Exceptional Scope as Discourse Reference to Quantificational Dependencies

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Abstract. The paper proposes a novel solution to the problem of exceptional scope (ES) of (in)definites, exemplified by the widest and intermediate scope readings of the sentence ***Every student of mine read every poem that a famous Romanian poet wrote.*** We propose that the ES readings have two sources: (i) discourse anaphora to particular sets of entities and quantificational dependencies between these entities that restrict the domain of quantification of the two universal determiners and the indefinite article; (ii) non-local accommodation of the discourse referent that restricts the quantificational domain of the indefinite article. Our account, formulated within a compositional dynamic system couched in classical type logic, relies on two independently motivated assumptions: (a) the discourse context stores not only (sets of) individuals, but also quantificational dependencies between them, and (b) quantifier domains are always contextually restricted. Under this analysis, (in)definites are unambiguous and there is no need for special choice-functional variables to derive exceptional scope readings.

1 The Problem and the Basic Proposal

The paper proposes a novel solution to the problem of exceptional scope (ES) of (in)definites (first noticed in [Farkas(1981)]), a problem that is still open despite the many insightful attempts in the literature to solve it. The ES cases we focus on here are the widest and the intermediate scope readings of (1), given below in first order translations:

1. `Every student of mine read every poem that a famous Romanian poet wrote.`
2. Narrowest scope (NS) indefinite:
   $\forall x(stud.o.m(x) \rightarrow \forall y(poem(y) \wedge \exists z(r.poet(z) \wedge write(z, y)) \rightarrow read(x, y)))$
3. a. Intermediate scope (IS) indefinite:
   $\forall x(stud.o.m(x) \rightarrow \exists z(r.poet(z) \wedge \forall y(poem(y) \wedge write(z, y) \rightarrow read(x, y))))$

   b. Context for the IS reading:
   It has been established that every student chose a poet and read every poem written by him.

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4. a. Widest scope (WS) indefinite:
   $\exists z(r.poet(z) \wedge \forall x(stud.o.m(x) \rightarrow \forall y(poem(y) \wedge write(z,y) \rightarrow read(x,y))))$
   b. Context for the WS reading:
   It has been established that every student chose a poet – the same poet – and read every poem written by him.

The availability of the ES readings is crucially dependent on the discourse context relative to which sentence (1) is interpreted – or the discourse context that can be accommodated based on the utterance context. The importance of the discourse context is shown by the fact that the IS reading is the only available reading when (1) is interpreted in the context given in (3b). Similarly, the WS reading is the only available one in the context given in (4b).

Starting from this observation, we propose that ES readings arise in the presence of anaphoric links between quantificational domains and dependencies. Such anaphoric links are supported by previous discourse or are created online.

For example, we derive the ES readings if the two ***every*** determiners and the indefinite article in (1) elaborate on the sets of individuals and the correlations between them assumed in the contexts given in (3b) and (4b) – as shown in (5), (6) and (7) below (the superscripts and subscripts indicate the antecedent-anaphor relations).

The IS interpretation arises because of the presence in the input discourse context of a function pairing students and poets that rules out the possibility of covariation between poets and poems. The WS reading arises because the domain restrictor for the indefinite is constant, thus making covariation impossible. In present terms, this means that the value of the discourse referent (dref) r'', the domain restrictor of the indefinite, is constant. We use drefs r, r', r'' etc. for domain restricting drefs, but this is just a mnemonic device – these drefs have the same status as any other dref for individuals, i.e., they can be introduced by quantifiers and indefinites and retrieved by subsequent pronouns, definites and quantifiers.

Finally, the NS reading arises by default, when there are no special contextual restrictions on the indefinite article and the ***every*** determiners.

5. Intermediate scope (IS) context:
   Every^{r} student chose a$^{r''}$ poet and read every$^{r'}$ poem written by him$_{r''}$.
6. Widest scope (WS) context:
   Every^{r} student chose a$^{r''}$ poet – the$_{r''}$ same$_{r''}$ poet – and read every$^{r'}$ poem written by him$_{r''}$.
7. Anaphora to previously introduced quantificational dependencies:
   `Every`$^{u \sqsubseteq r}$ `student of mine read every`$^{u' \sqsubseteq r'}$ `poem that a`$^{u'' \sqsubseteq r''}$ `famous Romanian poet wrote.`

Unlike the tradition inaugurated in [Fodor & Sag(1982)] and varied upon in [Reinhart(1997)] and [Kratzer(1998)], we take (in)definites to be unambiguous. Moreover, we do not need special choice-functional variables (as in [Winter(1997)]). Our proposal builds on the insight in [Schwarzschild(2002)] concerning the crucial role of contextual restrictions in the genesis of ES readings without, however, relying on the singleton quantifier domain restriction that [Schwarzschild(2002)] makes use of. We follow [Farkas(1997a)] in treating ES readings as being the result of the *interaction* between the indefinite and the other quantifiers present in its sentence, but we do not resort to assignment indices on determiners. Our account relies on two independently motivated assumptions: (*i*) the discourse context stores not only (sets of) individuals that are mentioned in discourse, but also dependencies between them (as motivated in [van den Berg(1996)], [Nouwen(2003)], [Brasoveanu(2007)] and references therein), and (*ii*) quantifier domains are contextually restricted.

We assume that the restrictor drefs r, r', r'' etc. can be non-locally introduced in certain cases. This is what is responsible for exceptional wide scope in downward entailing contexts, exemplified by (8) below based on [Chierchia(2001)] (p. 60, (16)). We can derive the correct truth-conditions for this sentence, provided in (9) below, if we represent it as shown in (10). Note that the first-order formula in (9) is in fact truth-conditionally equivalent to the $\neg(\forall x(ling(x) \ldots \exists z(prob(z) \ldots \forall y(sol(y) \ldots))))$ reading of sentence (8).

The crucial point is the accommodation of the dref r'' that provides the domain restrictor for the indefinite $\mathtt{some}^{u'' \sqsubseteq r''}$ `problem` intermediately between the two universal quantifiers $\mathtt{every}^{u}$ `linguist` and $\mathtt{every}^{u'}$ `solution`. We assume that such restrictor drefs, when they occur on indefinites as opposed to other types of DPs, can be freely accommodated at any point in the structure where presuppositions in general can be accommodated (see [Beaver & Zeevat(2007)] for a recent discussion of presupposition accommodation).

