Non-Standard Anaphoric Pronouns

Gary Hardegree
Department of Philosophy
University of Massachusetts
Amherst, MA 01003

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1. Introduction

A **standard anaphoric pronoun** is one that is bound by its antecedent. Unfortunately, there are examples of essentially-anaphoric pronouns that don't fit this pattern. They come in two varieties.

1. Variety-One [Numerical QPs]

Consider the following pairs of sentences, which are equivalent [on the most natural reading of the pronouns].

(1.1) `I own exactly one dog,` **`which`** `is a spaniel`
`I own exactly one dog;` **`it`** `is a spaniel`

(1.2) `I own exactly two dogs,` **`which`** `are (all) spaniels`
`I own exactly two dogs;` **`they`** `are (all) spaniels`

etc.

The following are similar.

(2.1) `only one student came to the party;` **`she`** `enjoyed herself`

(2.2) `only two students came to the party;` **`they`** `enjoyed themselves`

etc.

The trick in analyzing each of these sentences is to make the pronoun anaphoric to its antecedent without making the subordinate clause turn into a restrictive clause.

2. Variety-Two [Indefinite QPs]

Consider the following sentences.

(1) **`a man`** `is happy` **{**`unless`**|**`if`**|**`if-and-only-if`**}** **`he`** `is virtuous`
(2) **`someone`** is happy **{**`unless`**|**`if`**|**`if-and-only-if`**}** **`he/she`** `is virtuous`
(3) `every man who owns` **`a donkey`** `feeds` **`it`**
(4) `if` **`a man`** `owns` **`a donkey`**`, then` **`he`** `feeds` **`it`**
(5) `if` **`someone`** `owns a donkey, then` **`he/she`** `feeds it`
(6) **`a man`** `feeds` **`a donkey`** **{**`unless`**|**`if`**|**`if-and-only-if`**}** **`he`** `owns` **`it`**

In these examples, the puzzle is to make each pronoun anaphoric to its antecedent without raising the quantifier too high in the sentence.

Related puzzles use quantifier phrases and determiner phrases anaphorically.

(7) `if` **`a body`** `meet` **`a body`** `coming through the rye;`
`if` **`a body`** `kiss` **`a body`**`, need` **`a body`** `cry` [Robert Burns]

(8) `if` **`a man`** `respects` **`a woman`**`,`
`then` **`the woman`** `respects` **`the man`**

2. Non-Standard Anaphoric Pronouns – Variety 1 [Numerical QPs]

Consider the following sentence, in which the relative clause is understood to be non-restrictive.

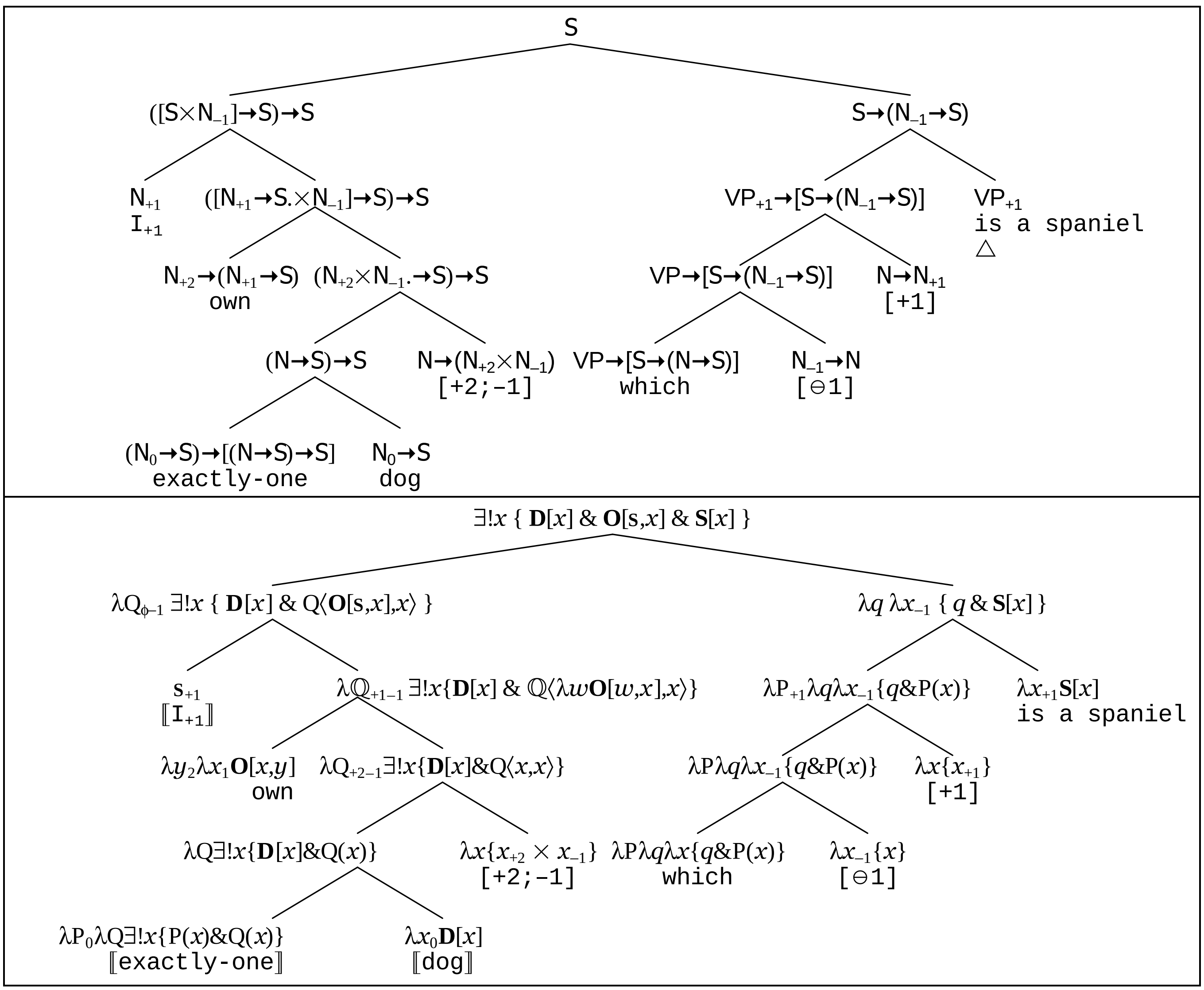
`I own exactly one dog, which is a spaniel`

Earlier, we proposed the following categorial analysis of '`exactly one`'.

type(`exactly-one`) = $(N_0 \to S) \to [(N \to S) \to S]$
⟦`exactly-one`⟧ = $\lambda P_0\, \lambda Q\, \exists! x\, \{\, P(x)\ \&\ Q(x)\, \}$

As before, we use the logical complex '$\exists! x$' to mean "there is exactly one x such that…".[1]

Earlier we proposed that a non-restrictive relative pronoun is anaphoric to an NP (QP or N), whereas a restrictive relative pronoun is anaphoric to a CNP ($\bar{N}$). Pursuing this line, we have the following categorial analysis, in which '`which`' is anaphoric to '`exactly one dog`'.



[1] In first-order logic, at least, we have the following official definition.

$$\exists! \nu \Phi \quad =_{df} \quad \exists \nu' \forall \nu \{ \Phi \leftrightarrow \nu = \nu' \}$$

where Φ is any formula, ν is any variable, and ν' is any variable not free in Φ. Also bear in mind that the quantifier symbols stand for operations that act on sets of truth-values.

The key compositions are underwritten by the following derivations.

(1)	$[N\to S]\to S$	1	Pr	$\lambda P\,\exists!x\ \{\ \mathbf{D}[x]\ \&\ P(x)\ \}$	
(2)	$N\to(N_{+2}\times N_{-1})$	2	Pr	$\lambda y\ \{\ y_{+1}\times y_{-1}\}$	
(3)	$(N_{+2}\times N_{-1})\to S$	3	As	Q_{+2-1}	$\lambda\langle x_{+2},y_{-1}\rangle\ Q\langle x,y\rangle$
(4)	N	4	As	y	
(5)	$N_{+2}\times N_{-1}$	24	2,4,$\to$O	$y_{+1}\times y_{-1}$	$\langle y_{+1},\ y_{-1}\rangle$
(6)	S	234	3,5,$\to$O	$Q_{+2-1}\ \langle y_{+1},\ y_{-1}\rangle$	$Q\langle y,y\rangle$
(7)	$N\to S$	23	4-6,$\to$I	$\lambda y\ Q\langle y,y\rangle$	
(8)	S	123	1,7,$\to$O	$\exists!x\ \{\ \mathbf{D}[x]\ \&\ Q\langle x,x\rangle\ \}$	
(9)	$[(N_{+2}\times N_{-1})\to S]\to S$	24	2,6,$\to$O	$\lambda Q_{+2-1}\ \exists!x\ \{\ \mathbf{D}[x]\ \&\ Q\langle x,x\rangle\ \}$	

