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A Hierarchy of Intervention

1 Introduction

This talk is mainly about data. I will present a data set and show that there is an interesting pattern to observe. This pattern is interesting, independent of the analysis for intervention effects one prefers. For the purposes of this talk, I will assume an analysis along the lines of Beck (2006) and the vocabulary associated with that. I assume that intervention effects are results of focus evaluation which makes alternatives unavailable for higher operators. As this is a Roothian framework, I assume that evaluation happens through ~. When I refer to "focus evaluating operators", I am talking about the element that is accompanied by ~, e.g. "only".

The talk is structured as follows: I will start by grouping different elements that employ alternatives into several categories. Using one element per category, I will explain why I assume that alternatives are involved and what it is they do that I interpret as an intervention effect.

After that, I will show how these elements interact with each other and describe the pattern these interactions follow. I will then go on to propose a small set of rules that allow us to account for this pattern within a Beck (2006) framework. Finishing up, I discuss some implications of this pattern for different strands of analyses of intervention effects.

The things I am trying to convince you of:

- Intervention effects are at work in many environments.
- The set of critical interveners is fairly large and heterogenous.
- The different kinds of critical interveners stand in a hierarchy.
- Whatever causes intervention effects creates a barrier for QR.

2 Kinds of interveners

The elements that use alternatives as part of their meaning are a quite heterogenous set. The first major distinction we can make is between those that cause intervention effects and those that do not.

Two examples for elements that do not cause intervention effects are the exhaustivity operator EXH (eg. Fox 2007) and the question operator Q.

Bade and Sachs (2019) argue that EXH needs to pass on alternatives for it to be employed successfully in analyses like Fox (2007), Tomioka (2010), and Crnič (2013). That Q passes on alternatives can, for example, be taken from Baker ambiguities (Baker 1970).

In this talk, I would like to focus on the other group: Elements that do cause intervention effects. I propose that there are (at least) four different classes that display different behaviour. I will use one item from each class to illustrate these differences. These classes are 'classic' focus evaluating operators, represented by "only", quantifiers, represented by "every", indefinites (or rather their perceived scope position) and modals, represented by "can".

Only

That "only" uses alternatives and causes intervention effects, I will assume as generally accepted:

(1) #Which boy did only Peter_{F} introduce which girl to?
(pair-list reading unavailable)

Another thing about "only" is that it is a barrier for QR:

(2) Only Peter_{F} read every book.
   a. Peter is the only x such that ∀y[book(y) → x read y]
   b. *∀y[book(y) → Peter is the only x such that x read y]

Every

Assuming that "every" employs alternatives needs at least some justification. Consider (3):

(3) Everyone thinks that Peter calls Mary_{F}.
   a. For all x: x thinks that Peter calls Mary.
   b. For all x: if x thinks that Peter calls someone, x thinks that Peter calls Mary.

In Sachs (2019), I assume a lexical entry similar to the one assumed in Eckardt (1999), which can be roughly paraphrased as in (4):

(4) ⟦every A B⟧=1 iff ∀x[(A(x) & ∃B'[B'∈ALT(B) & B'(x)]) → B(x)]

This is not uncontroversial, especially with regard to the assumption that "every" associates with focus itself instead of having its contextual restriction enriched through some other means. I take the fact that this association is sensitive to intervention effects itself as evidence that "every" is what evaluates the alternatives.

(5) Everyone thinks that only Peter_{F} calls Mary_{F}.
   a. For all x: x thinks that only Peter calls Mary.
   b. *For all x: if x thinks that only Peter calls someone, x thinks that only Peter calls Mary.

It has also been known since at least Beck (1996) that "every" causes intervention effects in question formation.

(6) #Which boy did every teacher introduce which girl to?
(pair-list reading unavailable)

Analogous to "only", "every" is a barrier for QR if it associates with focus:

(7) Everyone gave Peter$_F$ most books.
a. ∀x[x gave most books to someone → x gave most books to Peter]
b. *For most books y: ∀x[x gave y to someone → x gave y to Peter]

Indefinites

That indefinites might employ alternatives to take wide scope, especially out of islands, has been argued for in Shimoyama (2001), Kratzer and Shimoyama (2002), Shimoyama (2006), and Sachs (2019) among others.

