Exceptional de re via exceptional scope[1]

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February 26, 2020

[1] Thanks to Keny Chatain, Kai von Fintel, Julian Grove, Patrick Niedzielski, and three anonymous WCCFL reviewers for useful comments.

1 *Roadmap*

- Predicates are *world-sensitive*; in an intensional context, DPs may be interpeted *de re* or *de dicto*:

(1) George wants [$\overbrace{\boxed{\text{the Red Sox players}}\text{ to win the game}}^{\text{intensional context}}$].

  - Under the *de re* interpretation, *Red Sox player* is interpreted relative to the utterance evaluation world; (1) can be true even if George's desires don't pertain to Red Sox players, but rather to a group of people who (unbeknownst to him) happen to be Red Sox players.
  - Under the *de dicto* interpretation, *Red Sox player* is interpeted relative to George's *want*-worlds; (1) need not entail that any Red Sox players are playing.

- Two broad camps in accounting for world sensitivity – the Binding Theory of Intensionality (BTI)[2] and the Scope Theory of Intensionality (STI).[3]
- The BTI is powerful, but must be supplemented with a binding theory for world variables.[4] The STI is much more restrictive, but (seemingly) under-generates.
- Scope theory state of the art – Keshet's *split intensionality*[5] – succeeds in addressing some of the worst over-generation issues, but others remain.
- Concretely, Grano (2019) shows that the account of exceptional *de re* for indefinites (Keshet 2010) runs into some apparently insurmountable obstacles.
- I'll aim to improve on split intensionality by presenting a new take on the STI – which I'll call the *generalized scope theory* – whereby expressions can receive exceptional *de re* interpretations via recursive scope-taking,[6] facilitated by a minimal inventory of type-shifters.
- The generalized scope theory will preserve a central claim of split intensionality – *de re* requires movement to an edge position.
- The resulting theory will bear a (non-accidental) family resemblance to Charlow's (2014, 2019) theory of exceptionally-scoping indefinites.[7]

[2] See, e.g., Percus (2000) and Heim & von Fintel (2011: chapter 8).

[3] Heim & von Fintel (2011) refer to this as the *standard theory*.

[4] For example, it doesn't have a principled explanation for the fact that nominal predicates may be interpeted *de re* but verbal predicates may not (Percus's GENERALIZATION X).

[5] Keshet 2008, 2011

[6] A technique pioneered by Dayal (1996).

[7] See also Elliott 2019 and Demirok 2019 for extensions of Charlow's system to *wh*-questions.

The bigger picture is as follows: much like the indeterminacy associated with indefinites, world-sensitivity is an *effect* that can take exceptional scope via the bind of the underlying monad.

2 The scope theory vs. the binding theory

- The scope theory says, roughly, that an expression is interpreted *de dicto* if it scopes below an intensional operator, and *de re* if it scopes above an intensional operator.
- The binding theory says the predicates compose with a *world pronoun* which must be bound in a way consistent with whatever the binding theory says for world pronouns.

One immediate problem for the scope theory is the fact that scope islands do not always block *de re* interpretations.[8]

(3) George thinks $\overbrace{[\,\boxed{\text{every Red Sox player}}\text{ is staying in the Ritz-Carlton}]}^{\text{scope island}}$.

In (3), *Red Sox player* can be interpreted *de re*, even though the scope of the universal is roofed by the finite clause.[9]

Keshet's *split intensionality* theory is tailored to circumvent this problem.

2.1 Split intensionality

Keshet assumes that embedded clauses basically denote extensions, and attitude verbs are looking for intensions – in order to repair this mismatch, a type-shifter ^ is inserted at the clause-edge.

A QP may be interpreted *de re*, while nevertheless receiving narrow quantificational scope, by QR-ing to a position above ^ but below the attitude verb.

This is illustrated schematically below for the sentence in (3).

(5) George thinks
$\boxed{\text{every Red Sox player}}$ λx ^ [t_x is staying in the Ritz-Carlton].

In effect, ^ serves to create a privileged position at the clause edge in which QPs can be exceptionally interpreted *de re*.

We can note already that a straightforward prediction of split intensionality is that an expression can only be interpeted *de re* relative to the minimally

[8] The following can't mean: for each Red Sox player x, there is a potentially *different* guy who thinks that x is staying in the Ritz-Carlton.

(2) Some guy thinks that every Red Sox player is staying in the Ritz-Carlton.

[9] This is of course no problem for the BTI, assuming free insertion of an abstraction index a the edge of the matrix clause.

(4) 1 George thinks every Red Sox player$_{w_1}$ is staying in the Ritz Carlton.

containing scope island.

At face value, it is clear that this generalization doesn't hold, as pointed out by Grano. Consider the following example from Grano (2019: p. 162):

(6) a. *There is a group of people in this room. Neither Jo nor Mary know that they're in this room. Mary hopes they're actually outside. She reports her hope to Jo, and Jo believes her.*
b. ✓ Jo thinks [that Mary hopes [that everyone in this room is outside]].

So, it seems like there are simple cases in which split intensionality isn't sufficiently general.[10]

[10] Of course, this isn't accidental, but rather a design feature of Keshet's analysis. In support of this, Keshet observes (a) that counterfactuals with tautologous antecedents sound odd, and (b) if exceptional *de re* were available, it should rescue embedded counterfactuals.

(7) #If three professors were professors, the classes would be better taught.

(8) #Mary thinks that if three professors were professors, the classes would be better taught.

I don't have much to say about these examples, except that they can be much improved with some manipulation.

(9) a. #If three syntacticians were linguists, the classes would be more fun.
b. Mary thinks that the classes would be better taught if three syntacticians were linguists – she has no idea what they do!