(1)	$[(N_{+2}\times N_{-1})\to S]\to S$	1	Pr	$\lambda Q_{+2-1}\ \exists!x\ \{\ \mathbf{D}[x]\ \&\ Q\langle x,x\rangle\ \}$	
(2)	$N_{+2}\to(N_{+1}\to S)$	2	Pr	$\lambda y_{+2}\ \lambda w_{+1}\ \mathbf{O}[w,y]$	
(3)	$[N_{+1}\to S.\times N_{-1}]\to S$	3	As	$\mathbb{Q}_{+1-1}$	$\lambda\langle P_{+1},x_{-1}\rangle\mathbb{Q}\langle P,x\rangle$
(4)	$N_{+2}\times N_{-1}$	45	As	$y_{+2}\times z_{-1}$	$\langle y_{+2},\ z_{-1}\rangle$
(5)	N_{+2}	4	4,$\times$O$_1$	y_{+1}	
(6)	N_{-1}	5	4,$\times$O$_2$	z_{-1}	
(7)	$N_{+1}\to S$	24	2,6,$\to$O	$\lambda w_{+1}\mathbf{O}[w,y]$	
(8)	$N_{+1}\to S\ .\times\ N_{-1}$	245	6,7,$\times$I	$\lambda w_{+1}\mathbf{O}[w,y]\times z_{-1}$	
(9)	S	2345	3,8,$\to$O	$\mathbb{Q}_{+1-1}(\lambda w_{+1}\mathbf{O}[w,y]\times z_{-1})$	$\mathbb{Q}\langle\lambda x\mathbf{O}[x,y],\ z\rangle$
(10)	$(N_{+2}\times N_{-1})\to S$	23	4-9,$\to$I	$\lambda\langle y_{+2},\ x_{-1}\rangle\ \mathbb{Q}\langle\lambda w\mathbf{O}[w,y],\ x\rangle$	
(11)	S	123	1,10,$\to$O	$\exists!x\ \{\ \mathbf{D}[x]\ \&\ \mathbb{Q}\langle\lambda w\mathbf{O}[w,x],x\rangle\ \}$	
(12)	$([N_{+1}\to S.\times N_{-1}]\to S)\to S$	12	3-11,$\to$I	$\lambda\mathbb{Q}_{+1-1}\ \exists!x\{\mathbf{D}[x]\ \&\ \mathbb{Q}\langle\lambda w\mathbf{O}[w,x],x\rangle\}$	

(1)	$([N_{+1}\to S.\times N_{-1}]\to S)\to S$	1	Pr	$\lambda\mathbb{Q}_{+1-1}\ \exists!x\{\mathbf{D}[x]\ \&\ \mathbb{Q}\langle\lambda w\mathbf{O}[w,x],x\rangle\}$	
(2)	N_{+1}	2	Pr	$\mathbf{s}_{+1}$	
(3)	$(S\times N_{-1})\to S$	3	As	$Q_{\phi-1}$	$\lambda\langle p,x_{-1}\rangle Q\langle p,x\rangle$
(4)	$N_{+1}\to S.\times N_{-1}$	45	As	$P_{+1}\times x_{-1}$	$\langle P_{+1},\ x_{-1}\rangle$
(5)	$N_{+1}\to S$	4	4,$\times$O$_1$	P_{+1}	$\lambda x_{+1}P(x)$
(6)	N_{-1}	5	4,$\times$O$_2$	x_{-1}	
(7)	S	24	2,5,$\to$O	$P_{+1}(\mathbf{s}_{+1})$	$P(\mathbf{s})$
(8)	$S\times N_{-1}$	245	6,7,$\times$I	$P(\mathbf{s})\times x_{-1}$	$\langle P(\mathbf{s}),\ x_{-1}\rangle$
(9)	S	2345	3,8,$\to$O	$Q_{\phi-1}\langle P(\mathbf{s}),\ x_{-1}\rangle$	
(10)	$[N_{+1}\to S.\times N_{-1}]\to S$	23	4-9,$\to$I	$\lambda\langle P_{+1},\ x_{-1}\rangle\ Q_{\phi-1}\langle P(\mathbf{s}),\ x_{-1}\rangle$	
(11)	S	123	1,10,$\to$O	$\exists!x\{\mathbf{D}[x]\ \&\ Q\langle\mathbf{O}[\mathbf{s},x],x\rangle\}$	
(12)	$[(S\times N_{-1})\to S]\to S$	12	3-11,$\to$I	$\lambda Q_{\phi-1}\ \exists!x\{\mathbf{D}[x]\ \&\ Q\langle\mathbf{O}[\mathbf{s},x],x\rangle\}$	

Notice that the predicted value at the top node is incorrect; it says that the speaker (on the occasion of utterance) owns exactly one spaniel, but does not say that he/she owns exactly one dog. How do we achieve the latter result; how do we manage to make the relative clause non-restrictive?

3. Our Proposal – Tacit NPs

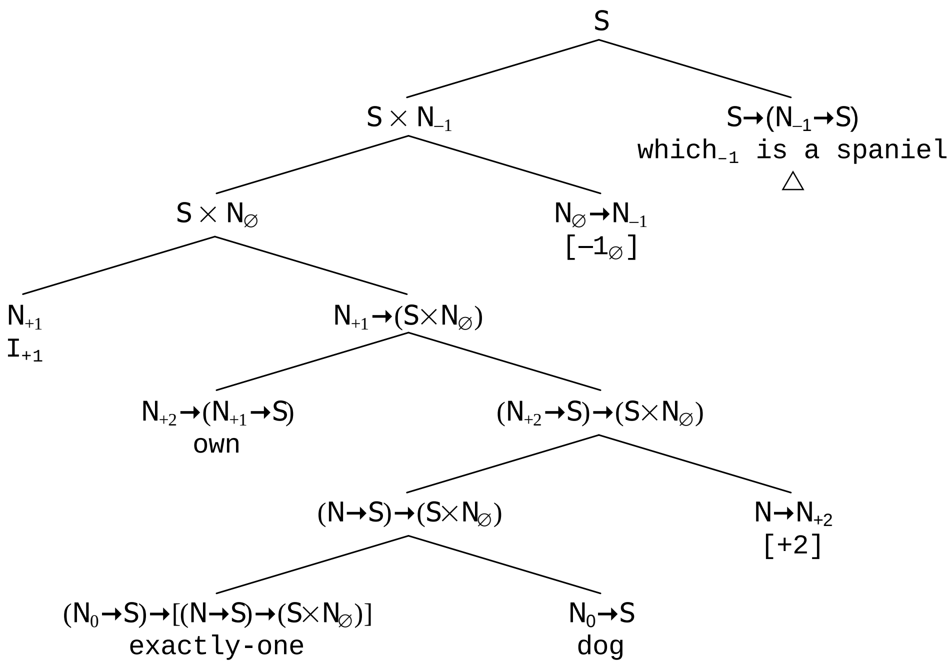
For this purpose, we propose a new categorial analysis of `'exactly one'`, according to which the functor is not a simple quantifier, but is rather a more complicated functor, categorially described as follows.

$$\text{type}(\texttt{exactly-one}) \quad = \quad (N_0 \rightarrow S) \rightarrow \{ (N \rightarrow S) \rightarrow [S \times N_{\varnothing}] \}$$

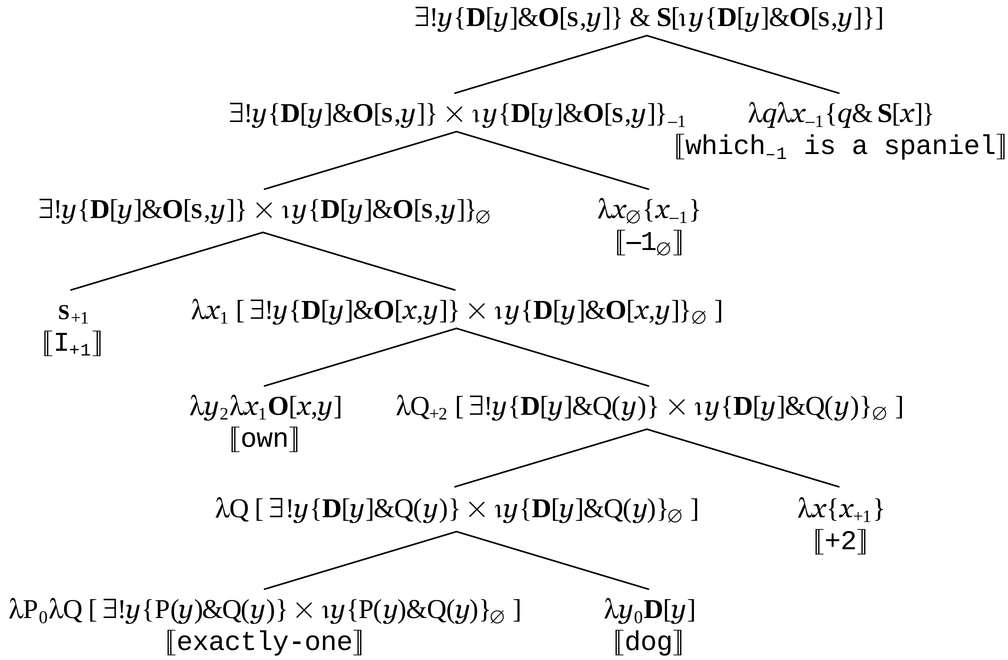
$$[\![\texttt{exactly-one}]\!] \quad = \quad \lambda P_0\, \lambda Q\, [\, \exists! x\{P(x) \& Q(x)\} \times \iota x\{P(x) \& Q(x)\}_{\varnothing}\,]$$

In other words, `'exactly-one'` takes a CNP and a VP and produces a sentence **plus** a collateral proper-noun phrase (N), the latter of which is never pronounced, although it is always tacitly understood. In particular, the collateral N serves as the official antecedent for any later pronoun that is ostensibly anaphoric to the QP.