8. Not $\mathtt{every}^{u}$ linguist studied $\mathtt{every}^{u'}$ solution that $\mathtt{some}^{u'' \sqsubseteq r''}$ problem might have.
9. The most salient reading of (8):
$\exists x(ling(x) \wedge \forall z(prob(z) \rightarrow \exists y(sol(y) \wedge m.have(z, y) \wedge \neg study(x, y))))$
10. Not $\mathtt{every}^{u}$ linguist [--accommodate the restrictor r'' here--] studied $\mathtt{every}^{u'}$ solution that $\mathtt{some}^{u'' \sqsubseteq r''}$ problem might have.

Introducing the restrictor dref r'' that restricts the indefinite $\mathtt{some}^{u''}$ `problem` at the location indicated in (10) above ensures that this indefinite may covary with the values of the dref u contributed by the universal `every linguist`, but not with the values of the dref u' contributed by `every solution` (see (34) below for the formal account).

The accommodation of the restrictor dref is an extreme case of the proposed account of ES as anaphora to quantificational dependencies: the anaphoric dependency here is created intra-sententially via accommodation. Downward entailing contexts seem to favor this kind of restrictor dref resolution because it results in the strongest reading.[1]

The same kind of restrictor accommodation is involved in deriving ES readings in upward entailing contexts like (1) above in the absence of contextually provided anaphoric dependencies. Thus, if we accommodate the restrictor dref

[1] We assume throughout the paper that natural language universal quantifiers come with an existential commitment with respect to their domain.

r'' in the position shown in (11) below, we derive the IS reading for sentence (1) without the need for the discourse contexts in (3b) and (4b).

11. `Every`^{u} `student of mine [--accommodate the restrictor` r'' `here--] read every`$^{u'}$ `poem that a`$^{u''\sqsubseteq r''}$ `famous Romanian poet wrote.`

Accommodating the restrictor dref for the indefinite between the two universal quantifiers does the work of the intermediate existential closure of choice-function variables in [Reinhart(1997)] and [Winter(1997)]. The present proposal is crucially different from these accounts in that it does not need choice-function variables / drefs. Nor do we need a special storage mechanism as [Abusch(1994)], an indexing mechanism as [Farkas(1997a)] or a special presupposition for specific indefinites as [Geurts(2007)]. What we need instead is a freely available accommodation procedure for the drefs that restrict indefinites.

The two options for restricting indefinites in our account, namely by anaphorically retrieving the restrictor drefs or, alternatively, by accommodating them, correspond to the contextual analysis of exceptional scope in [Kratzer(1998)] and the 'free existential closure' analyses in [Reinhart(1997)] and [Winter(1997)] respectively.

The account is independently motivated by the fact that definites and generalized quantifiers (e.g., universals) exhibit the same kind of anaphora to quantificational dependencies via their restrictor drefs, as the examples in (12) and (13) below show. Let us consider them in turn. The sentence-initial quantifier in (12b) is restricted by the domain of quantification contributed by the universal *every*^{r} *student* in (12a). Moreover, the definite *the*$^{u''\sqsubseteq r''}$ *French poet* in (12b) takes exceptional intermediate scope between the two quantifiers in (12b) precisely because it is anaphoric to, i.e., restricted by, the dref r'' introduced by the indefinite *two*$^{r''}$ *poets* in (12a). That is, *the*$^{u''\sqsubseteq r''}$ *French poet* is a *dependent* definite that, in addition, takes exceptional wide scope. The simpler example in (13) shows that we can also have dependent universals: the domain of quantification of the quantifier *every*$^{u'\sqsubseteq r'}$ *paper* in (13b) covaries with the quantifier *no/every*$^{u\sqsubseteq r}$ *graduate student* because the most salient interpretation of (13b) is that no/every graduate student read every paper that s/he was assigned. This interpretation is an immediate consequence of the present account, which takes the two quantifiers in (13b) to be anaphoric to the quantificational dependency introduced by the previous sentence (13a).

12. a. `Every`^{r} `student was assigned two`$^{r''}$ `poets, a Romanian and a French one.`
    b. `No/Every`$^{u\sqsubseteq r}$ `Romanian student read every`$^{u'}$ `poem that the`$^{u''\sqsubseteq r''}$ `French poet ever wrote.`
13. a. `Every`^{r} `student was assigned several`$^{r'}$ `papers to read.`
    b. `No/Every`$^{u\sqsubseteq r}$ `graduate student read every`$^{u'\sqsubseteq r'}$ `paper.`

Although all determiners are anaphoric to the quantifier domains and quantificational dependencies stored by their restrictor drefs, they do not exhibit the same kind of behavior relative to (exceptional) scope. This follows from the fact that determiners differ with respect to the constraints they place on their restrictor drefs. Indefinite determiners are the most liberal: they place no constraints on their restrictor dref, which can be contextually retrieved or freely accommodated (see [Farkas(2007a)]). In contrast, definites and universal determiners cannot accommodate their restrictor drefs. Consequently, either they are contextually unrestricted or they have to anaphorically retrieve their restrictors.

Cross-linguistically, however, we encounter special kinds of indefinites that place additional constraints on their restrictor sets, e.g., the dependent indefinites in Hungarian and Romanian discussed in [Farkas(1997b)] and [Farkas(2002)]. Such dependent indefinites must covary with a quantifier in the same clause, i.e., they introduce values that are distinct relative to distinct values of a variable bound by a quantifier. The last section of the paper shows that such covariation requirements can be formulated as anaphoric constraints relating the restrictor dref of the dependent indefinite and the dref introduced by the quantifier.

2 Exceptional Scope as Anaphora to Dependencies

The account is formulated within the Plural Compositional DRT (PCDRT) system in [Brasoveanu(2007)], which extends Compositional DRT ([Muskens(1996)]) with plural information states. Following [van den Berg(1996)], PCDRT models plural info states as sets of variable assignments, which can be represented as matrices with assignments (sequences) as rows. Plural info states enable us to account for anaphora to both individuals and dependencies between them: as shown in the matrix below, individuals are stored column-wise and dependencies are stored row-wise[2].