We'll come back to this point, but in the meantime we'll shift gears and consider another challenge for split intensionality and the STI more generally – Bäuerle's puzzle.

3 *Bäuerle's puzzle*

Consider the following example:[11]

[11] From Keshet 2010: p. 692, ex 1, loosely based on an example in German from Bäuerle (1983).

(10) George thinks $\boxed{\text{every Red Sox player}}$ is staying in $\boxed{\text{some five star hotel}}$ downtown.

There is a reading with the following features:

- *Red Sox player* is interpreted *de re* – George's beliefs pertain to a group of men who happen to be Red Sox players, potentially unbeknownst to George.
- *Five star hotel* is interpreted *de dicto* – George's beliefs involve a five star hotel; the sentence may still be true even if there are no five star hotels, just so long as George believes that there are.
- *Some* takes scope over *every* – George thinks that all the people in question are staying at the *same* five star hotel downtown.

If we take any version of the STI, such as split intensionality, this reading would seem to place contradictory requirements on the scope of *some five star hotel*.

- In order for *some five star hotel* to be interpreted *de dicto*, it should scope below ^.

(11) ^ > some fsh

- In order for *every Red Sox player* to be interpreted *de re*, it should scope above ^.

(12) every rsp > ^

- By transitivity, this means that *every Red Sox player* should have to take scope over *some five star hotel* – but this doesn't capture the reading we're interested in. Whoops!

Keshet recognizes that the problem here is a too-tight connection between the *quantificational* scope of an expression, and its *intensional* scope.

3.1 Keshet's solution

Keshet (2010) suggests that *some five star hotel* is a *specific indefinite*, and therefore involves a choice-functional variable existentially bound.[12]

Keshet's innovation is the suggestion that the choice function returns a member of the NP restrictor at the local evaluation world.

Together with the *split intensionality hypothesis*, this allows him to derive the problematic reading with the following LF:

(13) $\exists f$ George thinks $\boxed{\text{every Red Sox player}}$ $\lambda x \wedge [x$ is staying in f(five star hotel)].

[12] A function f is a *choice function* iff f is of type $(\mathtt{a} \to \mathtt{t}) \to \mathtt{a}$, and for any predicate P, $f\ P \in P$

3.2 Grano's challenge

According to Keshet (2010) then, the solution involves an exceptionally-scoping indefinite, the restrictor of which is interpreted *de dicto*.

As demonstrated by Grano (2019), exceptionally-scoping indefinites can also receive *de re* interpretations.[13]

(14) a. *Jo and Bill are out shopping. Bill finds a hat that he likes and considers purchasing it. It so happens that the hat is just like mine, but neither Jo nor Bill know this. Jo thinks that that the hat looks great on Bill and hopes he'll buy it.*

b. ✓ Jo hopes that Bill will buy $\boxed{\text{a hat just like mine}}$.

[13] The following example from Grano 2019: p. 162.

Keshet can account for this by QRing the restrictor of the indefinite to a position above the intensionalizing operator at the edge of the scope island.

(15) $\exists f$ Jo hopes $\boxed{f(\text{hat just like mine})}$ λx ^ [Bill will buy t_x]

This solution seems to work just fine, but as pointed out by Grano 2019, it won't generalize to cases involving more deeply embedded scope islands.[14]

(16) a. *Mary, Jo, and Bill are out shopping. Bill finds a hat that he likes and considers purchasing it. It so happens that the hat is just like mine, but neither Mary, nor Jo, nor Bill know this. Jo thinks that the hat looks great on Bill and hopes he'll buy it. Jo expresses her hope out loud, and Mary believes Jo.*

b. Mary thinks that Jo hopes that Bill will buy [a hat just like mine].

Since QR is clause-bounded, the best Keshet can do is the following LF, which doesn't derive the attested reading:

(17) $\exists f$ Mary thinks that Jo hopes [$\boxed{\text{a hat just like mine}}$ λx ^ Bill will buy t_x].

In the remainder of the paper, Grano (2019) briefly lays out (and rejects) other possible moves Keshet could make. I won't dwell on the remainder of the argumentation here, but I'll take this as a prompt to try to do better.

4 *Scope theory redux*

In this section, we'll start from minimal means and bootstrap a different way of achieving world-sensitivity that (I'll argue) slices the pie in just the right way.

Rather than assuming that the interpretation function $[\![.]\!]$ is relativized to a world parameter, I'll simply assume that we want our semantics to deliver intensions as sentential meanings.

The simplest way of accomplishing this is to assume that predicates deliver propositions rather than truth values, i.e.,[15]

(19) $[\![\text{swim}]\!] \coloneqq \lambda x w \,.\, \mathsf{swim}_w\ x$ $\qquad \mathsf{e} \to \mathsf{S}\ \mathsf{t}$

Without going into the details of DP-internal composition (yet), I'll assume

[14] The following example from Grano 2019: p. 162.

[15] Here, S is the *type constructor* for world-sensitive values.

(18) $\mathsf{S}\ \mathsf{a} \coloneqq \mathsf{s} \to \mathsf{a}$

In other words, its a function from types to intensional types. Here, s is the type of worlds.

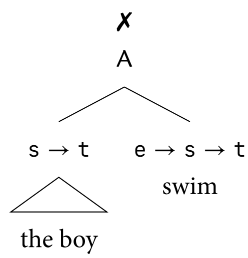
without argument that definite descriptions denote *individual concepts*, i.e., world-sensitive individuals.

(20) $[\![\text{the boy}]\!] = \lambda w \, . \, \iota x[\text{boy}_w \; x]$ $\quad$ `S e`

It will turn out that thinking through the problem of how to compose (20) with (19) will be the key to unlocking an intensional grammar with just the combinatoric potential we need to achieve *exceptional de re*.