By way of illustration, we re-do our earlier example. Notice the new inflection $\varnothing$, which marks tacit Ns, which we now officially add to our machinery. Also, notice the new inflectional-functor $[-k_{\varnothing}]$, which is used to add an anaphoric inflection $-k$ to such an N. Finally, notice that the inflectional functor is syntactically located between the first and second clauses.



The following is the associated semantic tree.



Notice that this says that there is exactly one dog that the speaker owns, and the (unique) dog that the speaker owns is a spaniel.[2]

We now consider how the parallel sentence

`I own exactly one dog; it is a spaniel`

is analyzed using the new proposal. First, it is plausible to treat the semi-colon '`;`' as a tacit coordinate-conjunction, in virtue of which this sentence is clearly equivalent to:

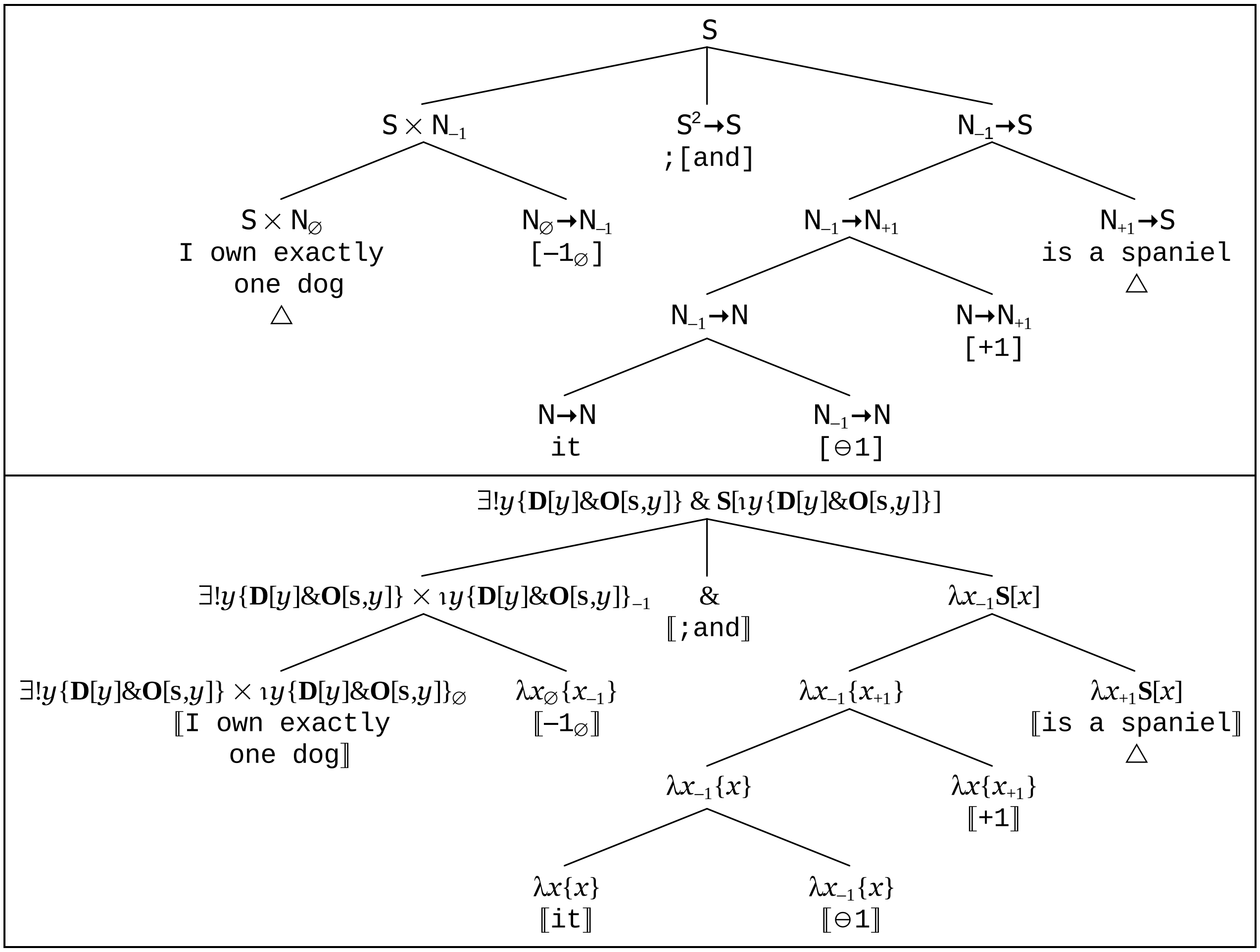
`I own exactly one dog,` **`and`** `it is a spaniel`

Since our analysis of non-restrictive relative pronouns proposes that 'which' is equivalent to 'and it', we should naturally expect that the latter sentence is equivalent to:

`I own exactly one dog,` **`which`** `is a spaniel`

This is confirmed in the following categorial trees.

[2] We have set up the &-function so that, whenever the description is improper, the top node receives truth-value F.



4. Non-Standard Anaphoric Pronouns – Variety 2 [Indefinite QPs]

The most famous trouble-makers of the second variety are the so-called "donkey sentences", of which the following is an example.[3]

`every man who owns a donkey feeds it`

The problem with this sentence is that `'it'` is presumably anaphoric to `'a donkey'`, which is presumably an existential quantifier; but if `'a donkey'` binds `'it'` in the conventional manner, then the scope of `'a donkey'` must be wide, in which case the sentence is equivalent to:

`some donkey is such that every man who owns it feeds it`

But this is definitely not the meaning of the original sentence, which is closer in meaning to:

`every donkey is such that every man who owns it feeds it`

Since this is a fairly complicated example, let us first examine a much simpler example that makes the same point. Consider the following pair, which are presumably equivalent.

`if a man is virtuous then he is happy`
`a man is happy if he is virtuous`

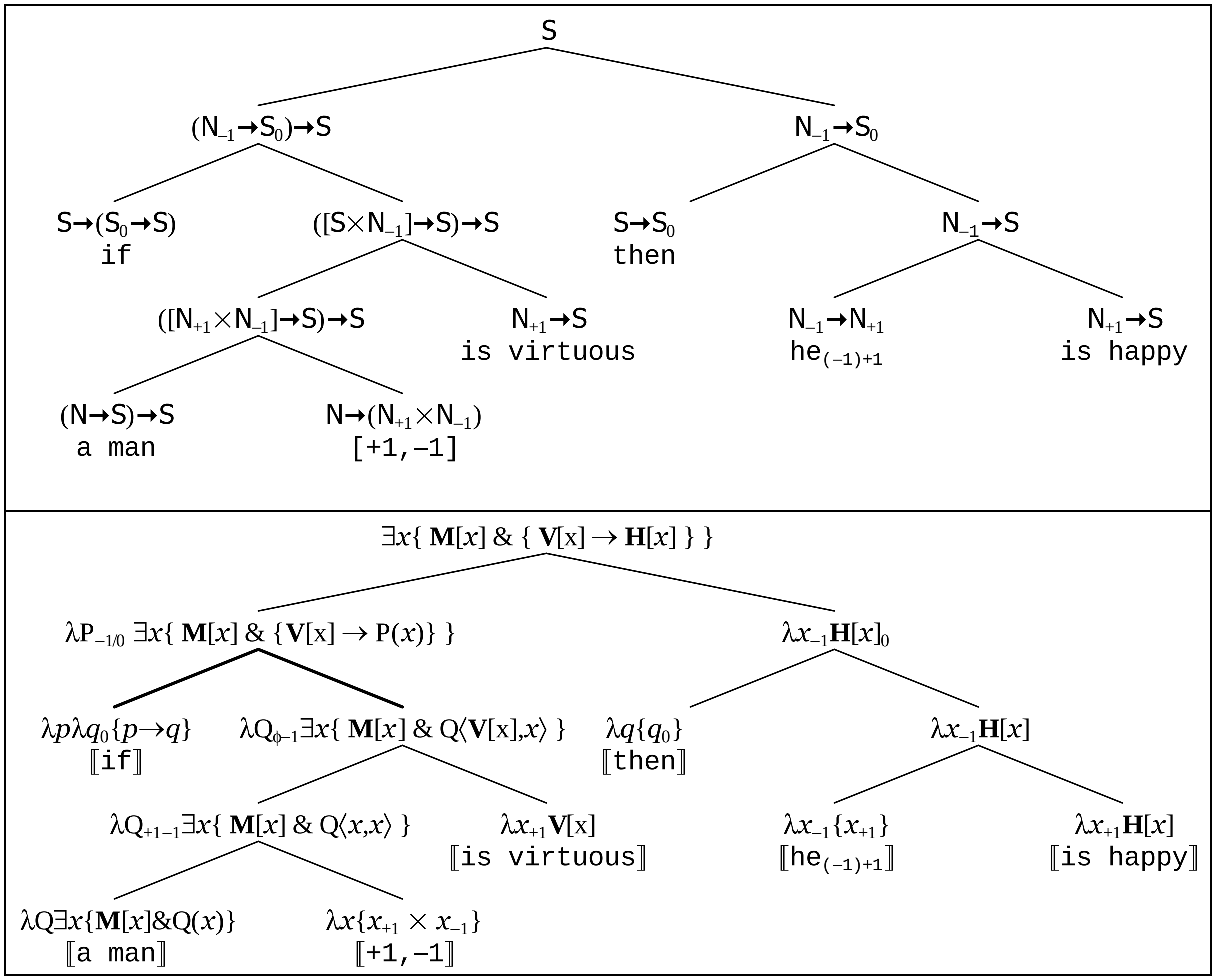
[3] The original example uses `'beats'` instead of `'feeds'`. We offer a kinder-and-gentler example.