Info State I	...	u	u'	u''	...
i_1	...	α_1 (i.e., ui_1)	β_1 (i.e., $u'i_1$)	γ_1 (i.e., $u''i_1$)	...
i_2	...	α_2 (i.e., ui_2)	β_2 (i.e., $u'i_2$)	γ_2 (i.e., $u''i_2$)	...
i_3	...	α_3 (i.e., ui_3)	β_3 (i.e., $u'i_3$)	γ_3 (i.e., $u''i_3$)	...
...	...	...	...	...	...

Quantifier domains (sets) are stored column-wise: $\{\alpha_1, \alpha_2, \alpha_3, \dots\}$, $\{\beta_1, \beta_2, \beta_3, \dots\}$ etc.	**Quantifier dependencies** (relations) are stored row-wise: $\{\langle\alpha_1, \beta_1\rangle, \langle\alpha_2, \beta_2\rangle, \langle\alpha_3, \beta_3\rangle, \dots\}$ etc.

We formalize the analysis in a Dynamic Ty2 logic, i.e., in a version of the Logic of Change introduced by [Muskens(1996)], which reformulates dynamic semantics ([Kamp(1981)], [Heim(1982)]) in Gallin's Ty2 ([Gallin(1975)]). We have three basic types: type t (truth-values), type e (individuals; variables: x, x' etc.) and type s ('variable assignments'; variables: i, j etc.).[3]

[2] Mixed weak & strong donkey sentences and quantificational and modal subordination discourses provide independent empirical motivation for a semantics based on plural info states – see [Brasoveanu(2007)] for more discussion.

[3] A suitable set of axioms ensures that the entities of type s behave as variable assignments; see [Muskens(1996)] for more details.

A dref for individuals u is a function of type se from assignments i_s to individuals x_e (the subscripts on terms indicate their type). Intuitively, the individual $u_{se}(i_s)$ is the individual that the assignment i assigns to the dref u. Thus, we model drefs in much the same way as individual concepts are modeled in Montague semantics. A dynamic info state I is a set of variable assignments (type st). An individual dref u stores a set of individuals with respect to an info state I, abbreviated as $uI := \{u_{se}(i_s) : i_s \in I_{st}\}$, i.e., uI is the image of the set of assignments I under the function u.

A sentence is interpreted as a Discourse Representation Structure (DRS), which is a relation of type $(st)((st)t)$ between an input state I_{st} and an output state J_{st}, as shown in (14) below. A DRS requires: (i) the input state I to differ from the output state J at most with respect to the **new drefs** and (ii) all the **conditions** to be satisfied relative to the output state J. For example, the DRS $[u, u' \mid student\{u\}, poem\{u'\}, read\{u, u'\}]$ abbreviates the term $\lambda I_{st}.\lambda J_{st}.\ I[u, u']J \wedge student\{u\}J \wedge poem\{u'\}J \wedge read\{u, u'\}J$.[4] Conditions denote sets of information states and are interpreted *distributively* relative to an info state, e.g., $read\{u, u'\}$ is basically the term $\lambda I_{st}.\ I \neq \emptyset \wedge \forall i_s \in I(read(ui, u'i))$ of type $(st)t$ (see the exact definition of such conditions in the Appendix).

14. $[\textbf{new drefs} \mid \textbf{conditions}] := \lambda I_{st}.\lambda J_{st}.\ I[\textbf{new drefs}]J \wedge \textbf{conditions}J$

Given the underlying type logic, we achieve compositionality at subclausal level in the usual Montagovian way.

More precisely, the compositional aspect of interpretation in an extensional Fregean/Montagovian framework is largely determined by the types for the (extensions of the) 'saturated' expressions, i.e., names and sentences. Abbreviate them as **e** and **t**. An extensional static logic identifies **e** with e and **t** with t. The denotation of the noun *poem* is of type **et**, i.e., et: *poem* $\rightsquigarrow \lambda x_e.\ poem_{et}(x)$. The determiner *every* is of type $(\mathbf{et})((\mathbf{et})\mathbf{t})$, i.e., $(et)((et)t)$.

PCDRT assigns the following dynamic types to the 'meta-types' **e** and **t**: **t** abbreviates $(st)((st)t)$, i.e., a sentence is interpreted as a DRS, and **e** abbreviates se, i.e., a name is interpreted as a dref. The denotation of the noun *poem* is still of type **et** – as shown in (15) below. The determiners *every* and *a* are still of type $(\mathbf{et})((\mathbf{et})\mathbf{t})$, as shown in (16) and (17); their translations make use of the maximization and distributivity operators $\mathbf{max}^u(\dots)$ and $_u(\dots)$ defined in the Appendix. Maximization stores all and only the individuals that satisfy some property P, while distributivity ensures that *each* stored individual satisfies property P and is associated with whatever dependencies P introduces. Crucially, these operators enable us to extract and store the sets of individuals involved in the interpretation of quantifiers, indefinites etc., as well as their associated dependencies. The compositionally obtained update contributed by (1) is provided in (21) below (see (18), (19) and (20) for some of the intermediate translations[5]).

[4] See the Appendix for the definition of dref introduction (a.k.a. random assignment).
[5] The update and the intermediate translations are simplified in inessential ways.