Assuming that the only semantic composition rule available to us is function application (A), attempting to compose a definite description and a predicate will result in a type mismatch.

(21)



[16] If you're familiar with haskell (or category theory), you'll recognize the type signature of bind. Where `m` is a monad, monadic bind is of type `m a → (a → m b) → m b`

In fact, our bind is just the bind of a `Reader` monad.

[17] N.b. that, for our purposes, we could have made bind rigidly typed, where `a = e`, and `b = t`. Instead, I've given bind a maximally polymorphic type based on what we want it to do.

What's the problem here? It looks like we need to extract the type `e` part of the definite description and feed it into the predicate, while ensuring that *boy* and *swim* are interpreted relative to the same evaluation world.

Below, I define a composition rule ☆ (pronounced: *bind*) in order to accomplish just this.[16,17]

(22) Bind (def.)
$m^{☆} \coloneqq \lambda k \, . \, \lambda w \, . \, (k \; (m \; w)) \; w$[18] $\quad$ `☆ : S a → (a → S b) → S b`

[18] An alternative rendering in terms of function composition might be helpful for developing an intuition for what bind is doing:

First off, note that there's a very natural way of collapsing two layers of world-sensitivity into one – we simply abstract out a λw and collapse both layers of world-sensitivity by feeding in w twice. We'll call this method *join* (μ).

(22) $m^{\mu} \coloneqq \lambda w \, . \, m \; w \; w$ $\quad$ μ `: S (S a) → S a`

We can now define bind in the following way:

(23) Bind (alternative def.)
$m☆k \coloneqq (k \circ m)^{\mu}$

Composing m with k gives back a function of type `S (S b)`. To get back something of type `S b` we use join.

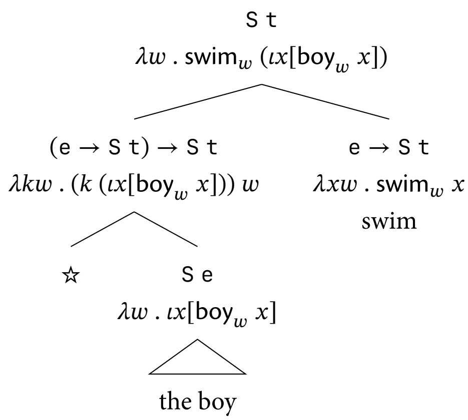
Bind takes an argument m and a function k; it returns a new function from a world w, where:

- w is first fed into m, and then...
- ...the result is fed into k, and the resulting open world argument is saturated again by w.

Now that we have bind, I'll assume that definite descriptions are *bind-shifted* in order to allow them to compose with predicates.

(25) The boy swims.

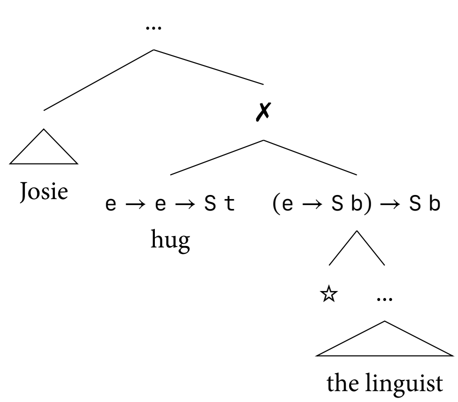
(26)



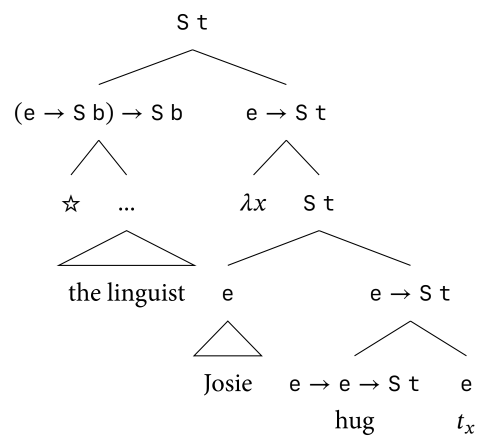
Tellingly, when we have a definite description in *object position*, it must be bind-shifted and undergo QR in order for composition to proceed:[19]

[19] Glossing over a whole bunch of complications, I'm assuming here that proper names are rigid, i.e., *world-insensitive*. Assuming an ontology with trans-world individuals, we can simply treat names as being of type e.

(27)



(28)



A helpful intuition

Bind takes an intensional *a* and turns it into a *scope-taker*.

4.1 Exceptional de re

Perhaps surprisingly, we now have *almost* everything we need to account for *exceptional de re* readings of definite descriptions.[20]

[20] Keshet (2011) acknowledges that definites can be interpreted *de re*, even in deeply embedded environments, but speculates that definites have a distinct route to *de re* than QPs, gesturing towards Donnellan's (1966) referential/attributive distinction.

All else being equal though, it would be nice to have a unified treatment of *de re* that doesn't require a different treatment for definites. Furthermore, Romoli & Sudo (2009) present data indicating that restrictions on *de re* readings of definites track restrictions on scope. We'll see this later.

