Relational Nouns and Prepositions

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1. Introduction

In the current chapter, we investigate the grammar of relational nouns and their affiliated prepositional suffixes, as well as relational prepositions. Among relational nouns, we concentrate on genitive nouns, which are common nouns that subcategorize for a genitive argument, marked by the suffix `'of'`, which we call the inflectional/genitive use of `'of'`. Correspondingly, among relational prepositions, we concentrate on the relational/possessive use of `'of'`, but also include material on `'from'`. We also investigate corresponding uses of `'have'` – the genitive use, and the possessive use, and we investigate another use of `'have'` that is similar to genitive `'have'`.

2. Genitive Nouns

Common nouns divide into *ordinary common nouns* and *relational common nouns*. Whereas an ordinary common noun denotes a subset of entities, a relational common noun denotes a two-place relation on the set of entities.[1]

Among relational common nouns are a special subclass we propose to call *genitive nouns*, examples of which include:

`mother`, `brother`, `uncle`, etc.
`customer`, `capital`, `member`, `citizen`, `friend`

Genitive nouns carry, or subcategorize for, the suffix `'of'`.[2] For example, being a *mother* is tantamount to being the/a mother <u>of</u> someone. Examples of relational nouns that are not genitive include:

`hole` (in), `solution` (to), `reason` (for), `passenger` (in/on)

By contrast, ordinary common nouns do not carry `'of'`, or any other suffix. For example, being a *dog* is *not* tantamount to being the/a dog <u>of</u> (or in, or to, or for) someone or something. Most common nouns are like `'dog'` and not like `'mother'`; most common nouns are ordinary.

Whereas we propose that ordinary common nouns have category $\bar{N}$ [$=_{df}$ $N_0 \to S$], we propose that relational common nouns have category [$N_\theta \to \bar{N}$], where θ is the affiliated case-inflection, such as genitive or inessive. In this chapter, we concentrate on genitive.

In summary:

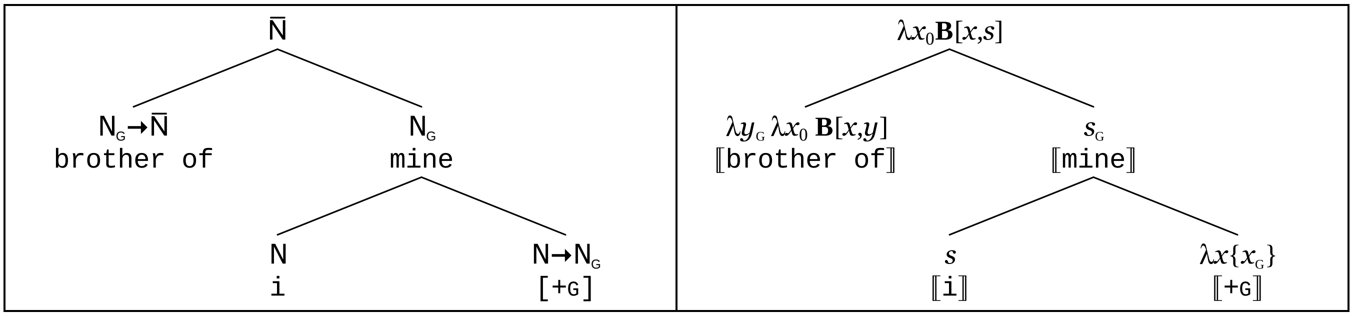
type(ordinary common noun)	$=$	$\bar{N}$
	$=_{df}$	$N_0 \to S$
type(relational common noun)	$=$	$N_\theta \to \bar{N}$
	$=_{df}$	$N_\theta \to (N_0 \to S)$
type(genitive common noun)	$=$	$N_G \to \bar{N}$
	$=_{df}$	$N_G \to (N_0 \to S)$

[1] Technically, an ordinary common noun denotes the characteristic function associated with a subset of entities, and a relational common noun denotes the Schönfinkel form of a characteristic function associated with a relation on the set of entities.
[2] This is analogous to claiming that `'sell'` subcategorizes for `'to'` and `'buy'` subcategorizes for `'from'`.

3. Inflectional (Genitive) ‘of’

Genitive nouns subcategorize for `‘of’`, which serves as a dependent suffix, and which we call the *inflectional* (*genitive*) use of `‘of’`. Its grammar is illustrated in the following.