Examples for intervention effects of indefinites in wh-questions are hard to come by: In Sachs (2019), I argue that an indefinite can receive a specific reading, i.e. one where it is essentially treated as a placeholder for a proper name that is known to the speaker or irrellevant for the conversation (cf. Fodor and Sag 1982). This reading is scopeless and does not cause intervention effects. To make sure that we have existential quantification in an intervening position, we would need another scope bearing element in the same environment to see whether the indefinite scopes below it. These elements are themselves critical interveners, so this is not easy to do.

One example where the effect is visible comes from Mayr (2014) (attributed to Bernhard Schwarz):

(8) a. Wo haben sich drei Maler wann eine Pizza geteilt?
where have self three painters when a pizza shared
"Where did three painters when share a pizza?"
b. *Wo haben sich drei Maler wann eine Arbeitshose
where have self three painters when a dungaree
angezogen?
put.on
"Where did three painters when put on a dungaree?"

Note that (8-a.) works, since the prominent reading is one where the indefinite is not interpreted as a quantifier but as a group entity. In (8-b.), this is not possible, so the indefinite has to have some kind of quantificational force and causes an intervention effect.

In Sachs (2019), I argue that indefinites do not outscope quantifiers via existential closure, but that the perceived scope position of the indefinite is a result of the quantifier associating with the alternatives generated by the indefinite. Accordingly, a quantifier is a barrier for QR if an indefinite takes scope above it:

(9) Noone gave every teacher a book.
*$\forall$x[teacher(x) $\rightarrow$ $\exists$y[book(y) & $\neg\exists$z[z gave x y]]]

This does nothing to show that indefinites create intervention effects, but it does show that an indefinite outscoping a quantifier has the same effect as a quantifier associating with focus.

That existential closure creates a QR barrier has been noticed - in a different form - by Chierchia (2001), where it is observed that a non-locally construed indefinite cannot be outscoped by a quantifier that did not already c-command it at spellout.

(10) Every student who read some book failed no exam.
*$\neg\exists$x[exam(x) & $\exists$y[book(y) & $\forall$z[z read y $\rightarrow$ z failed x]]]

Can

Aloni (2007a,b) argues that free choice readings of "any" in combination with an existential modal like "can" are a result of "any" generating alternatives and the modal using these alternatives. In her approach, the contribution of the modal can be roughly paraphrased as in (11) (R being an accessability relation describing the modal base):

(11) $[\![\text{can A}]\!]^w$=1 iff $\forall$A'[A'$\in$ALT(A) $\rightarrow$ $\exists$w'[R(w)(w') & A'(w')]]
"For every alternative, there is a compatible world in which it is true"

The sentence in (12) would then receive the following meaning:

(12) Peter can tell Mary anything.
a. $\forall$A'[A'$\in\{\lambda$w".Peter tells Mary x in w" | x$\}$ $\rightarrow$ $\exists$w'[R(w)(w')&A'(w')]]
b. For all x that Peter might tell Mary, there is a compatible world in which he does so.

Using the combination of "can" and "any" in a question allows for both readings, the "existential" NPI reading and the "universal" FCI reading:

(13) Can anyone do this?
a. Is there someone who can do this? (NPI reading)
b. Is this something that everyone can do? (FCI reading)

This makes it difficult to observe an intervention effect in question formation caused by "can", but we can note that the reading that would require use of alternatives, i.e. the free choice reading of "any" produced by the modal, is conspiciously absent in the relevant configurations[1]:

(14) The girls and the boys have formed separate groups. We want them to interact more with each other. Since the kids (especially the boys) are a bit peculiar about this topic, this requires that a teacher that introduces a girl to a boy needs a certain connection to the boy. So the

[1]Note that the data concerning "can" and free choice readings is preliminary. The small number of native speakers I consulted agree with these judgements, but a proper study on the acceptability of these items still needs to be done.

question is...
To which boy can which teacher introduce any girl?

a. *Which boy/teacher-pairs x/y are such that for all girls z: y can introduce z to x. (FCI reading)
b. Which boy/teacher-pairs x/y are such that there is a girl z and y can introduce z to x. (NPI reading)

Again, if "can" is used to enable a free choice reading, it becomes a barrier for QR:

(15) Anyone can say nothing.
a. ∀x[it could be the case that ¬∃y[x says y]]
b. *¬∃y[∀x[it could be the case that x says y]]

3 Four Classes and a Pecking Order

We can note two thing about four elements above:

a.) While "only" and "every" require prosodic marking on the source of alternatives to do their thing, indefinites and "can" are able to do without. I will call this overt and covert focus[2].

b.) While "only" cannot work without a focused element and there is no existential closure for an indefinite without an indefinite, "every" and "can" work perfectly fine without a source of alternatives. I will call this obligatory and optional evaluation.

	overt	covert
obligatory	only	∃
optional	every	can

These four classes display an interesting hierarchical behaviour.

(16) obligatory/overt > optional/overt > obligatory/covert > optional/covert

obligatory/overt vs. optional/overt

We saw above (repeated in (17)), that "only" causes an intervention effect for "every". This is not the case the other way round.

(17) Everyone thinks that only Peter_{F} calls Mary_{F}.
a. For all x: x thinks that only Peter calls Mary.
b. *For all x: if x thinks that only Peter calls someone, x thinks that only Peter calls Mary.

(18) Peter only thinks that everyone calls Mary_{F}.
a. Only Mary is y such that Peter thinks that for all x: x calls y.

[2]...which implies a lot more than I am actually willing to defend. This nomenclature is more of a shorthand for the time being.

b. *Only Mary is y such that Peter thinks that for all x: if x calls someone, x calls y.

Instead, "only" seems to stop "every" from using the focus in its scope. This is even the case when there is more than one focus available:

(19) Peter only said that everyone introduced Mary_{F} to Sue_{F}.
   a. Mary/Sue is the only x/y such that Peter said that everyone introduced x to y.
   b. *Mary is the only x such that Peter said that everyone who introduced x to someone, introduced x to Sue.
   c. *Sue is the only y such that Peter said that everyone who introduced someone to y, introduced Mary to y.

optional/overt vs. obligatory/covert

If we go one step down the ladder, we can see similar behaviour. The rumor in (20) can be about a specific student, i.e. the indefinite can take scope above the definite article. (Note that for reading (20-a.), it does not matter whether the indefinite takes scope above or below "every", as the PSP of the definite article will lead to a specific reading either way.)

(20) Everyone told Mary_{F} the rumor that the dean ordered a student of mine to her office.
   a. ∀y[∃x[student(x) & y told someone the rumor that the dean ordered x to her office → y told Mary the rumor that the dean ordered x to her office]]
   b. ∀y[y told someone the rumor ∃x[student(x) & the dean ordered x to her office] → y told Mary the rumor ∃x[student(x) & the dean ordered x to her office]]

This changes, if we move the focus that "every" associates with into the definite description:

(21) Everyone told Mary the rumor that the dean_{F} ordered a student of mine to her office.
   a. *∀y[∃x[student(x) & y told Mary the rumor that someone ordered x to their office → y told Mary the rumor that the dean ordered x to her office]]
   b. ∀y[y told Mary the rumor ∃x[student(x) & someone ordered x to their office] → y told Mary the rumor ∃x[student(x) & the dean ordered x to her office]]

Existential closure cannot be in a position where it would cause an intervention effect for "every", even though "every" does not require association with focus to function.

obligatory/overt vs. obligatory/covert

The same effect can be observed for "only":

(22) a. Peter only told Mary_{F} the rumor that the dean ordered a student of mine to her office.
b. Peter only told Mary the rumor that the dean_{F} ordered a student of mine to her office.

optional/covert vs. obligatory/overt

To test the optional/covert class, I will use "can" in combination with "any". If a free choice reading is available, the modal is focus evaluating, as in (23):

(23) Peter thinks that he can tell Mary anything.
$\forall$x[Peter thinks that he can tell Mary x]

The presence of "only" blocks this reading. The only available reading in (24) is the existential NPI reading, licensed by "only".