15. $\texttt{poem} \rightsquigarrow \lambda v_{\mathbf{e}}.\ [poem_{et}\{v\}]$, i.e., $\texttt{poem} \rightsquigarrow \lambda v_{\mathbf{e}}.\lambda I_{st}.\lambda J_{st}.\ I = J \wedge poem_{et}\{v\}J$
16. $\texttt{every}^{u\sqsubseteq r} \rightsquigarrow \lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ \mathbf{max}^{u\sqsubseteq r}({}_{u}(P(u)));\ {}_{u}(P'(u))$
17. $\texttt{a}^{u''\sqsubseteq r''} \rightsquigarrow \lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ [u''\,|\,u''\sqsubseteq r'', \mathbf{singleton}\{u''\}];\ {}_{u''}(P(u'');\ P'(u''))$
18. $\texttt{every}^{u\sqsubseteq r}\ \texttt{student of mine} \rightsquigarrow \lambda P_{\mathbf{et}}.\ \mathbf{max}^{u\sqsubseteq r}([stud.o.m\{u\}]);\ {}_{u}(P(u))$
19. $\texttt{a}^{u''\sqsubseteq r''}\ \texttt{Romanian poet} \rightsquigarrow$
$\lambda P_{\mathbf{et}}.\ [u''\,|\,u''\sqsubseteq r'', \mathbf{singleton}\{u''\}, r.poet\{u''\}];\ {}_{u''}(P(u''))$
20. $\texttt{read} \rightsquigarrow \lambda Q_{\mathbf{(et)t}}.\lambda v_{\mathbf{e}}.\ Q(\lambda v'_{\mathbf{e}}.\ [read\{v, v'\}])$
21. $\texttt{every}^{u\sqsubseteq r}\ \texttt{student of mine read every}^{u'\sqsubseteq r'}\ \texttt{poem that a}^{u''\sqsubseteq r''}\ \texttt{Romanian poet wrote} \rightsquigarrow \mathbf{max}^{u\sqsubseteq r}([stud.o.m\{u\}]);\ {}_{u}(\mathbf{max}^{u'\sqsubseteq r'}([poem\{u'\}];\ {}_{u'}([u''\,|\,u''\sqsubseteq r'', \mathbf{singleton}\{u''\}, r.poet\{u''\}, write\{u'', u'\}])));\ [read\{u, u'\}]$

22.
$$\begin{array}{|c|c|c|}\multicolumn{1}{c}{r} & \multicolumn{1}{c}{r'} & \multicolumn{1}{c}{r''}\\ \hline \dots & \dots & \dots\\ \hline \dots & \dots & \dots\\ \hline \dots & \dots & \dots\\ \hline \end{array} \xRightarrow{\mathbf{max}^{u\sqsubseteq r}([stud.o.m\{u\}])} \begin{array}{|c|c|c|c|}\multicolumn{1}{c}{r} & \multicolumn{1}{c}{r'} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u\sqsubseteq r}\\ \hline \dots & \dots & \dots & stud_1\\ \hline \dots & \dots & \dots & stud_2\\ \hline \dots & \dots & \dots & stud_3\\ \hline \end{array} \xRightarrow{{}_{u}(\dots)}$$
$$\left\{\begin{array}{ll} \begin{array}{|c|c|c|c|}\multicolumn{1}{c}{r} & \multicolumn{1}{c}{r'} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u\sqsubseteq r}\\ \hline \dots & \dots & \dots & stud_1\\ \hline \end{array} & \text{is updated as in (23) below}\\[2em] \begin{array}{|c|c|c|c|}\multicolumn{1}{c}{r} & \multicolumn{1}{c}{r'} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u\sqsubseteq r}\\ \hline \dots & \dots & \dots & stud_2\\ \hline \end{array} & \text{is updated in a similar way}\\[2em] \begin{array}{|c|c|c|c|}\multicolumn{1}{c}{r} & \multicolumn{1}{c}{r'} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u\sqsubseteq r}\\ \hline \dots & \dots & \dots & stud_3\\ \hline \end{array} & \text{is updated in a similar way} \end{array}\right\}$$

23.
$$\begin{array}{|c|c|c|c|}\multicolumn{1}{c}{r} & \multicolumn{1}{c}{r'} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u\sqsubseteq r}\\ \hline \dots & \dots & \dots & stud_1\\ \hline \end{array} \xRightarrow{\mathbf{max}^{u'\sqsubseteq r'}([poem\{u'\}];\dots)} \begin{array}{|c|c|c|c|c|}\multicolumn{1}{c}{r} & \multicolumn{1}{c}{r'} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u\sqsubseteq r} & \multicolumn{1}{c}{u'\sqsubseteq r'}\\ \hline \dots & \dots & \dots & stud_1 & poem_1\\ \hline \dots & \dots & \dots & stud_1 & poem_2\\ \hline \end{array}$$
$$\xRightarrow{{}_{u'}([u''\,|\,u''\sqsubseteq r'', \mathbf{singleton}\{u''\}, r.poet\{u''\}, write\{u'', u'\}])}$$
$$\left\{\begin{array}{ll} \begin{array}{|c|c|c|c|c|c|}\multicolumn{1}{c}{r} & \multicolumn{1}{c}{r'} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u\sqsubseteq r} & \multicolumn{1}{c}{u'\sqsubseteq r'} & \multicolumn{1}{c}{u''\sqsubseteq r''}\\ \hline \dots & \dots & \dots & stud_1 & poem_1 & poet_1\\ \hline \end{array} & poet_1 \text{ wrote } poem_1\\[2em] \begin{array}{|c|c|c|c|c|c|}\multicolumn{1}{c}{r} & \multicolumn{1}{c}{r'} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u\sqsubseteq r} & \multicolumn{1}{c}{u'\sqsubseteq r'} & \multicolumn{1}{c}{u''\sqsubseteq r''}\\ \hline \dots & \dots & \dots & stud_1 & poem_2 & poet_2\\ \hline \end{array} & poet_2 \text{ wrote } poem_2 \end{array}\right\}$$

The update in (21) can be paraphrased as follows (see the matrix-based representation in (22) above): first, we introduce the dref u and store in it all the speaker's students among the previously introduced r-individuals (as required by $\mathbf{max}^{u\sqsubseteq r}$). Then, relative to each u-student (as required by the distributivity operator ${}_{u}(\dots)$), we introduce the set of all poems (among the r'-entities) written by a Romanian poet and store these poems in dref u', while storing the corresponding poets in dref u''. Finally, we test that each u-student read each of the corresponding u'-poems. The output info state obtained after updating with (21) stores the set of all r-students in dref u, the set of all r'-poems written by a Romanian poet in u' and the corresponding r''-Romanian poets in u''.

The update in (21) yields the NS indefinite reading if there are no special constraints on the restrictor drefs r, r' and r''. If the discourse context places particular constraints on these drefs, as the contexts in (5) and (6) above do, the update in (21) yields different truth-conditions, namely the truth-conditions associated with the IS and WS readings.

Consider the context in (5) first, represented in (24) below. As (24) shows, the context in (5) stores a functional dependency associating each r-student with one r''-poet. Consequently, the update in (21) above will retrieve this functional dependency and elaborate on it, thereby yielding the IS indefinite reading.