We just need one extra ingredient, which will play a similar role to Keshet's ^ type-shifter; therefore, we'll also call it ^:

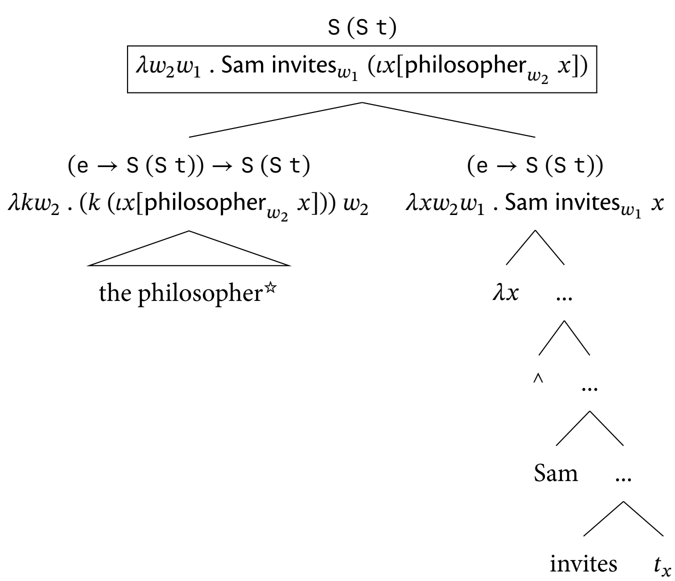
(29) Up operator (def.)
$\hat{}\ a \coloneqq \lambda w\ .\ a$ $\qquad\qquad$ $\hat{}\ : \mathtt{a} \to \mathtt{S\ a}$

All that the up-shifter does is add a vacuous world argument. Now we can derive the *de re* interpretation of *the philosopher* in the following example:

(30) Tom hopes [Sam invites $\boxed{\text{the philosopher}}$].

Step 1: scope the bind-shifted definite description over an up-shifter inserted at the edge of the scope-island:

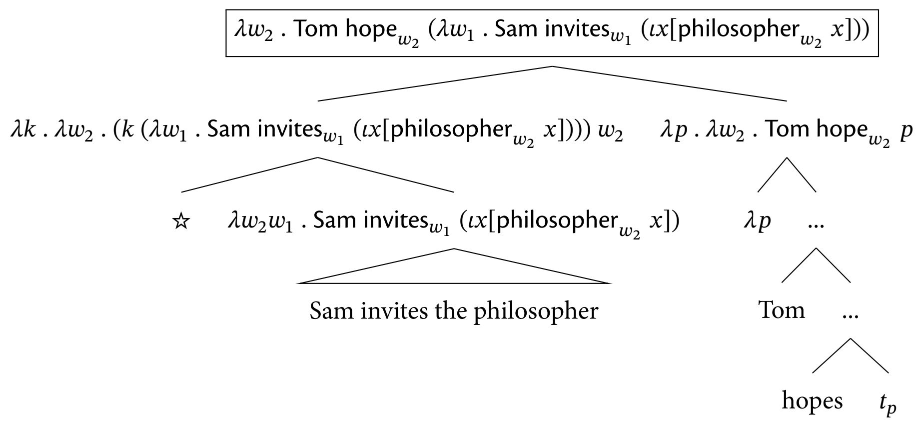
(31)



the result is a *world-sensitive proposition* of type S (S t), where *invite* is interpreted relative to the inner world argument, and *philosopher* is interpreted relative to the outer world argument.

Step 2: Bind-shift the scope island, and QR it to the edge of the matrix clause.

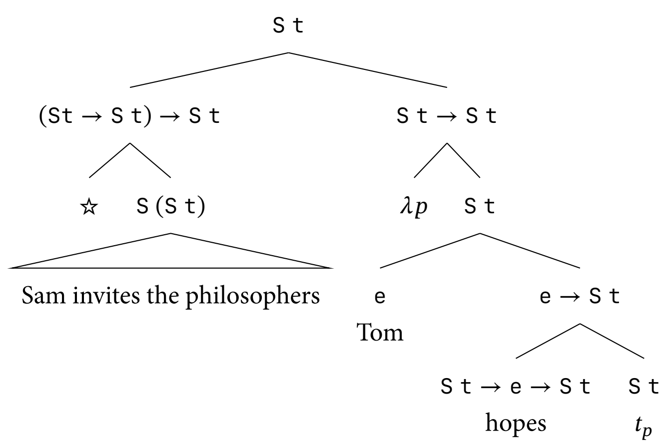
(32)



We've successfully derived the *de re* reading of the definite.

Let's zoom out and make sure the types work out:

(33)

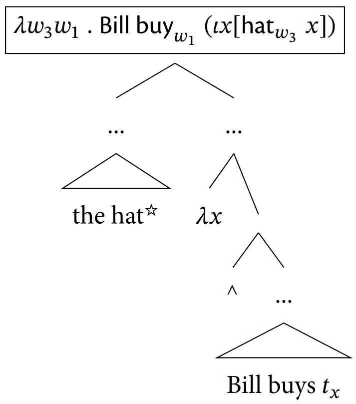


This general mechanism will generalize to more deeply embedded scope islands:

(34) Mary thinks [that Jo hopes [that Bill buys the hat just like mine]].

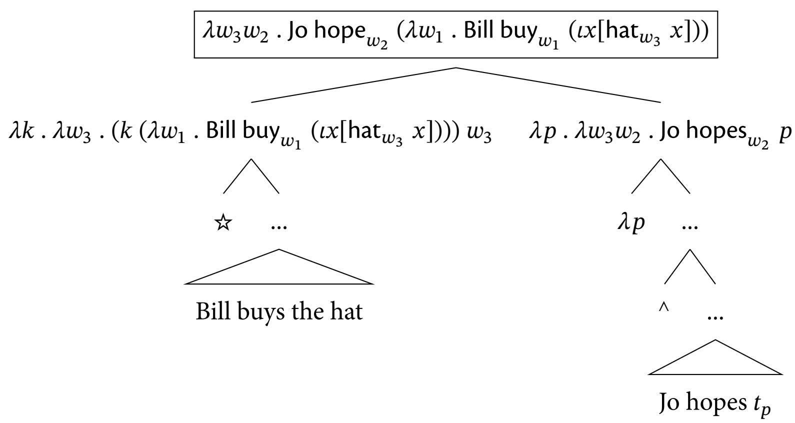
Step 1: scope the definite over an up-shifter:

(35)



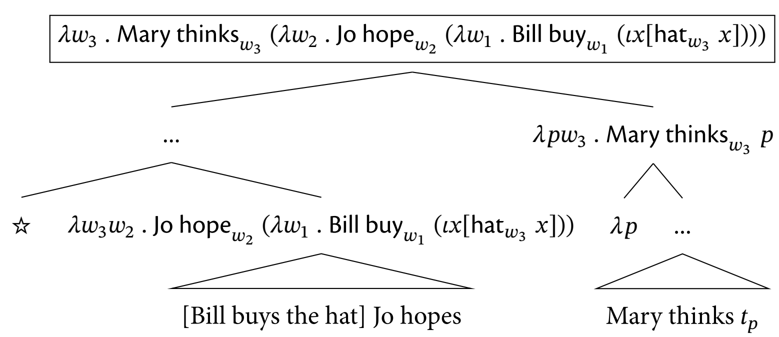
Step 2: bind-shift the scope island and scope it over an up-shifter:

(36)



Step 3: bind-shift the result, and scope it to the edge of the matrix clause:

(37)



Schematically, a *de re* interpretation for a DP embedded in two scope islands can be derived via the following LF:

(38) $[_{\text{island}_3} \boxed{[_{\text{island}_2} \boxed{[_{\text{island}_1}\ \text{DP}^{\star}_{1} \wedge [\ ...t_1...\ ]]^{\star}_{2}} \wedge [\ ...t_2...\ ]]^{\star}_{3}}\ [\ ...t_3...\ ]]$

An intermediate *de re* interpretation can be derived by only scoping the innermost scope island.

The mechanism for deriving exceptional *de re* therefore, at LF, involves *recursive cyclic scope-taking* (Charlow 2017).[21,22]

4.2 *Evidence for scope*

Since Keshet (2011), for independent reasons, rejects a scope-based theory of *de re* interpretations on definites, it's worth dwelling on what this buys us.

Romoli & Sudo observe a constraint on *de re*/*de dicto* readings of nested DPs:

(39) *Nested DP constraint*
When a DP is embedded inside a DP, the embedding DP must be opaque if the embedded DP is opaque.

If we take the following sentence, this blocks a reading where *president* takes narrow intensional scope, and *wife* takes (exceptionally) wide intensional scope:

(40) Mary thinks $\boxed{\text{the wife of } \boxed{\text{the president}}}$ is nice.

As Romoli & Sudo (2009) observe, the sentence is intuitively false in the following context: *Mary sees Bono Vox on TV with his wife Alison Hewson. Mary wrongly believes that he is the president, and furthermore, that the nice woman next to him is his sister. Thus, the wife-relation is actually true, but the characterization of Bono Vox as the president is not*

On the BTI, this reading is easy to generate. On a scope theory however, such as the one outlined here, the corresponding LF will inevitably involve an unbound trace (here: t_3):

(41) $\boxed{[_{\text{island}} \boxed{[\text{the wife of } t_3]^{\star}_{2}} \wedge [\text{the president}]^{\star}_{3}\ t_2 \text{ is nice }]^{\star}_{1}}$ Mary thinks t_3.

[21] It's not a coincidence that the combinatorics for exceptional *de re* bear a resemblance to Charlow's (2019) account of exceptionally-scoping indefinites via cyclic scope.

The type-constructor `S`, alongside the bind-shifter and up-shifter constitute a typed instantiation of the `Reader` monad.

Charlow shows in detail how the bind associated with a given monad `M` can be interpreted as a method for lifting a value of type `M a` into a scope-taker.

[22] I've framed the analysis here in terms of quantifier raising, but a completely isomorphic could be given in a fragment which uses *continuations* (Barker 2002, Barker & Shan 2014) as an in-situ scope-taking mechanism, as in Charlow 2014. It's hard to find genuinely *syntactic* evidence for the movements posited here, so ultimately this may be a better way to go.

5 *Extending the fragment: determiners*

There are (at least) two outstanding issues with the current state of our fragment:

- We haven't said anything yet about what QPs denote, so we aren't in a position to address Grano's challenge.
- Relatedly, we haven't said anything yet about DP-internal composition.

It will turn out that resolving the latter issue will also give us a natural answer to the former question.

Let's begin by thinking about how a definite determiner composes with its restrictor.

We'll assume a Fregean denotation, i.e.:

(42) $[\![\text{the}]\!] := \lambda R \,.\, \iota x[R\ x]$ $\qquad (\mathtt{e} \to \mathtt{t}) \to \mathtt{e}$

If we want our rule to be maximally general, we need a way of composing something of type $\mathtt{S}\ ((\mathtt{a} \to \mathtt{b}) \to \mathtt{c})$ with something of type $\mathtt{a} \to \mathtt{S}\ \mathtt{b}$ to give back something of type $\mathtt{S}\ \mathtt{c}$.

We'll accomplish via a new operation, which we'll call *c-lift*. C-lift captures a similar intuition to bind – bind provides a way of lifting intensional values into intensional scope-takers; c-lift provides a way of lifting intensional scope-takers into scope-takers with an intensional return type.[23]

(46) C-lift (def.)
$m^\star := \lambda n w \,.\, m\ w\ (\lambda x \,.\, n\ x\ w)$ $\qquad \mathtt{S}\ ((\mathtt{a} \to \mathtt{b}) \to \mathtt{c}) \to (\mathtt{a} \to \mathtt{S}\ \mathtt{b}) \to \mathtt{S}\ \mathtt{c}$

One we up-shift our determiner, we can c-lift it to achieve the following result – a function from a restrictor to an individual concept of type $(\mathtt{e} \to \mathtt{S}\ \mathtt{t}) \to \mathtt{S}\ \mathtt{e}$.