(24) Peter only thinks that he can tell Mary_{F} anything.
a. *Mary is the only y such that $\forall$x[Peter thinks that he can tell y x]
b. Mary is the only y such that $\exists$x[Peter thinks that he can tell y x]

The effect vanishes, if the focus that "only" associates with is above "can". In (25), the NPI reading and the FCI reading are available:

(25) Only Peter_{F} thinks that he can tell Mary anything.
a. Peter is the only y such that $\forall$x[y thinks that he can tell Mary x]
b. Peter is the only y such that $\exists$x[y thinks that he can tell Mary x]

Again, "can" cannot be focus evaluating, if it is in a position to cause an intervention effect for "only".

optional/covert vs. optional/overt

As expected, the effect persists for "every". In (26), the only (marginally) available reading is a contrastive one (i.e. as an answer to "Everyone thinks that Peter can tell Sue anything.").

(26) *Everyone thinks that Peter can tell Mary_{F} anything.

Again, a free choice reading is easily available when the focus is above "can".

(27) Everyone thinks that Peter_{F} can tell Mary anything.

optional/covert vs. obligatory/covert

A free choice reading should not be available if an indefinite is between the modal and "any". Either existential closure is between the two, in which case it should create an intervention effect, or it is above the modal, which would mean that the modal creates an intervention effect for the indefinite. If the indefinite takes scope above the modal and the modal is not focus evaluating, "any" is not licensed. Consider (28):

(28) Peter can tell a friend anything.
a. *$\exists$x[friend(x) & $\forall$y[Peter can tell x y]]

b. *∀y[∃x[friend(x) & Peter can tell x y]]
c. (∀x,y[x is a typical friend → Peter can tell x y])

The only reading that seems to be available is a free choice reading, but one in which "a friend" receives a generic reading.

4 Rules of Intervention

The result of the above is a pattern of "making way", in which evaluating overt focus takes precedence over covert and if both foci are of the same type, obligatory evaluators take precedence over optional. This pattern can be more precisely described using the rules in (29):

(29) Rules to avoid intervention effects:

a. A focus evaluating operator does not have any other focus evaluating operator between itself and the nearest focus it can associate with.

b. A focus evaluating operator that cannot associate with a certain type of focus does not have an item with focus of that type in its scope without a focus evaluating operator in between.

c. An operator that optionally evaluates focus does so if and only if there is a focused element in its scope and there is no focus evaluating operator in between.

Rule a.) is basically only saying "Do not cause intervention effects." Rule b.) comes with the caveat that covert focus can be interpreted as overt, but not vice versa. From an intuitive point of view, this says that you are allowed to assume that you missed an overt focus, but you are not allowed to ignore one. From a technical point of view, this makes sure that interpreting overt focus takes precedence over covert focus. Rule c.) makes sure that optional evaluation is systematic.

These rules are prioritized. Violating rule a.) leads to ungrammaticality. Breaking rule b.) would require a configuration where overt focus is inbetween an obligatory/covert evaluator and the source of alternatives it wants to evaluate. This kind of configuration would also violate a.), since the obligatory/covert evaluator would be in a position to cause an intervention effect for whatever evaluates the overt focus. Rule c.), however, can be broken, but only to avoid violating rule a.). An example of this would be (30) (repeated from above):

(30) Peter only thinks that everyone calls Mary_{F}.

a. Only Mary is y such that Peter thinks that for all x: x calls y.
b. *Only Mary is y such that Peter thinks that for all x: if x calls someone, x calls y.

5 Discussion

With these rules, we can account for the pattern using a Beck (2006)-style approach. There are, however, some problems.

- The rules do not fall out from the approach as is. They would need to be justified using some additional machinery/principle/maxim.
- Implementing the QR barrier would require some covert movement (QR) to rely on alternatives in some way. Other covert movement, namely covert wh-movement (which can cross "only", as shown in e.g. Kotek 2014) should, however, not be affected.

An approach based on movement/binding, such as Kotek (2017), has an advantage here in so far that an interaction between movement and intervention effects is expected. But similar problems remain:

- If intervention effects are caused by a λ-binder within alternatives, the rules proposed above translate into very strange restrictions on movement that would need justification.
- The movement that is predicted to cause trouble is movement into the path of association, not movement out of it. Again, there are elements that do move out of this path. Kotek (2017) allows, for example, QR of an intervener out of the association path of (no intervention effect causing) Q. Implementing the QR barrier created by intervention effect causing elements would therefore require separate types of movement/binding - or different ways of creating alternatives - as well.

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