The semantic problem is how to analyze `'a'` so that these sentences are equivalent to

`every man is happy if he is virtuous`

We could, of course, simply declare that, in this context, `'a'` means `'every'`, but this is not a very satisfying explanation. Why does `'a'` sometimes mean `'every'`?

First, let us examine the standard analysis, which goes as follows.



Thus, the standard analysis (incorrectly) predicts that the original sentence says that there is a man, who is happy if he is virtuous. What has happened is that, insofar as `'a man'` binds `'he'` it is semantically raised in the sentence.[4]

The key composition is underwritten by the following derivation.

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[4] On the other hand, contrary to the syntactic-binding theory, the quantifier phrase need not be *syntactically* raised. Its syntactic position stays put.

(1)	$S\rightarrow(S_0\rightarrow S)$	1	Pr	$\lambda p\lambda q_0\{p\rightarrow q\}$	
(2)	$([S\times N_{-1}]\rightarrow S)\rightarrow S$	2	Pr	$\lambda Q_{\phi\text{-}1}\exists x\{\ \mathbf{M}[x]\ \&\ Q\langle \mathbf{V}[\mathrm{x}],x\rangle\ \}$	
(3)	$N_{-1}\rightarrow S_0$	3	As	$P_{-1/0}$	$\lambda x_{-1}P(x)_0$
(4)	$S\times N_{-1}$	45	As	$p\times x_{-1}$	$\langle p, x_{-1}\rangle$
(5)	S	4	$4,\times O_1$	p	
(6)	N_{-1}	5	$4,\times O_2$	x_{-1}	
(7)	$S_0\rightarrow S$	15	$1,6,\rightarrow O$	$\lambda q_0\{p\rightarrow q\}$	
(8)	S_0	35	$3,6,\rightarrow O$	$P(x)_0$	
(9)	S	1345	$3,8,\rightarrow O$	$p\rightarrow P(x)$	
(10)	$[S\times N_{-1}]\rightarrow S$	13	$4\text{-}9,\rightarrow I$	$\lambda\langle p, x_{-1}\rangle\ \lambda q_0\ \{\ p\rightarrow P(x)\ \}$	
(11)	S	123	$2,10,\rightarrow O$	$\exists x\{\ \mathbf{M}[x]\ \&\ [\mathbf{V}[\mathrm{x}]\rightarrow P(x)]\ \}$	
(12)	$(N_{-1}\rightarrow S_0)\rightarrow S$	12	$3\text{-}11,\rightarrow I$	$\lambda P_{-1/0}\ \exists x\{\ \mathbf{M}[x]\ \&\ [\mathbf{V}[\mathrm{x}]\rightarrow P(x)]\ \}$	

5. Our Proposal – Co-Anaphora

It appears that standard anaphoric-inflection raises a quantifier sufficiently high in the sentence to bind any pronoun that is anaphoric to it. What we need is an alternative way of implementing anaphoric cross-referencing. For this purpose we propose an alternative anaphoric construction, according to which we use an **appositive construction**, in virtue of which a pronoun and its antecedent are **co-anaphoric**. In particular, we propose yet another anaphoric suffix operator – notated by curly braces – defined as follows.

$$\text{type}\ \{\alpha\} \quad = \quad N_\alpha\rightarrow[(N_0\rightarrow S)\rightarrow(N_0\rightarrow S)]$$

$$[\![\ \{\alpha\}\ ]\!] \quad = \quad \lambda z_\alpha\lambda P_0\ \lambda x_0\ \{\ P(x)\ \&\ x=z\ \}$$

We refer to this as an appositive construction, because its most natural reading is appositional. In particular, the anaphorically-marked sentence

`[a man]`$_\alpha$ `is happy if [he]`$_\alpha$ `is virtuous`

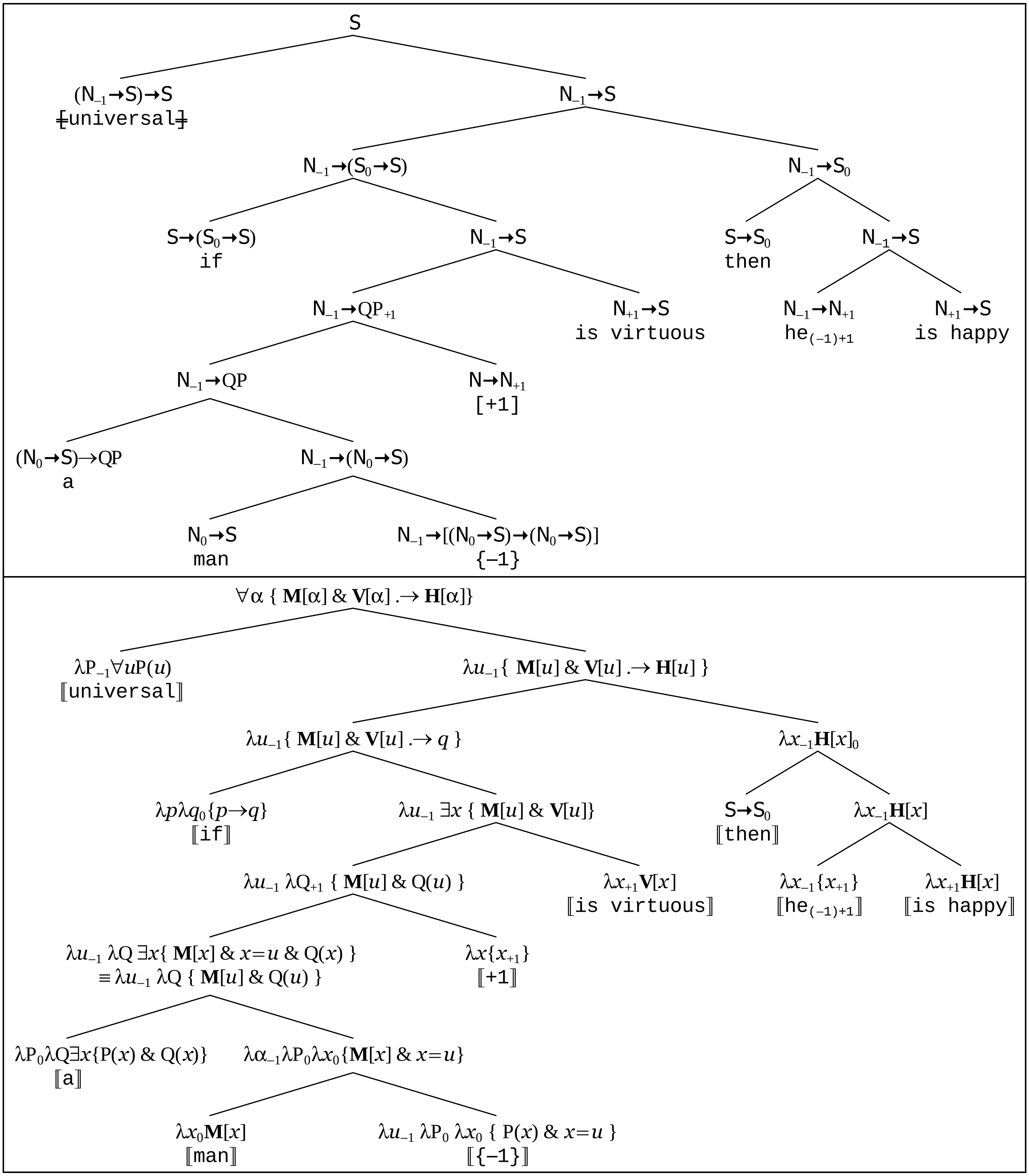
is naturally read as:

`a man, α, is happy if he, α, is virtuous`

which in turn means

`a man who is identical to α is happy if he, i.e. α, is virtuous`

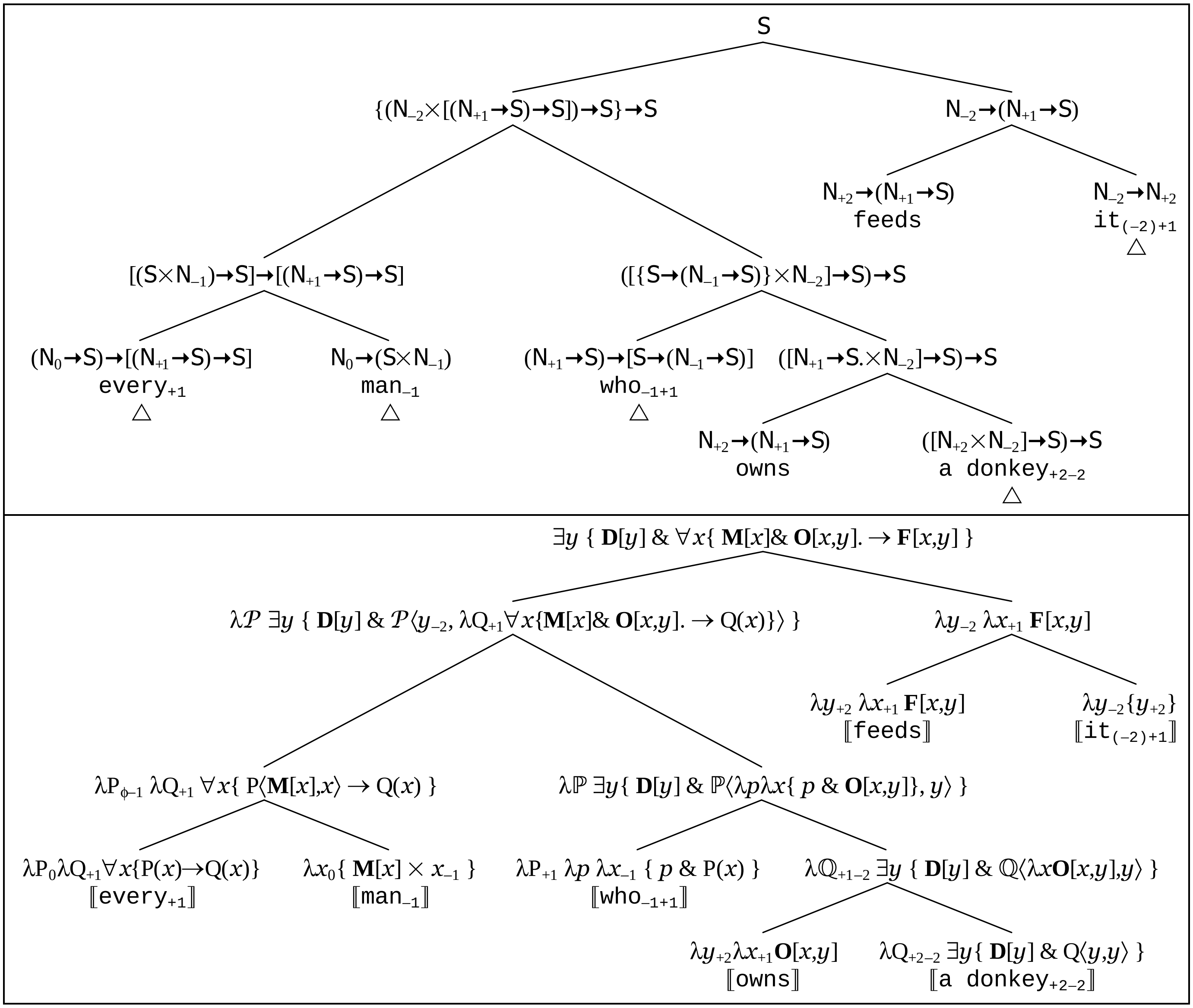
This idea is clarified in the following analysis of our earlier sentence.



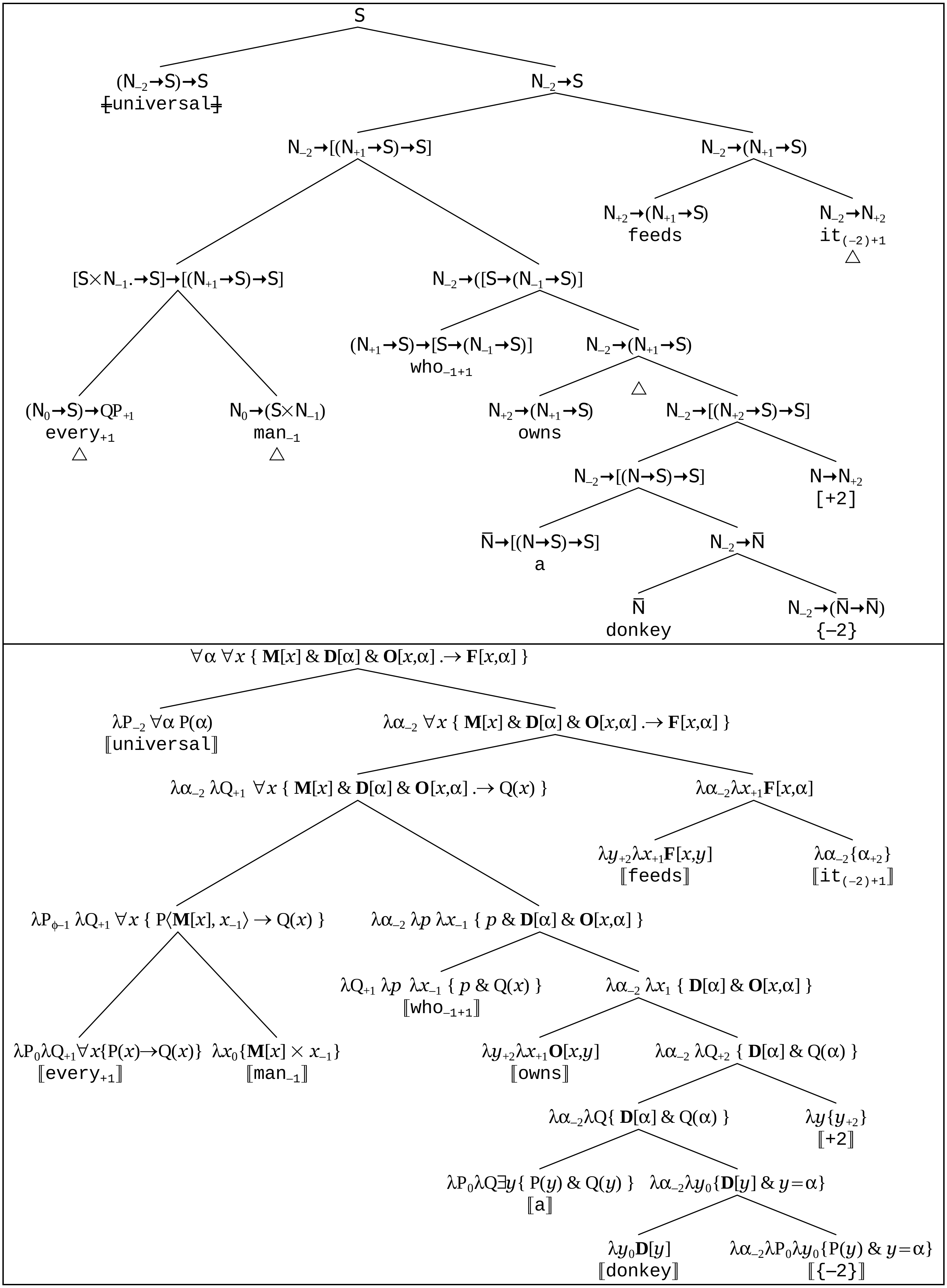
Note that the anaphoric-suffix {–1} is attached to the common noun `'man'`. The basic idea is that {–1} takes the common noun `'man'` and produces an open common-noun-phrase `'man who is identical to him'`, where `'him'` is **co-anaphoric** with `'he'`. The slight problem is that, when we get to the top node in the overt form, we have an open sentence involving `'he'`. In order to close this open sentence, we apply the standard technique, well-known in mathematics, of binding any remaining open variables with universal quantifiers. Syntactically speaking, we propose one or more unpronounced universal quantifiers in the logical form.

6. The "Donkey" Sentence

The "donkey" sentence is treated the same way, as we see in the following. First. the conventional approach to pronoun-binding produces the following analysis.



As expected, the existential quantifier `'a donkey'` gets semantically-raised in order to bind the pronoun `'it'`. On the other hand, the co-anaphoric approach produces the following analysis.