(47) $(^\wedge\ [\![\text{the}]\!])^\star = \lambda n w \,.\, \iota x[n\ x\ w]$ $\qquad (\mathtt{e} \to \mathtt{S}\ \mathtt{t}) \to \mathtt{S}\ \mathtt{e}$

Exactly the same trick will generalize to the quantificational determiners.

Let's start with a classical entry for *every*:

[23] For the haskellers/category theorists in the audience, you'll notice that, although extremely useful for lifting natural language determiners, this is not a very familiar type-signature. In fact, this is operation requires something strictly stronger than a monad, namely a monad m for which an operation *inject* can be defined:

(43) $\text{inject} : (\mathtt{a} \to \mathtt{m}\ \mathtt{b}) \to \mathtt{m}\ (\mathtt{a} \to \mathtt{b})$

As far as I can tell, a "natural" implementation of *inject* should be subject to the following identity law:

(44) $\lambda f \,.\, \lambda x \,.\, \mathtt{fmap}\ (\lambda k \,.\, k\ x)\ (\text{inject}\ f) = id$

For this class of monads (which includes at least `Reader` and (I think) `Writer`), c-lift is defined as follows. Consequently, for just this class of monads, we can define a general operation for lifting monadic computations into computations where monadic effects are pushed to the return type.

(45) $m^\star := \lambda k \,.\, (m\ \text{ap}\ (\text{inject}\ (\lambda x \,.\, k\ x)))^\mu$

Thanks especially to Keny Chatain, Julian Grove, and Patrick Niedzielski for helping me clarify this.

(48) $[\![\text{every}]\!] \coloneqq \lambda rs\,.\,\forall x[r\,x \to s\,x]$ $\qquad (\texttt{e} \to \texttt{t}) \to \texttt{t}$

If we first up-shift it, and then c-lift the result, we get the following meaning; a function from a predicate to an intensional scope-taker:

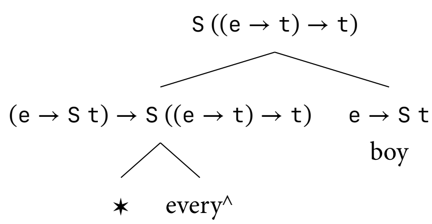
(49) $[\![\text{every}]\!]^{\ast\circ\wedge} = \lambda rw\,.\,\lambda s\,.\,\forall x[r\,x\,w \to s\,x]$ $\qquad (\texttt{e} \to \texttt{S}\,\texttt{t}) \to \texttt{S}\,(\texttt{e} \to \texttt{t}) \to \texttt{t}$

Composing this meaning with a restrictor, e.g., *boy*, will result in the following:

(50) $\lambda w\,.\,\lambda s\,.\,\forall x[\mathsf{boy}_w\,x \;\to s\,x]$ $\qquad \texttt{S}\,((\texttt{e} \to \texttt{t}) \to \texttt{t})$

The internal composition for a QP therefore follows from the following LF:

(51)



6 *Back to Bäuerle's puzzle*

We now have all the pieces we need to account for Bäuerle's puzzle.

To remind you:

(52) George thinks every Red Sox player is staying in some five star hotel downtown.

I'll assume that the meanings of *every Red Sox player* and *some five star hotel* are assembled via c-lift:

(53) a. $[\![\text{every Red Sox player}]\!] = \lambda wk\,.\,\forall y[\mathsf{rsp}_w\,y \to k\,y]$
b. $[\![\text{some five star hotel}]\!] = \lambda wk\,.\,\exists x[\mathsf{fsh}_w\,x \wedge k\,x]$

Note that if we take an intensional QP, and c-lift it *again*, we derive something that scopes at an intensional abstract:

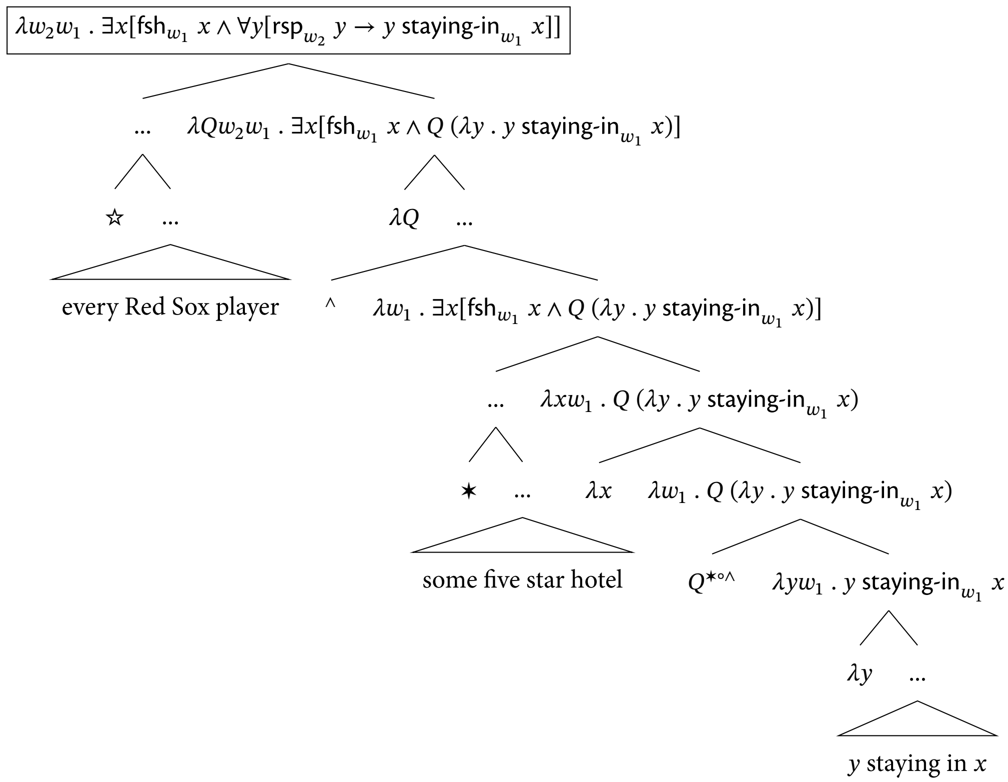
(54) $[\![\text{every Red Sox player}]\!]^{\star} = \lambda k \,.\, \lambda w \,.\, \forall y[\mathsf{rsp}_w\ y \rightarrow k\ y\ w]$