24. The context for the IS indefinite reading:

r	r'	r''
$stud_1$	$poem_1$	$poet_1$
$stud_1$	$poem_2$	$poet_1$
...	...	...
$stud_2$	$poem_m$	$poet_2$
$stud_2$	$poem_{m+1}$	$poet_2$
...	...	...
$stud_3$	$poem_n$	$poet_3$
$stud_3$	$poem_{n+1}$	$poet_3$
...	...	...

Similarly, the context in (6) is represented in (25) below: the plural info state stores the same r''-poet relative to every r-student. When the update in (21) anaphorically retrieves and elaborates on this *contextually* singleton indefinite (i.e., singleton in the plural info state, but not necessarily relative to the entire model), we obtain the WS indefinite reading.

25. The context for the WS indefinite reading:

r	r'	r''
$stud_1$	$poem_1$	$poet_1$
$stud_1$	$poem_2$	$poet_1$
...	...	...
$stud_2$	$poem_m$	$poet_1$
$stud_2$	$poem_{m+1}$	$poet_1$
...	...	...
$stud_3$	$poem_n$	$poet_1$
$stud_3$	$poem_{n+1}$	$poet_1$
...	...	...

The formal account of examples like (12) above in which definites take exceptional scope is entirely parallel.

3 Exceptional Scope in Downward Entailing Contexts

The PCDRT account of exceptional wide scope as anaphora to quantificational dependencies generalizes to exceptional wide scope in downward entailing contexts. [Chierchia(2001)] draws attention to these contexts and to the problem they pose for the 'free choice-/Skolem-function' approaches to scope in [Kratzer(1998)] and [Matthewson(1999)].

To see what the problem is, consider sentence (26) below. Its most salient reading, provided in (27), has the indefinite $\texttt{some}^{u''\sqsubseteq r''}$ taking exceptional scope intermediately between the two universal quantifiers.

26. $\texttt{Every}^{u\sqsubseteq r}$ `linguist that studied every`$^{u'}$ `solution that some`$^{u''\sqsubseteq r''}$ `problem might have has become famous.`
27. The most salient reading of (26): $\forall x(ling(x) \wedge \exists z(prob(z) \wedge \forall y(sol(y) \wedge m.have(z, y) \rightarrow study(x, y))) \rightarrow b.f(x))$
28. $\forall x(ling(x) \wedge \forall y(sol(y) \wedge m.have(\mathbf{f}(prob), y) \rightarrow study(x, y))) \rightarrow b.f(x))$
29. $\forall x(ling(x) \wedge \exists \mathbf{f}(\forall y(sol(y) \wedge m.have(\mathbf{f}(prob), y)) \rightarrow study(x, y))) \rightarrow b.f(x))$

As [Chierchia(2001)] observes, 'free choice-function variable' approaches like [Kratzer(1998)] represent sentence (26) as shown in (28) above ('top-level existential closure' approaches like [Matthewson(1999)] derive a representation that, for our current purposes, is virtually identical), while the 'intermediate existential closure' approaches in [Reinhart(1997)] and [Winter(1997)] represent it as shown in (29).

If we assume together with [Chierchia(2001)] that any choice function can in principle be contextually assigned to a free choice-function variable (but see [Kratzer(2003)] for an argument against this assumption), then the former kind of approaches derive truth conditions that are too weak: (28) is verified by any problem for which some linguist didn't study every solution – this makes the antecedent false and the whole formula in (28) true (see also the argument in [Schwarz(2001)] that 'free choice-function variable' approaches undergenerate).

The latter kind of approaches derive the correct truth conditions – but allowing for such intermediate-level existential closure of choice-function variables nullifies much of the initial motivation for them, namely that they enable us to give the indefinite exceptional scope (semantically), while syntactically leaving it *in situ*. If this kind of existential closure is needed, allowing for non-local existential closure of individual-level variables as in [Abusch(1994)] (which obviates the need for choice functions) might prove to be the more parsimonious choice.

In contrast, our account proceeds as before: in a context like (30) below, which provides a suitable dependency between the restrictor drefs r and r'', the representation of sentence (26), given in (31), derives the intuitively correct truth-conditions.

30. Context for the most salient reading of (26):
    It has been established that every scientist has a favorite problem that she studied systematically. And being systematic is enough to bring one fame in linguistics. So: $\texttt{every}^{u\sqsubseteq r}$ `linguist that studied every`$^{u'}$ `solution that some`$^{u''\sqsubseteq r''}$ `problem might have has become famous.`
31. $\mathbf{max}^{u\sqsubseteq r}([ling\{u\}];\ _u(\mathbf{max}^{u'}([sol\{u'\}]; [u'' \mid u'' \sqsubseteq r'', \mathbf{singleton}\{u''\}, prob\{u''\}]; [m.have\{u'', u'\}])); [study\{u, u'\}]); [b.f\{u\}]$

The analysis of the ES example in (26) does not face the same problems as choice-/Skolem-function analyses because the determiner *every* is not analyzed in terms of material implication,[6] but as dynamically conjoining the restrictor and nuclear scope DRSs (which, crucially, update plural info states).

This analysis also generalizes to other kinds of downward entailing contexts besides the restrictor of ***every***. Consider, for example, the ‘wide-scope negation’ sentence in (32) below (repeated from (8) above), also from [Chierchia(2001)]. We can derive the correct truth-conditions for this sentence, provided in (33) below, if we represent it as shown in (34). The crucial point is the accommodation of the dref r'' (which restricts the indefinite $\textbf{\texttt{some}}^{u'' \sqsubseteq r''}$ ***problem***) intermediately between the two universal quantifiers $\textbf{\texttt{every}}^{u}$ ***linguist*** and $\textbf{\texttt{every}}^{u'}$ ***solution***.