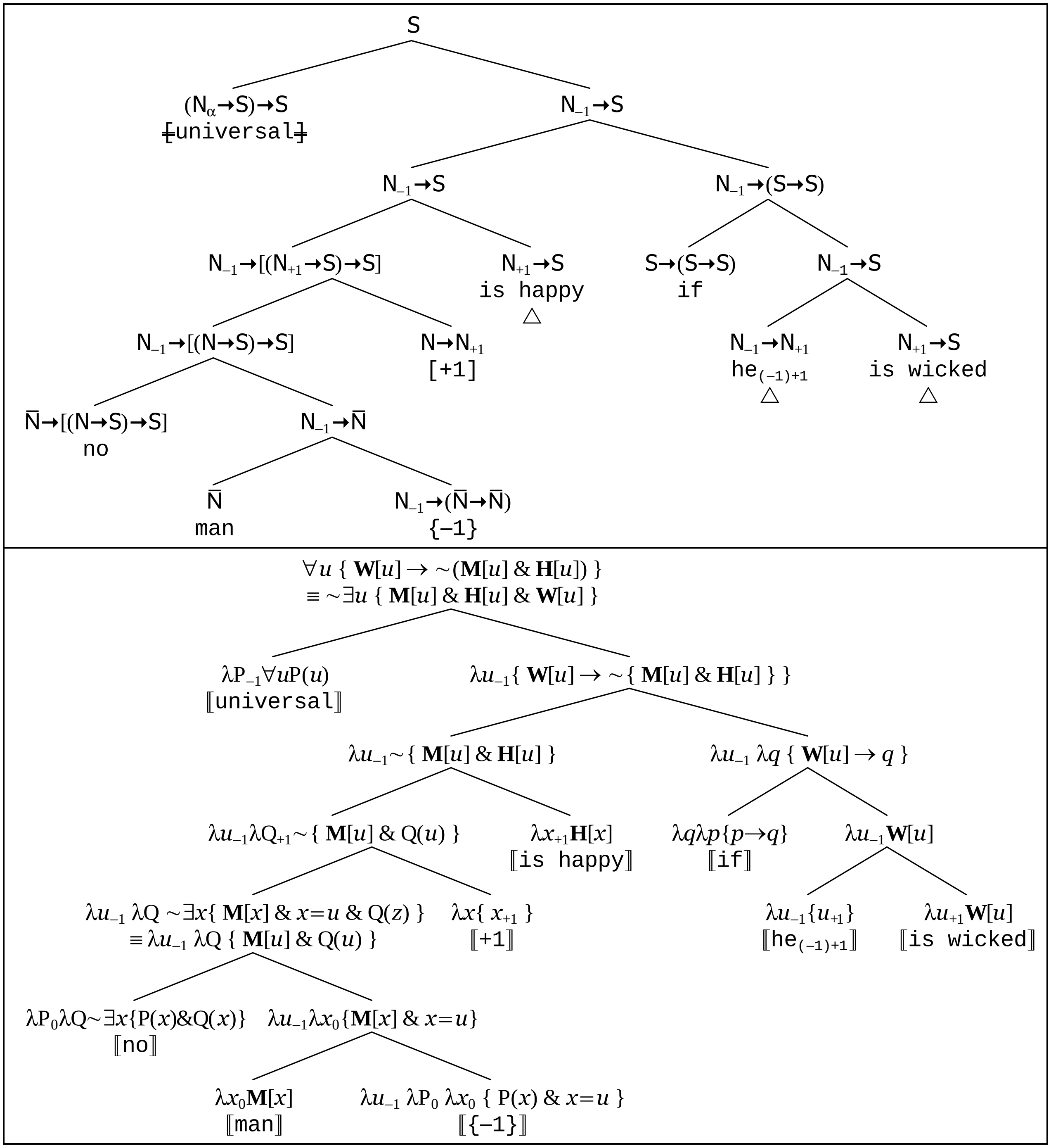

S
$(N_{-2}\to S)\to S$
⟦universal⟧
$N_{-2}\to S$
$N_{-2}\to[(N_{+1}\to S)\to S]$
$N_{-2}\to(N_{+1}\to S)$
$N_{+2}\to(N_{+1}\to S)$
feeds
$N_{-2}\to N_{+2}$
$\text{it}_{(-2)+1}$
$[S\times N_{-1}.\to S]\to[(N_{+1}\to S)\to S]$
$N_{-2}\to([S\to(N_{-1}\to S)]$
$(N_{+1}\to S)\to[S\to(N_{-1}\to S)]$
who_{-1+1}
$N_{-2}\to(N_{+1}\to S)$
$(N_0\to S)\to QP_{+1}$
every_{+1}
$N_0\to(S\times N_{-1})$
man_{-1}
$N_{+2}\to(N_{+1}\to S)$
owns
$N_{-2}\to[(N_{+2}\to S)\to S]$
$N_{-2}\to[(N\to S)\to S]$
$N\to N_{+2}$
[+2]
$\bar{N}\to[(N\to S)\to S]$
a
$N_{-2}\to\bar{N}$
$\bar{N}$
donkey
$N_{-2}\to(\bar{N}\to\bar{N})$
{–2}
$\forall\alpha\,\forall x\,\{\,\mathbf{M}[x]\,\&\,\mathbf{D}[\alpha]\,\&\,\mathbf{O}[x,\alpha]\,.\!\to\mathbf{F}[x,\alpha]\,\}$
$\lambda P_{-2}\,\forall\alpha\,P(\alpha)$
⟦universal⟧
$\lambda\alpha_{-2}\,\forall x\,\{\,\mathbf{M}[x]\,\&\,\mathbf{D}[\alpha]\,\&\,\mathbf{O}[x,\alpha]\,.\!\to\mathbf{F}[x,\alpha]\,\}$
$\lambda\alpha_{-2}\,\lambda Q_{+1}\,\forall x\,\{\,\mathbf{M}[x]\,\&\,\mathbf{D}[\alpha]\,\&\,\mathbf{O}[x,\alpha]\,.\!\to Q(x)\,\}$
$\lambda\alpha_{-2}\lambda x_{+1}\mathbf{F}[x,\alpha]$
$\lambda y_{+2}\lambda x_{+1}\mathbf{F}[x,y]$
⟦feeds⟧
$\lambda\alpha_{-2}\{\alpha_{+2}\}$
$[\![\text{it}_{(-2)+1}]\!]$
$\lambda P_{\phi-1}\,\lambda Q_{+1}\,\forall x\,\{\,P\langle\mathbf{M}[x],x_{-1}\rangle\to Q(x)\,\}$
$\lambda\alpha_{-2}\,\lambda p\,\lambda x_{-1}\,\{\,p\,\&\,\mathbf{D}[\alpha]\,\&\,\mathbf{O}[x,\alpha]\,\}$
$\lambda Q_{+1}\,\lambda p\,\lambda x_{-1}\,\{\,p\,\&\,Q(x)\,\}$
$[\![\text{who}_{-1+1}]\!]$
$\lambda\alpha_{-2}\,\lambda x_1\,\{\,\mathbf{D}[\alpha]\,\&\,\mathbf{O}[x,\alpha]\,\}$
$\lambda P_0\lambda Q_{+1}\forall x\{P(x)\to Q(x)\}$
$[\![\text{every}_{+1}]\!]$
$\lambda x_0\{\mathbf{M}[x]\times x_{-1}\}$
$[\![\text{man}_{-1}]\!]$
$\lambda y_{+2}\lambda x_{+1}\mathbf{O}[x,y]$
⟦owns⟧
$\lambda\alpha_{-2}\,\lambda Q_{+2}\,\{\,\mathbf{D}[\alpha]\,\&\,Q(\alpha)\,\}$
$\lambda\alpha_{-2}\lambda Q\{\,\mathbf{D}[\alpha]\,\&\,Q(\alpha)\,\}$
$\lambda y\{y_{+2}\}$
⟦+2⟧
$\lambda P_0\lambda Q\exists y\{\,P(y)\,\&\,Q(y)\,\}$
⟦a⟧
$\lambda\alpha_{-2}\lambda y_0\{\mathbf{D}[y]\,\&\,y=\alpha\}$
$\lambda y_0\mathbf{D}[y]$
⟦donkey⟧
$\lambda\alpha_{-2}\lambda P_0\lambda y_0\{P(y)\,\&\,y=\alpha\}$
⟦{–2}⟧

7. A Parallel Analysis of Indefinite 'No'

We already have a working analysis of `'no'` that handles the following problematic example.

```
no man is happy if he is wicked
```

Nevertheless, in this section, we demonstrate that the indefinite-analysis of the previous sections can also be applied to this example, as seen in the following.

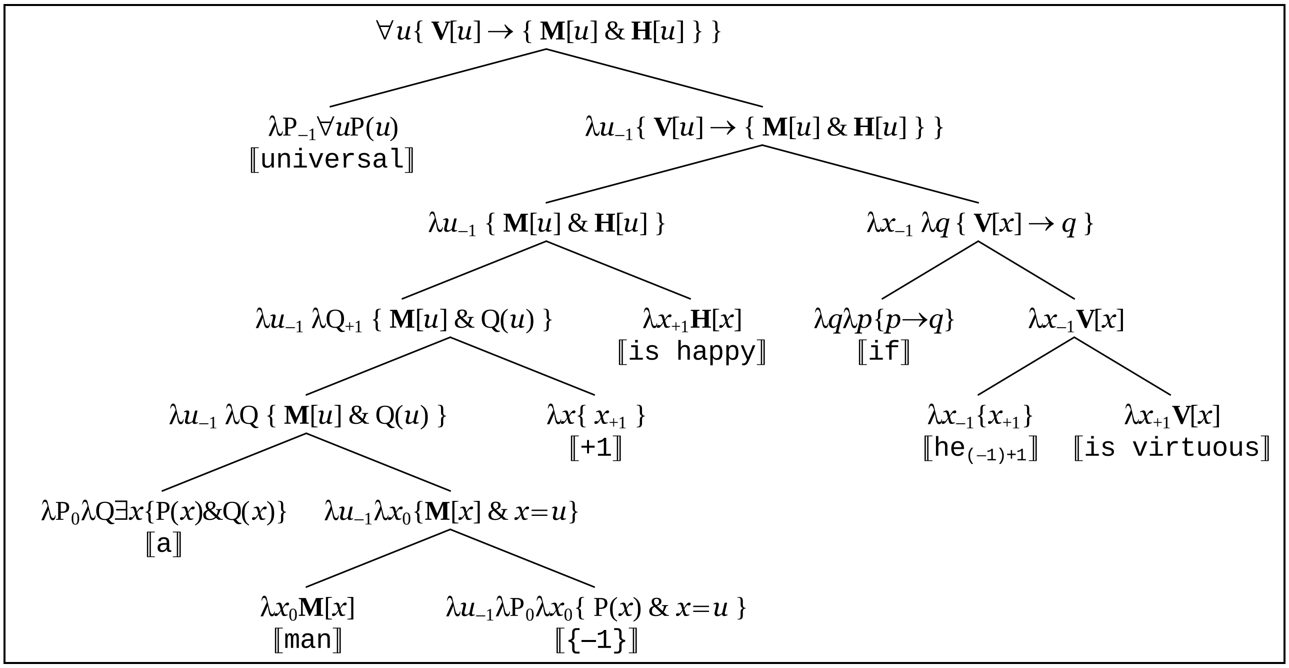


8. A Crucial Modification of Our Account

The co-anaphora approach faces a immediate problem in the following examples.