Inside of the embedded clause, *some five star hotel* scopes to a position below the *up* operator, via c-lift.

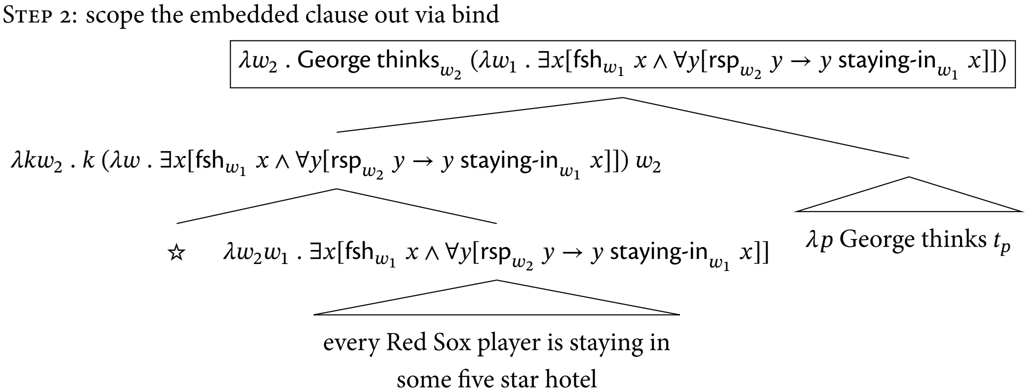
every Red Sox player scope to a position *above* the up-shifter via bind, leaving behind a higher-type trace below the existential's scope site.[24]

[24] In this upgraded fragment, bind is still essential in order to allow for semantic reconstruction.

(55) Step 1: compute the value of the embedded clause



(56) Step 2: scope the embedded clause out via bind



7 *Specificity and transparency*

More generally, this system divorces intensionality and quantification in a systematic way. Consider the famous constellation of readings for the following sentence, as discussed by Fodor (1970).

(57) Mary wants to buy an expensive coat.
   a. ✓Non-specific opaque
      Narrow quantificational and intensional scope
   b. ✓Specific transparent
      Wide quantificational and intensional scope
   c. ✓Non-specific transparent
      Narrow quantificational and wide intensional scope
   d. ✗Specific opaque
      Wide quantificational and narrow intensional scope

7.1 Non-specific opaque

This is easy – an c-lifted QP scopes below *want*.

(58) Mary wants [$\boxed{\text{an expensive coat}}^{*}$ (λx PRO buy t_x)]

Quantificational and intensional effects scope together.

7.2 Specific transparent

This is easy too – an c-lifted QP scopes above *want*.

(59) $\boxed{\text{an expensive coat}}^{*}$ (λx Mary wants PRO buy t_x).

Quantificational and intensional effects scope together.

7.3 Non-specific transparent

There are at least two ways we could achieve this:

(i) A bind-shifted QP scopes above *want*, and the quantificational part of the meaning reconstructs:[25]

[25] Achieving the so-called "third reading" via semantic reconstruction was proposed in Heim & von Fintel 2011: chapter 8.2.7.

(60) $\boxed{\text{an expensive coat}}^{\star}$ (λQ Mary wants (Q (λx PRO buy x))).

(ii) A c-lifted QP scopes to the edge of the embedded infinitival over an up-shifter, which in-turn is bind-shifted and scopes above *want*.[26]

[26] There's no motivation for positing pied-piping in this particular case since the complement of *want* isn't a scope island.

(61) A different student wants to attend every seminar. $\forall > \exists$

(62) $\boxed{\boxed{\text{an expensive coat}}^{\star}\ \lambda x\ ^\wedge\ \text{PRO buy } x}$ (λp Mary wants p).

Intensional effects can out-scope quantificational effects.

7.4 Specific opaque

There is no obvious way of achieving wide quantificational and narrow intensional scope on this system.

One possibility we could entertain is that certain expressions can leave behind a type `S e`. This allows, e.g., definite descriptions to *totally semantically reconstruct*.