`brother of mine`

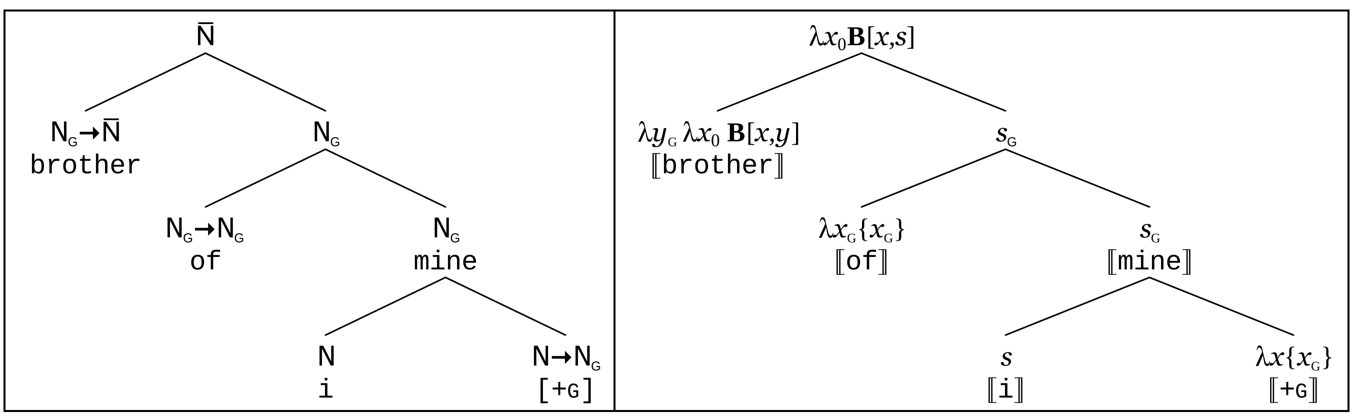


In the semantic tree, note the following identities.

⟦`brother of`⟧	=	$\lambda y_G\, \lambda x_0\, \mathbf{B}[x,y]$
	$=_{df}$	$\lambda y_G\, \lambda x_0$ (x is a brother of y)
`i`	=	first-person singular pronoun minus case-inflection
s	=	the speaker of the sentence (on the occasion of utterance)

Note that in the above analysis, we treat `‘of’` as internal to `‘brother of’`, which is treated as a lexical item. The following is an alternative treatment, which separates the suffix `‘of’`.

`brother of mine`



Notice `‘of’` is semantically vacuous.[3] We henceforth employ the latter analysis, in preference to the former analysis, for three reasons.

(1) it renders this use of `‘of’` syntactically parallel to the other uses of `‘of’` [Sections 4 and 9.1];

(2) it fits better with our account of the secondary genitive form [Section 6];

(3) it simplifies how genitive nouns combine with quantifiers [Section 9].

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[3] An alternative account of internal `‘of’` proposes distinct genitive forms – G and G′ – exemplified by the distinction between `my/her/their[G]` and `mine/hers/theirs[G′]`. This proposal then treats internal `‘of’` as a genitive-case converter, which converts one genitive form – e.g., `‘mine’` – into the other genitive form – e.g., `‘my’` [≡ `‘of mine’`]. In particular: ⟦`of`⟧ = $\lambda x_{G'}\{x_G\}$. Later, in Section 9.1, we offer a, similar, secondary account of genitive `‘of’` that has type $N_2 \rightarrow N_G$.

4. Relational (Possessive) 'of'

In addition to its usage as an inflectional suffix, `'of'` is also used as a preposition, which we propose to call the *relational* (*possessive*) use of `'of'`. There are basically two kinds of prepositions – *adverbial-prepositions*, and *adjectival-prepositions*. For example, the word `'from'` is used in both ways, as illustrated in the following.

`Kay moved here` **`from`** `California`	[adverbial]
`Kay is` **`from`** `California`	[adjectival]

Let us concentrate on adjectival prepositions, which have the following *basic* type.[4]

$$\text{type(Adj-Prep)} = \mathsf{N}\to\text{Adj}$$
$$=_{\text{df}} \mathsf{N}\to(\bar{\mathsf{N}}\to\bar{\mathsf{N}})$$
$$=_{\text{df}} \mathsf{N}\to([\mathsf{N}_0\to\mathsf{S}]\to[\mathsf{N}_0\to\mathsf{S}])$$

In other words, an adjectival-preposition takes a proper-noun phrase (N) as input, and delivers an adjective as output, the latter being a functor that takes an ordinary common-noun phrase ($\bar{\mathsf{N}}$) and delivers an ordinary common-noun phrase.

