projected by *wh*-phrases, because it is the only operator that operates on the focus-semantic value of its sister but not its ordinary value. All other focus-sensitive operators require both the ordinary and focus-semantic value of their sisters, and the fact that *wh*-elements lack an ordinary value (Ramchand 1997, Beck 2006) leads to undefinedness.[12]

6.3 Abstraction over non-individuals

All known interveners, as well as the new ones I have presented here, quantify over individuals. Quantification over worlds does not lead to intervention, nor is there any evidence that tense is ever relevant for intervention. Likewise, families of questions have been fruitful in the analysis of topics and of multiple questions. Below are two relevant example:

(28) *Modals do not cause intervention in superiority-violating questions:*
  a. ✓ *Which abstract* **should** Mary assign ____ to *which reviewer*?
  b. ✓ *Which reviewer* **should** Mary assign *which abstract* to ____?

(29) a. ✓ *Which paper* **could** Mary read ____ for *which class*?
  b. ✓ *Which class* **could** Mary read *which paper* for ____?

This fact could be taken to call into question whether the problem is with abstraction in general, or with movement in particular. We do find modality/tense/aspect systems that use indices instead of abstraction, but the question of abstraction over degrees and propositions remains a difficult one. As I know of no theory in the literature that singles out abstraction over individuals from other types of abstraction, I leave this as a topic for future research.

6.4 Nature of grammar

The above discussion leads to a more general conclusion about the nature of the grammar that we must assume underlies all linguistic theory: the proposal here builds on a standard syntax of probes and goals, allowing for both A- and $\overline{\text{A}}$-movement. To interpret the resulting structures, we must adopt a Heim & Kratzer (1998)-style semantics with simple basic types, in which Rooth-Hamblin alternatives exist alongside movement. *Wh*-phrases can be interpreted both via movement and via alternative computation in different syntactic structures. That is, we must adopt a system with an inherent flaw, and furthermore not fix the flaw — in other words, the badness of abstraction over alternatives is a feature, not a bug. Intervention effects occur precisely when this prohibition is ignored.

[12] In general, I see no reason why Beck's (2006) theory couldn't be correct for true cases of Association with Focus. My criticism is about its extension to cases where it doesn't seem like focus is involved.

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