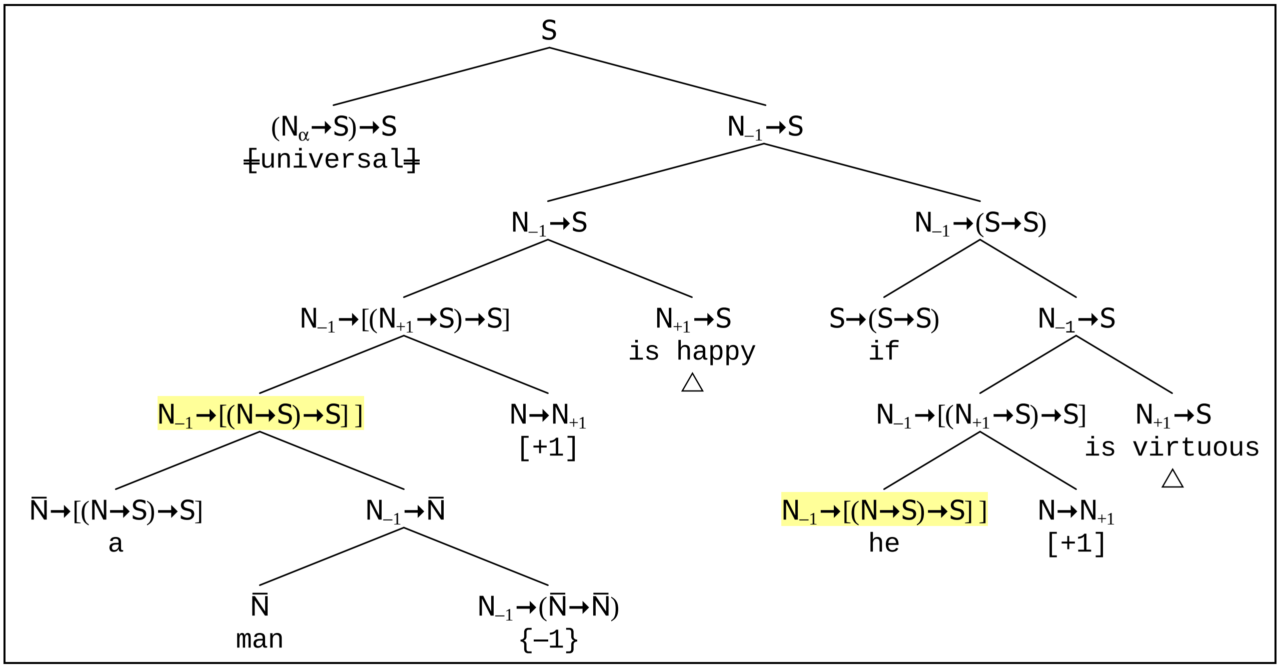
```
a man is happy if he is virtuous
a man is happy unless he is virtuous
a man is happy if and only if he is virtuous
```

To see this, we do the first one, leaving the other two as exercises.

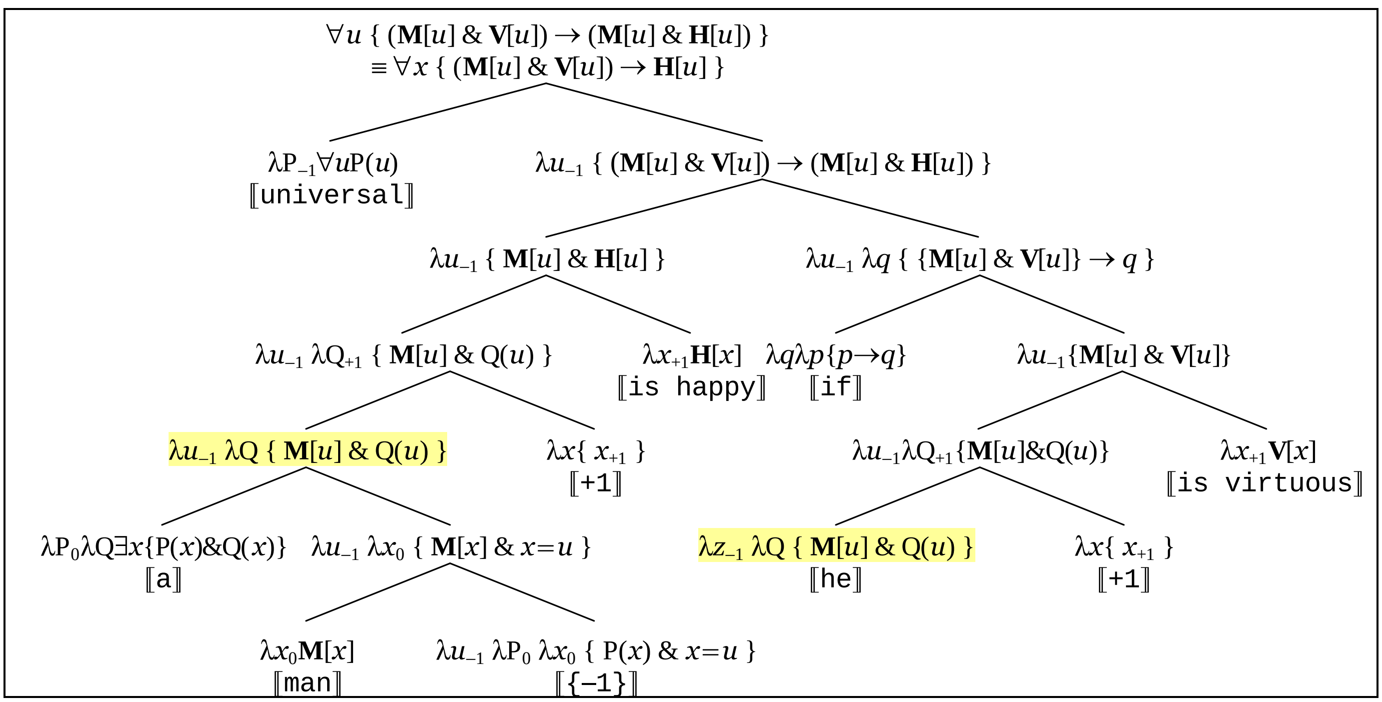


This analysis proposes that the original sentence says that anyone who is virtuous is a happy man, but what we want is that anyone who is a virtuous man is happy. What to do?

We propose to treat the anaphoric pronoun `'he'` as a lazy pronoun that simply duplicates its antecedent including the anaphoric-suffix information as before, so that the underlying form is as follows.



Notice that the type of `'he'` simply repeats the type of its antecedent. This duplication is furthermore carried through into the semantics, according to which the denotation of `'he'` repeats the denotation of its antecedent.



A similar analysis can be provided for the corresponding sentences involving `'unless'` and `'if and only if'`, as well as our earlier examples, which are left as exercises for the reader.

9. Anaphoric Uses of Determiner Phrases

So far, we have proposed that the underlying form of a typical indefinite-quantifier sentence is given as follows.

…… $[\text{a CNP}]_\alpha$ …… $[\text{a CNP}]_\alpha$ ……

where the two QPs are **co-anaphoric**, and where the second QP is optionally replaceable by a pronoun in the phonetic form. Perhaps the most famous example in which the QPs are not replaced by pronouns comes from Robert Burns:

```
if a body meet a body coming through the rye;
if a body kiss a body, need a body cry
```

A considerably less poetic variation of this goes as follows.[5]

```
suppose a body meets a body coming through the rye;
suppose the former body kisses the latter body;
then it is not necessary that the latter body cries
```

I take the words `'former'` and `'latter'` to be anaphoric-indicators, which are dispensed with in the underlying form, which instead uses anaphoric suffixes, such as in the following.

suppose [**a body**]$_1$ meets [**a body**]$_2$ coming through the rye;
suppose [**the body**]$_1$ kisses [**the body**]$_2$;
then it is not necessary that [**the body**]$_2$ cries

The following is a similar, but considerably simpler, example.

if [**a man**]$_1$ respects [**a woman**]$_2$;
then [**the woman**]$_2$ respects [**the man**]$_1$

We propose the following official analysis of this sentence, in which the anaphoric suffixes once again are appositive, and the NPs are co-anaphoric.