Even when used as an adjectival-preposition, the same word can have two different meanings, as seen in the following.

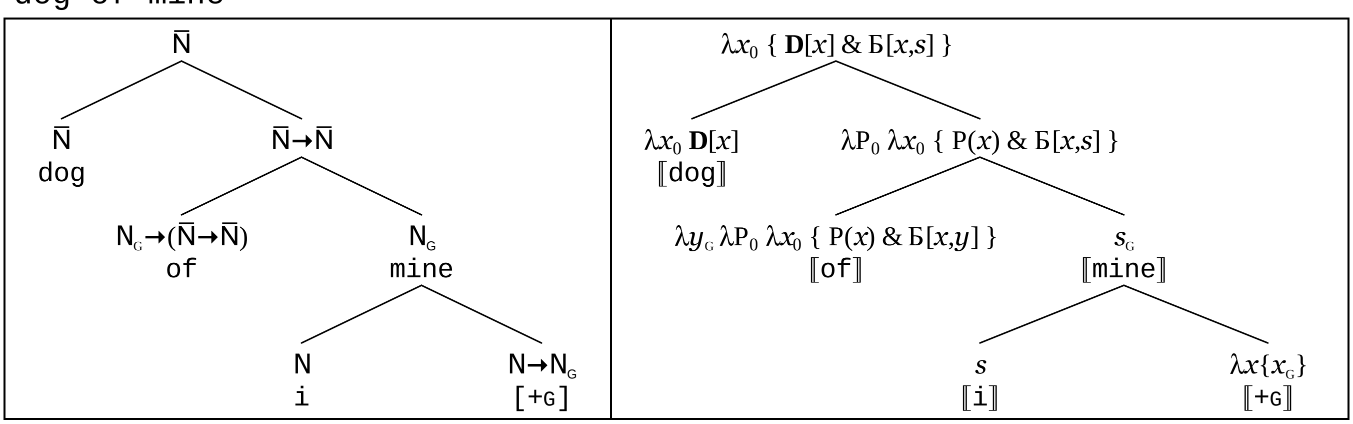
(1) `a picture` **`of`** `Kay`
(2) `a picture` **`of`** `Kay's`

Whereas the first picture *depicts* Kay, the second picture *belongs to* Kay. Note the different inflections; in (1) the object is accusative; in (2) the object is genitive. It is accordingly useful to distinguish between *accusative prepositions* and *genitive prepositions*, which are categorized as follows.

$$\text{type(accusative preposition)} = \mathsf{N}_2\to\text{Adj}$$
$$\text{type(genitive preposition)} = \mathsf{N}_G\to\text{Adj}$$

There is probably only one example of a genitive preposition – namely, `'of'` – which is illustrated in the following.

`dog of mine`



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4 Later, in Section 11, we revise our account – by "lifting" the type so that it takes QPs as input.

The semantic tree employs the following identities.[5]

$$[\![\text{of}]\!] \;=\; \lambda y_{\text{G}}\, \lambda \text{P}_0\, \lambda x_0 \;\{\ \text{P}(x) \;\&\; \text{Б}[x,y]\ \}$$
$$\text{Б}[\alpha,\beta] \;=_{\text{df}}\; \lambda(\alpha \text{ belongs to } \beta)$$

$$[\![\text{dog}]\!] \;=\; \lambda x_0\, \mathbf{D}[x]$$
$$\mathbf{D}[\alpha] \;=_{\text{df}}\; \lambda(\alpha \text{ is a dog})$$

Note that the ownership/possession conveyed by `‘belongs’` is generally context-dependent. For example, when Robert Kraft says `‘my football team’` [≈ `‘football team of mine’`; see Section 6], he probably means the football team he *owns*, and when Tom Brady says `‘my football team’`, he probably means the football team that he *plays on*.[6] On the other hand, when the "average guy" says `‘my football team’`, he probably does not mean the/a football that he owns, or plays on, but rather only the/a team that he is related to in some salient specifiable way on the occasion of utterance. For example, it may be the/a team he usually roots for, or it may be the/a team he has recently made a wager on, or it may be the/a team that he "owns" in a fantasy league.