32. `Not every`^{u} `linguist studied every`$^{u'}$ `solution that some`$^{u'' \sqsubseteq r''}$ `problem might have.`
33. The most salient reading of (32):
$\exists x(ling(x) \wedge \forall z(prob(z) \rightarrow \exists y(sol(y) \wedge m.have(z, y) \wedge \neg study(x, y))))$
34. $[\sim (\mathbf{max}^{u}([ling\{u\}]);\ [r''];\ _{u}(\mathbf{max}^{u'}([sol\{u'\}]; [u'' \mid u'' \sqsubseteq r'', \mathbf{singleton}\{u''\},$ $prob\{u''\}, m.have\{u'', u'\}]));\ [study\{u, u'\}])]$
35. Negation requires that no update of the following form is possible:

$$\emptyset \xRightarrow{\mathbf{max}^{u}([ling\{u\}])} \begin{array}{|c|} \multicolumn{1}{c}{u} \\ \hline ling_1 \\ \hline ling_2 \\ \hline ling_3 \\ \hline \end{array} \xRightarrow{[r'']} \begin{array}{|c|c|} \multicolumn{1}{c}{u} & \multicolumn{1}{c}{r''} \\ \hline ling_1 & \alpha_1 \\ \hline ling_2 & \alpha_2 \\ \hline ling_3 & \alpha_3 \\ \hline \end{array} \xRightarrow{_{u}(\dots)}$$

$$\left\{ \begin{array}{l} \begin{array}{|c|c|} \multicolumn{1}{c}{u} & \multicolumn{1}{c}{r''} \\ \hline ling_1 & \alpha_1 \\ \hline \end{array} \xRightarrow{\mathbf{max}^{u'}(\dots[u''|u'' \sqsubseteq r'' \dots])} \begin{array}{|c|c|c|c|} \multicolumn{1}{c}{u} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u'} & \multicolumn{1}{c}{u''} \\ \hline ling_1 & \alpha_1 & sol_1 & prob_1 = \alpha_1 \\ \hline ling_1 & \alpha_1 & sol_2 & prob_1 = \alpha_1 \\ \hline \end{array} \\ \\ \begin{array}{|c|c|} \multicolumn{1}{c}{u} & \multicolumn{1}{c}{r''} \\ \hline ling_2 & \alpha_2 \\ \hline \end{array} \xRightarrow{\mathbf{max}^{u'}(\dots[u''|u'' \sqsubseteq r'' \dots])} \begin{array}{|c|c|c|c|} \multicolumn{1}{c}{u} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u'} & \multicolumn{1}{c}{u''} \\ \hline ling_2 & \alpha_2 & sol_3 & prob_2 = \alpha_2 \\ \hline \end{array} \\ \\ \begin{array}{|c|c|} \multicolumn{1}{c}{u} & \multicolumn{1}{c}{r''} \\ \hline ling_3 & \alpha_3 \\ \hline \end{array} \xRightarrow{\mathbf{max}^{u'}(\dots[u''|u'' \sqsubseteq r'' \dots])} \begin{array}{|c|c|c|c|} \multicolumn{1}{c}{u} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u'} & \multicolumn{1}{c}{u''} \\ \hline ling_3 & \alpha_3 & sol_4 & prob_3 = \alpha_3 \\ \hline ling_3 & \alpha_3 & sol_5 & prob_3 = \alpha_3 \\ \hline ling_3 & \alpha_3 & sol_6 & prob_3 = \alpha_3 \\ \hline \end{array} \end{array} \right\}$$

$$\xRightarrow{[study\{u,u'\}]} \begin{array}{|c|c|c|c|} \multicolumn{1}{c}{u} & \multicolumn{1}{c}{r''} & \multicolumn{1}{c}{u'} & \multicolumn{1}{c}{u''} \\ \hline ling_1 & \alpha_1 & sol_1 & prob_1 = \alpha_1 \\ \hline ling_1 & \alpha_1 & sol_2 & prob_1 = \alpha_1 \\ \hline ling_2 & \alpha_2 & sol_3 & prob_2 = \alpha_2 \\ \hline ling_3 & \alpha_3 & sol_4 & prob_3 = \alpha_3 \\ \hline ling_3 & \alpha_3 & sol_5 & prob_3 = \alpha_3 \\ \hline ling_3 & \alpha_3 & sol_6 & prob_3 = \alpha_3 \\ \hline \end{array} \quad \begin{array}{l} \\ ling_1 \text{ studied } sol_1 \text{ of } prob_1 (= \alpha_1) \\ ling_1 \text{ studied } sol_2 \text{ of } prob_1 (= \alpha_1) \\ ling_2 \text{ studied } sol_3 \text{ of } prob_2 (= \alpha_2) \\ ling_3 \text{ studied } sol_4 \text{ of } prob_3 (= \alpha_3) \\ ling_3 \text{ studied } sol_5 \text{ of } prob_3 (= \alpha_3) \\ ling_3 \text{ studied } sol_6 \text{ of } prob_3 (= \alpha_3) \end{array}$$

We can think of this accommodation-based account of intermediate ES under negation as an extreme case of the proposed account of ES as anaphora to quantificational dependencies. The accommodation strategy also generalizes to

[6] The ‘material implication’ problem is not specific to choice-/Skolem-function analyses; see, for example, [Abusch(1994)] for an early discussion.

examples of ES in upward entailing contexts like the very first example we considered, i.e., example (1) above. The analysis of this example in terms of restrictor accommodation obviates the need for the discourse contexts given in (3b) and (4b). As the representations for the intermediate ES reading in (36) and (37) below show, the crucial feature is that the restrictor dref r'' is accommodated between the two universal quantifiers.

36. `Every`^{u} `student of mine [--accommodate` r'' `here--] read every`$^{u'}$ `poem that a`$^{u''\sqsubseteq r''}$ `famous Romanian poet wrote.`
37. $\mathbf{max}^{u}([stud.o.m\{u\}]);\ [r''];\ {}_{u}(\mathbf{max}^{u'}([poem\{u'\}];$ ${}_{u'}([u'' \mid u'' \sqsubseteq r'', r.poet\{u''\}, write\{u'', u'\}])));\ [read\{u, u'\}]$

What we achieve by accommodating the restrictor dref for the indefinite between the two universal quantifiers is done by intermediate existential closure of choice-function variables in [Reinhart(1997)] and [Winter(1997)], by a special storage mechanism in [Abusch(1994)], by assignment-function indexation in [Farkas(1997a)] and by a special presupposition associated with specific indefinites postulated in [Geurts(2007)].