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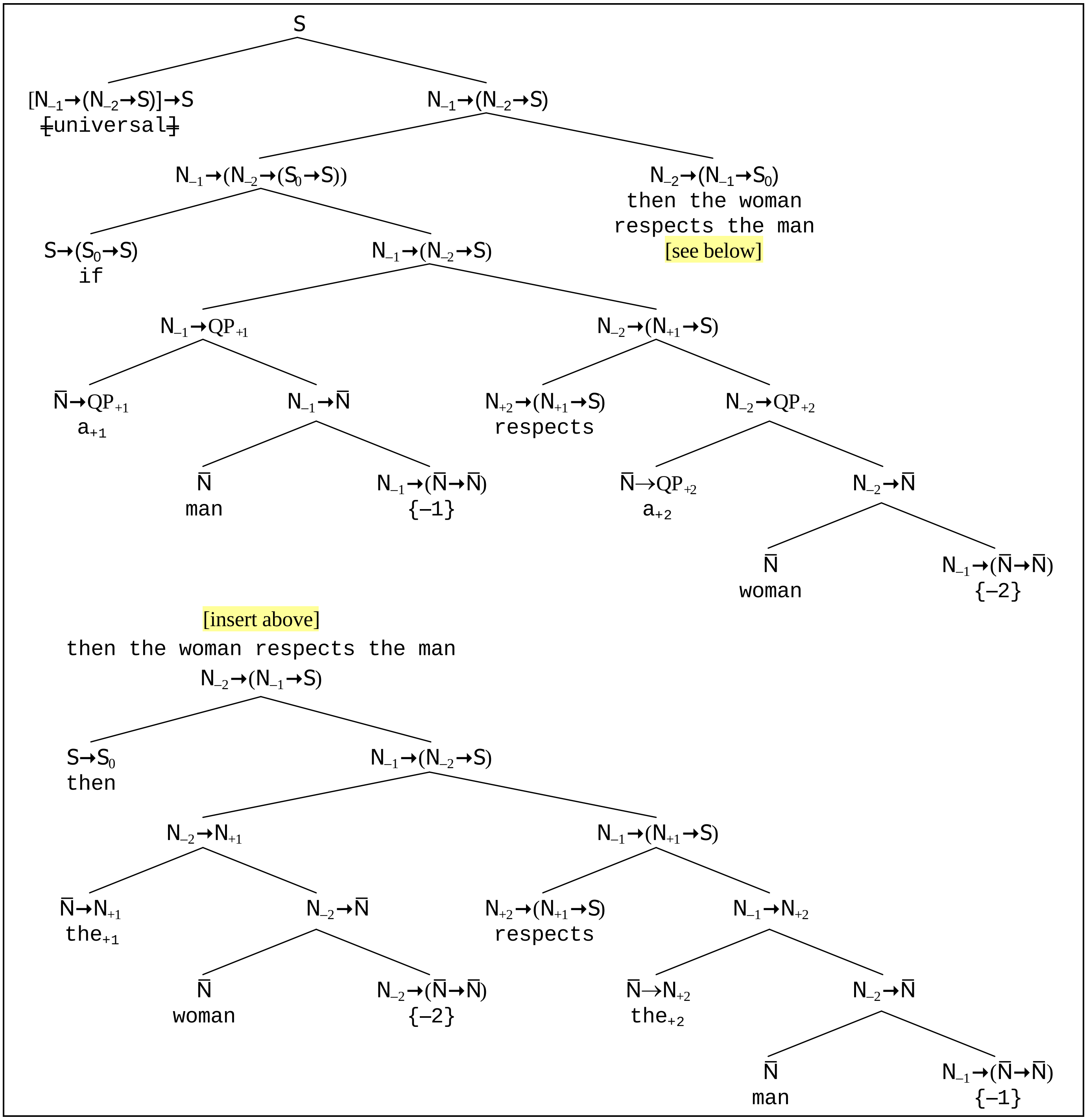
[5] Note carefully that I am not proposing the variation as an *exegesis* of Burn's lyric, but only as a grammatically *admissible reading* of it, which further illustrates how two QPs can be co-anaphoric. Rather, I think that Burns intends that the last occurrence of `'a body'` is not anaphoric to any earlier occurrence of `'a body'`, but is rather a third reference. In other words, no one should cry if someone kisses someone coming through the rye.


S
[N–1→(N–2→S)]→S
[universal]
N–1→(N–2→S)
N–1→(N–2→(S0→S))
N–2→(N–1→S0)
then the woman
respects the man
[see below]
S→(S0→S)
if
N–1→(N–2→S)
N–1→QP+1
N–2→(N+1→S)
N̄→QP+1
a+1
N–1→N̄
N+2→(N+1→S)
respects
N–2→QP+2
N̄
man
N–1→(N̄→N̄)
{–1}
N̄→QP+2
a+2
N–2→N̄
N̄
woman
N–1→(N̄→N̄)
{–2}
[insert above]
then the woman respects the man
N–2→(N–1→S)
S→S0
then
N–1→(N–2→S)
N–2→N+1
N–1→(N+1→S)
N̄→N+1
the+1
N–2→N̄
N+2→(N+1→S)
respects
N–1→N+2
N̄
woman
N–2→(N̄→N̄)
{–2}
N̄→N+2
the+2
N–2→N̄
N̄
man
N–1→(N̄→N̄)
{–1}

- $\forall u \forall v \{ \{ \mathbf{M}[u] \,\&\, \mathbf{W}[v] \,\&\, \mathbf{R}[u,v] \} \rightarrow \mathbf{R}[v,u] \}$
  - $\lambda \mathrm{P}_{-1-2} \, \forall u \forall v \, \mathrm{P}\langle u,v \rangle$ ⟦`universal`⟧
  - $\lambda u_{-1} \, \lambda v_{-2} \{ (\mathbf{M}[u] \,\&\, \mathbf{W}[v] \,\&\, \mathbf{R}[u,v]) \rightarrow \mathbf{R}[\iota x\{\mathbf{W}[x] \,\&\, x{=}v\}, \iota y\{\mathbf{M}[y] \,\&\, y{=}u\}] \}$ $\equiv \lambda u_{-1} \, \lambda v_{-2} \{ \{ \mathbf{M}[u] \,\&\, \mathbf{W}[v] \,\&\, \mathbf{R}[u,v] \} \rightarrow \mathbf{R}[v,u] \}$
    - $\lambda u_{-1} \, \lambda \beta_{-2} \, \lambda q_0 \{ \{ \mathbf{M}[u] \,\&\, \mathbf{W}[\beta] \,\&\, \mathbf{R}[u,\beta] \} \rightarrow q \}$
      - $\lambda p \lambda q_0 \{p \rightarrow q\}$ ⟦`if`⟧
      - $\lambda u_{-1} \, \lambda \beta_{-2} \{ \mathbf{M}[u] \,\&\, \mathbf{W}[\beta] \,\&\, \mathbf{R}[u,\beta] \}$
        - $\lambda u_{-1} \lambda \mathrm{Q}_{+1} \{ \mathbf{M}[u] \,\&\, \mathrm{Q}(u) \}$
          - $\lambda \mathrm{P}_0 \lambda \mathrm{Q}_{+1} \exists x \{\mathrm{P}(x) \& \mathrm{Q}(x)\}$ ⟦`a`$_{+1}$⟧
          - $\lambda u_{-1} \lambda x_0 \{\mathbf{M}[x] \& x{=}u\}$
            - $\lambda x_0 \mathbf{M}[x]$ ⟦`man`⟧
            - $\lambda u_{-1} \lambda \mathrm{P}_0 \lambda x_0 \{\mathrm{P}(x) \& x{=}u\}$ ⟦`{–1}`⟧
        - $\lambda v_{-2} \, \lambda x_{+1} \{ \mathbf{W}[v] \,\&\, \mathbf{R}[x,\beta] \}$
          - $\lambda y_{+2} \lambda x_{+1} \mathbf{R}[x,y]$ ⟦`respects`⟧
          - $\lambda v_{-2} \, \lambda \mathrm{Q}_{+2} \{ \mathbf{W}[v] \,\&\, \mathrm{Q}(v) \}$
            - $\lambda \mathrm{P}_0 \lambda \mathrm{Q}_{+2} \exists x \{\mathrm{P}(x) \& \mathrm{Q}(x)\}$ ⟦`a`$_{+2}$⟧
            - $\lambda v_{-2} \lambda \mathrm{P}_0 \lambda x_0 \{\mathbf{W}[x] \& x{=}v\}$
              - $\lambda x_0 \mathbf{W}[x]$ ⟦`woman`⟧
              - $\lambda v_{-2} \lambda \mathrm{P}_0 \lambda x_0 \{\mathrm{P}(x) \& x{=}v\}$ ⟦`{–2}`⟧
    - $\lambda u_{-1} \, \lambda v_{-2} \, \mathbf{R}[\iota x\{\mathbf{W}[x] \,\&\, x{=}v\}, \iota y\{\mathbf{M}[y] \,\&\, y{=}u\}]_0$ ⟦`then the woman respects the man`⟧ [seee below]

[insert above]

- $\lambda u_{-1} \, \lambda v_{-2} \, \mathbf{R}[\iota x\{\mathbf{W}[x] \,\&\, x{=}v\}, \iota y\{\mathbf{M}[y] \,\&\, y{=}u\}]_0$
  - $\lambda q\{q_0\}$ ⟦`then`⟧
  - $\lambda u_{-1} \, \lambda v_{-2} \, \mathbf{R}[\iota x\{\mathbf{W}[x] \,\&\, x{=}v\}, \iota y\{\mathbf{M}[y] \,\&\, y{=}u\}]$
    - $\lambda v_{-2} \, \iota x \{ \mathbf{W}[x] \,\&\, x{=}v \}$
      - $\lambda \mathrm{P}_0 \, \iota x\{\mathrm{P}(x)\}_{+1}$ ⟦`the`$_{+1}$⟧
      - $\lambda v_{-2} \lambda x_0 \{\mathbf{W}[x] \& x{=}v\}$
        - $\lambda x_0 \mathbf{W}[x]$ ⟦`woman`⟧
        - $\lambda v_{-2} \lambda \mathrm{P}_0 \lambda x_0 \{\mathrm{P}(x) \& x{=}v\}$ ⟦`{–2}`⟧
    - $\lambda u_{-1} \, \lambda x_{+1} \, \mathbf{R}[x, \iota y\{\mathbf{M}[y] \,\&\, y{=}u\}] \}$
      - $\lambda y_{+2} \lambda x_{+1} \mathbf{R}[x,y]$ ⟦`respects`⟧
      - $\lambda u_{-1} \, \iota y \{ \mathbf{M}[y] \,\&\, y{=}u \}$
        - $\lambda \mathrm{P}_0 \, \iota y\{\mathrm{P}(y)\}_{+2}$ ⟦`the`$_{+2}$⟧
        - $\lambda u_{-1} \, \lambda \mathrm{P}_0 \, \lambda x_0 \{ \mathbf{M}[x] \,\&\, x{=}u \}$
          - $\lambda x_0 \mathbf{M}[x]$ ⟦`man`⟧
          - $\lambda u_{-1} \lambda \mathrm{P}_0 \lambda x_0 \{\mathrm{P}(x) \& x{=}u\}$ ⟦`{–1}`⟧