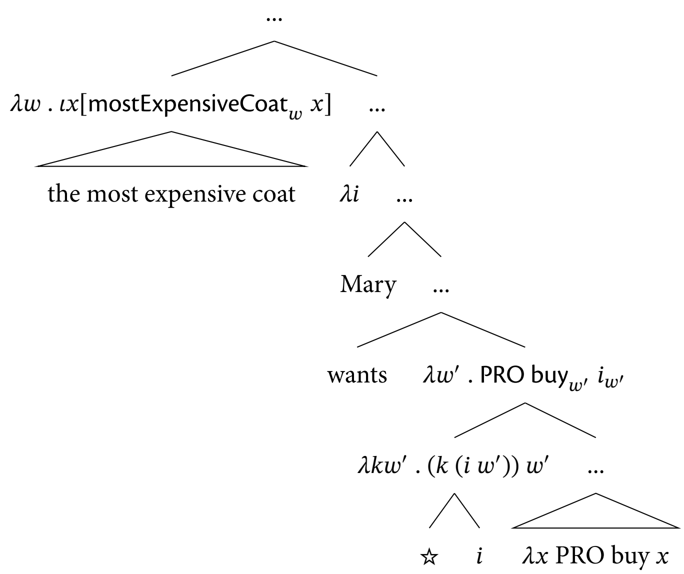
Consider, e.g., the following example:

(63) The most expensive coat, MARY wants to buy.

The most expensive coat can be interpreted *de dicto*. In order to account for this, we can totally semantically reconstruct the definite description.[27]

[27] Technically, the QP semantically reconstructs to an intermediate position, where it is bind-shifted.

(64)



However, based on the machinery we've introduced for lifting classical GQs into intensional operators, determiners always induce quantification over (extensional) individuals.

Since we derive meanings for QPs of type $\mathtt{S}\ ((\mathtt{e} \rightarrow \mathtt{t}) \rightarrow \mathtt{t})$, then if they can leave behind traces of this same type, we predict that QPs should be able to totally reconstruct too. This seems right:

(65) An expensive coat, Mary wants to buy.

Based on the machinery we've introduced however, there's no way to derive a quantifier over individual concepts from a classical GQ. Intuitively, this is what we would need to derive narrow intensional scope and wide quantificational scope.

Conjecture: there are no natural language quantifiers which quantify over individual concepts.

8 *Conclusion*

Starting from the assumption that definite descriptions denote individual concepts, and predicates return propositions, we've shown the following:

- A natural operation that shifts a description into a scope-taker (☆), alongside an operation for deriving trivially intensional meanings (^) *automatically* gives rise to exceptional *de re*; this is because, much like definite descriptions, scope islands can be bind-shifted.
- A natural operation for shifting determiners (∗), automatically gives rise to a system in which quantificational and intensional scope are divorced – either quantificational and intensional effects scope together, or intensional effects outscope quantificational effects (the third reading).

The result is a *generalized* scope theory which inherits many of the advantages of classical scope theory (Romoli & Sudo's generalization, etc.), while avoiding under-generation pitfalls (exceptional *de re*, Bäuerle's puzzle, etc.).

World-sensitivity slots neatly into a broader family of "effects" that may take exceptional scope via recursive scope taking.[28]

[28] Concomitantly, world-sensitivity in natural language requires the full expressive power of a *monad*; an applicative/functor isn't enough.

References

Barker, Chris. 2002. Continuations and the Nature of Quantification. *Natural Language Semantics* 10(3). 211–242.

Barker, Chris & Chung-chieh Shan. 2014. *Continuations and natural language* (Oxford studies in theoretical linguistics 53). Oxford University Press. 228 pp.

Bäuerle, Rainer. 1983. Pragmatisch-semantische aspekte der np-interpretation. In Manfred Faust et al. (eds.), *Allgemeine Sprachwissenschaft, Sprachtypologie und Textlinguistik: Festschrift für Peter Hartmann*, 121–131. Tübingen: Gunter Narr.

Charlow, Simon. 2014. *On the semantics of exceptional scope*.

Charlow, Simon. 2017. The scope of alternatives: Indefiniteness and islands. lingbuzz/003302.

Charlow, Simon. 2019. The scope of alternatives: indefiniteness and islands. *Linguistics and Philosophy*.

Dayal, Veneeta. 1996. *Locality in WH quantification*. Red. by Gennaro Chierchia, Pauline Jacobson & Francis J. Pelletier. Vol. 62 (Studies in Linguistics and Philosophy). Dordrecht: Springer Netherlands.

Demirok, Ömer. 2019. *Scope theory revisited: Lessons from pied-piping in wh-questions*. Massachussetts Institute of Technology dissertation.

Donnellan, Keith S. 1966. Reference and Definite Descriptions. *The Philosophical Review* 75(3). 281–304.

Elliott, Patrick D. 2019. Nesting habits of flightless *wh*-phrases. unpublished manuscript. University College London/ZAS.

Fodor, Janet Dean. 1970. *The linguistic description of opaque contents.* Massachusetts Institute of Technology Thesis.

Grano, Thomas. 2019. Choice functions in intensional contexts: Rehabilitating Bäuerle's challenge to the scope theory of intensionality. In Richard Stockwell et al. (eds.), *Proceedings of the 36th West Coast Conference on Formal Linguistics*, 159–164. Somerville, MA: Cascadilla Proceedings Project.

Heim, Irene & Kai von Fintel. 2011. Intensional semantics. Lecture notes.

Keshet, Ezra. 2008. *Good intensions : paving two roads to a theory of the de re / de dicto distinction*. Massachusetts Institute of Technology Thesis.

Keshet, Ezra. 2010. Possible Worlds and Wide Scope Indefinites: A Reply to Bäuerle 1983. *Linguistic Inquiry* 41(4). 692–701.

Keshet, Ezra. 2011. Split intensionality: a new scope theory of de re and de dicto. *Linguistics and Philosophy* 33(4). 251–283.

Percus, Orin. 2000. Constraints on Some Other Variables in Syntax. *Natural Language Semantics* 8(3). 173–229.

Romoli, Jacopo & Yasutada Sudo. 2009. *De re/de dicto* ambiguity and presupposition projection. In Arndt Riester & Torgrim Solstad (eds.), *Proceedings of Sinn und Bedeutung 21*. Universität Stuttgart.