The assumption that indefinite-restricting drefs can be freely accommodated enables us to avoid the undergeneration problems raised by [Chierchia(2001)] and [Schwarz(2001)] for 'free choice-function variable' approaches.[7]

4 Dependent Indefinites

The type of indefinites we discuss here were first discussed in [Farkas(1997b)] where it was noted that in Hungarian, the indefinite determiner, as well as cardinal numerals may reduplicate, in which case the DP must be interpreted as covarying with an individual or situation variable bound by a quantifier within the same clause (see also [Farkas(2002)]). In [Farkas(2007b)] it is shown that the same effect is obtained in Romanian by having the item *cîte* precede an indefinite or numeral. In present terms, the item *cîte* introduces a new dref u', the values of which must covary with the values of another dref u introduced by a quantificational element scoping over it.

For example, in (38) below, at least two of the students we are quantifying over must have read distinct articles – otherwise, the particle *cîte* is infelicitous. We capture this property by taking the particle *cîte* to place a constraint on the dref r' that restricts the domain of the narrow-scope indefinite *un*$^{u'\sqsubseteq r'}$ *articol*. In particular, *cîte* requires the values of r' to covary with the values of the dref u introduced by the wide-scope universal *fiecare*^{u} *student* – enforced by means of the condition $r' \div u$. This condition requires that, for at least two different students x and x', the corresponding papers have to be distinct (see the appendix for the exact definition). This is informally shown in (39) and the relevant translations are provided in (40) and (41). In (40), underlining indicates presuppositional status.

[7] The extent to which the overgeneration problems mentioned in [Chierchia(2001)] and [Schwarz(2001)] are relevant for our account is left for future research.

38. `Fiecare`^{u} `student a citit cîte un`$^{u' \sqsubseteq r'}$ `articol.`
‘Every student read CÎTE a paper.’
39. `Fiecare`^{u} `student [--accommodate` r' `here and require covariation with` u`--] a citit cîte un`$^{u' \sqsubseteq r'}$ `articol.`
40. $\textit{cîte}^{r' \div u}$ $\textit{un}^{u' \sqsubseteq r'}$ $\leadsto$
$\lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ \underline{[r' \mid r' \div u]};\ [u' \mid u' \sqsubseteq r', \mathbf{singleton}\{u'\}];\ P(u');\ P'(u'))$
41. (38) $\leadsto \mathbf{max}^u([student\{u\}]);\ [r' \mid r' \div u];$
${}_u([u' \mid u' \sqsubseteq r', \mathbf{singleton}\{u'\}, paper\{u'\}, read\{u, u'\}])$

Thus, the particle *cîte* is anaphoric to an individual (or event) dref and the restrictor dref r' of the indefinite is required to store different (sets of) values relative to the values of the anaphorically retrieved dref. It is therefore not surprising that we get weak crossover (WCO) effects with *cîte* in Romanian, just like we get them with pronouns:

42. `#Cîte`$_u$ `un student urăşte pe fiecare`^{u} `profesor.`
‘CÎTE A student hates every professor.’
43. `#Mama lui`$_u$ `iubeşte pe fiecare`^{u} `băiat.`
‘His mother loves every boy.’

And, just as direct object clitic-doubling (i.e., the clitic *îl* in this particular case) waives WCO effects with pronouns, it waives them with the particle *cîte*:

44. `Cîte`$_u$ `un student îl urăşte pe fiecare`^{u} `profesor.`
45. `Mama lui`$_u$ `îl iubeşte pe fiecare`^{u} `băiat.`

The crucial requirement contributed by *cîte* is that of covariation. A further restriction involves the nature of the dref that *cîte* must covary with: as shown in previous work, *cîte* indefinites may only covary with individual or situation/event drefs but not with worlds. In this view, the core property of dependency is covariation and the parameters of cross-linguistic variation involve the presence or absence of the covariation requirement, and, in the case of its presence, the possibility of further restrictions concerning the nature of the 'boss' dref, the item that induces the covariation.

5 Conclusion

The readings of sentence (1) differ with respect to whether the indefinite covaries with another DP or not, and if it does, which of the two *every*-DPs it covaries with. Traditionally, this sort of (in)dependence was the result of the structural relation between the existential quantifier contributed by the indefinite and the two universal quantifiers contributed by the two *every*-DPs. *In situ* analyses employed implicit arguments present in the interpretation of the indefinite (as arguments of a choice function or as implicit arguments in the restrictor) that could be left free (WS reading) or that could be bound by the first universal (IS reading) or the second (NS reading).

Our account dispenses with bound implicit arguments in favor of independently needed contextually introduced and stored dependencies. The essence of our approach concerns the way restrictors are interpreted. Non-local scope is the result of contextual anaphoric dependencies or of restrictor accommodation. We suggest that the freedom with which restrictors accommodate is connected to the fact that they are not in the part of the sentence that is asserted. The process of non-locally accommodating restrictor drefs is constrained: on the one hand, it is possible only for indefinite determiners, but not for definite or generalized determiners, and, on the other hand, it is constrained even for indefinites, e.g., as [Endriss(2006)] argues, such indefinites need to have a topical status.

The approach proposed here leads us to expect that particular determiners may vary with respect to their sensitivity to the presence of interpretational dependencies. 'Ordinary' indefinites, such as *a(n)*, are indifferent to this issue, which is why (1) is three-way ambiguous. We take 'special' indefinite determiners, such as *cîte* in Romanian and *egy-egy* in Hungarian, to require the presence of a particular type of interpretational dependency encoded as an anaphoric constraint on the dref that restricts the quantificational domain of the indefinite. This suggests that a crucial parameter in the semantic typology of DPs is the issue of variation vs. constancy of the values that a DP quantifies over relative to the values quantified over by other DPs – a parameter that our formal system is well equipped to handle.

Appendix: The Formal System

The Basic Dynamic System

1. $R\{u_1, \dots, u_n\} := \lambda I_{st}.\ I_{u_1 \neq \#, \dots, u_n \neq \#} \neq \emptyset \wedge \forall i_s \in I_{u_1 \neq \#, \dots, u_n \neq \#}(R(u_1 i, \dots, u_n i))$, where $I_{u_1 \neq \#, \dots, u_n \neq \#} := \{i_s \in I : u_1 i \neq \# \wedge \dots \wedge u_n i \neq \#\}$ and $\#$ is the universal falsifier, i.e., the exception individual that falsifies any relation R.
2. $\mathbf{singleton}\{u\} := \lambda I_{st}.\ |uI_{u \neq \#}| = 1$, where $uI := \{ui : i_s \in I\}$
3. $\mathbf{2}\{u\} := \lambda I_{st}.\ |uI_{u \neq \#}| = 2$
4. $r' \div u := \lambda I_{st}.\ I_{u=\#} \subseteq I_{r'=\#} \wedge \exists x_e \in uI_{u \neq \#} \exists x'_e \in uI_{u \neq \#}(r' I_{u=x} \neq \{\#\} \wedge r' I_{u=x'} \neq \{\#\} \wedge x \neq x' \wedge r' I_{u=x} \cap r' I_{u=x'} = \emptyset)$
5. $D; D' := \lambda I_{st}.\lambda J_{st}.\ \exists H_{st}(DIH \wedge D'HJ)$, where D, D' are DRSs (type $\mathbf{t}$).
6. $\sim D := \lambda I_{st}.\ I \neq \emptyset \wedge \forall H_{st} \neq \emptyset(H \subseteq I \rightarrow \neg \exists K_{st}(DHK))$
7. $[R\{u_1, \dots, u_n\}] := \lambda I_{st}.\lambda J_{st}.\ I = J \wedge R\{u_1, \dots, u_n\}J$
8. $[Condition_1, \dots, Condition_m] := [Condition_1]; \dots; [Condition_m]$
9. $[u] := \lambda I_{st}.\lambda J_{st}.\ \forall i_s \in I(\exists j_s \in J(i[u]j)) \wedge \forall j_s \in J(\exists i_s \in I(i[u]j))$
10. $[u_1, \dots, u_n] := [u_1]; \dots; [u_n]$
11. $[u_1, \dots, u_n \,|\, Condition_1, \dots, Condition_m] :=$ $[u_1, \dots, u_n]; [Condition_1, \dots, Condition_m]$
12. A DRS D of type $\mathbf{t}$ is *true* with respect to an input info state I_{st} iff $\exists J_{st}(DIJ)$.

The default input discourse context stores no anaphoric information. This empty discourse context is modeled as the singleton plural info state $\{i_\#\}$, the only member of which is the exception variable assignment $i_\#$ that assigns the exception individual $\#$ (i.e., the universal falsifier) to all drefs.

Structured Inclusion, Maximization and Distributivity

13. $u \sqsubseteq r := \lambda I_{st}.\ (u \Subset r)I\ \wedge \forall i_s \in I(ri \in uI_{u\neq\#} \to ri = ui)$,
    where $u \Subset r := \lambda I_{st}.\ \forall i_s \in I(ui = ri \vee ui = \#)$.[8]
14. $\mathbf{max}^u(D) := \lambda I_{st}.\lambda J_{st}.\ ([u]; D)IJ \wedge \forall K_{st}(([u]; D)IK \to uK_{u\neq\#} \subseteq uJ_{u\neq\#})$
15. $\mathbf{max}^{u\sqsubseteq r}(D) := \mathbf{max}^u([u \sqsubseteq r]; D)$
16. $\mathbf{dist}_u(D) := \lambda I_{st}.\lambda J_{st}.\ uI = uJ \wedge \forall x_e \in uI(DI_{u=x}J_{u=x})$,
    where $I_{u=x} = \{i_s \in I : ui = x\}$.
17. ${}_u(D) := \lambda I_{st}.\lambda J_{st}.\ I_{u=\#} = J_{u=\#} \wedge I_{u\neq\#} \neq \emptyset \wedge \mathbf{dist}_u(D)I_{u\neq\#}J_{u\neq\#}$

Translations for Basic Expressions

18. *poem* $\leadsto \lambda v_{\mathbf{e}}.\ [poem_{et}\{v\}]$
19. *every* $^{u\sqsubseteq r}$ (anaphoric to r) $\leadsto \lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ \mathbf{max}^{u\sqsubseteq r}({}_u(P(u)));\ {}_u(P'(u))$
20. *every* ^{u} (unrestricted) $\leadsto \lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ \mathbf{max}^u({}_u(P(u)));\ {}_u(P'(u))$
21. *a* $^{u\sqsubseteq r}$ (r can be freely accommodated) $\leadsto$
    $\lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ \underline{[r]};\ [u \,|\, u \sqsubseteq r, \mathbf{singleton}\{u\}];\ {}_u(P(u);\ P'(u))$
22. *two* $^{u\sqsubseteq r}$ (r can be freely accommodated) $\leadsto$
    $\lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ \underline{[r]};\ [u \,|\, u \sqsubseteq r, \mathbf{2}\{u\}];\ {}_u(P(u);\ P'(u))$
23. *he* $_u \leadsto \lambda P_{\mathbf{et}}.\ [\mathbf{singleton}\{u\}];\ P(u)$
24. *the* $^{\mathbf{sg}:u\sqsubseteq r}$ (anaphoric to r) $\leadsto \lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ \mathbf{max}^{u\sqsubseteq r}(P(u));\ [\mathbf{singleton}\{u\}];\ P'(u)$
25. *the* $^{\mathbf{sg}:u}$ (unrestricted/unique) $\leadsto \lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ \mathbf{max}^u(P(u));\ [\mathbf{singleton}\{u\}];\ P'(u)$
26. *they* $_u \leadsto \lambda P_{\mathbf{et}}.\ P(u)$
27. *the* $^{\mathbf{pl}:u\sqsubseteq r}$ (anaphoric to r) $\leadsto \lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ \mathbf{max}^{u\sqsubseteq r}(P(u));\ P'(u)$
28. *the* $^{\mathbf{pl}:u}$ (unrestricted/maximal) $\leadsto \lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ \mathbf{max}^u(P(u));\ P'(u)$
29. *cîte* $^{r'\div u}$ *un* $^{u'\sqsubseteq r'}$ (anaphoric to u) $\leadsto$
    $\lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.\ \underline{[r' \,|\, r' \div u]};\ [u' \,|\, u' \sqsubseteq r', \mathbf{singleton}\{u'\}];\ {}_{u'}(P(u');\ P'(u'))$

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[8] The definition of structured inclusion, where we go from a superset r to a subset u by discarding cells in a matrix / plural info state (thereby ensuring that the subset dref preserves the dependencies associated with the superset dref) uses the exception individual # to 'tag' the discarded cells.

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