5. Relational Prepositions

Officially, the relational (possessive) form of `‘of’` is categorially rendered as follows.

$$\text{type}(\texttt{of}) \;=\; \text{N}_{\text{G}} \rightarrow \text{Adj}$$
$$=_{\text{df}}\; \text{N}_{\text{G}} \rightarrow (\bar{\text{N}} \rightarrow \bar{\text{N}})$$

$$[\![\texttt{of}]\!] \;=\; \lambda y_{\text{G}}\, \lambda \text{P}_0\, \lambda x_0 \;\{\ \text{P}(x) \;\&\; \text{Б}[x,y]\ \}$$
$$=_{\text{df}}\; \lambda y_{\text{G}}\, \lambda \text{P}_0\, \lambda x_0 \;\{\ \text{P}(x) \;\&\; x \text{ belongs to } y\ \}$$

Notice that `‘of’` takes a genitive-inflected N and yields an *intersective* adjective. Recall that an intersective adjective has a *core-denotation*, which is a subset of entities. In particular, if η is an intersective adjective, then its core-denotation $\|\eta\|$ satisfies the following, for any common noun N.

$$\|\eta(N)\| \;=\; \|N\| \cap \|\eta\|$$

Note that the core-denotation $\|N\|$ of a common noun N is a subset of entities; in particular:

$$[\![N]\!] \;=\; \lambda x_0 \;\{\ x \in \|N\|\ \}$$

Since `‘of’` generates an adjective with a core-denotation, `‘of’` correspondingly has a core-denotation, which may be characterized as follows.

$$\|\text{of}\| \;=\; \{\ \langle x,y\rangle : x \text{ belongs to } y\ \}$$

In other words, the core-denotation of possessive `‘of’` is the *belongs-to* relation. This is why it is appropriate and useful to refer to `‘of’` as a *relational* preposition.

The possessive `‘of’` is one among many relational prepositions, which additionally include the following, just to list a few.

`above, behind, from, inside, on, under, with`

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[5] The letter ‘?’ is the Cyrillic counterpart of ‘B’, which we use to distinguish `‘belongs’` (**?**) and `‘brother’` (**B**).

[6] At the time of writing this paragraph, Robert Kraft owns the New England Patriots, and Tom Brady plays for them.

What makes a preposition relational is that its core-denotation is a relation. The following is our proposed general account.[7]

$$\text{type(R-prep)} \;=\; \mathrm{N}_\theta \rightarrow \text{Adj}$$
$$=_{\text{df}} \;\mathrm{N}_\theta \rightarrow [(\mathrm{N}_0{\rightarrow}\mathrm{S}){\rightarrow}(\mathrm{N}_0{\rightarrow}\mathrm{S})]$$
$$[\![\text{R-prep}]\!] \;=\; \lambda y_\theta\, \lambda \mathrm{P}_0\, \lambda x_0 \,\{\, \mathrm{P}(x) \,\&\, x\mathbf{R}y \,\}$$

Here, **R** is the core-denotation of the relational preposition, and θ is the affiliated case-inflection.

6. Alternative Genitive and Possessive Forms

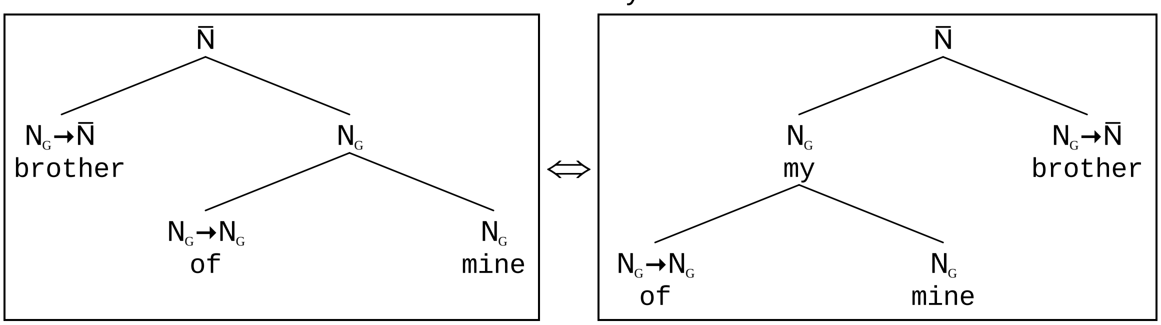
English implements both genitive `'of'` and possessive `'of'` in two ways, as illustrated in the following.

brother of mine	my brother
sister of hers	her sister
uncle of theirs	their uncle

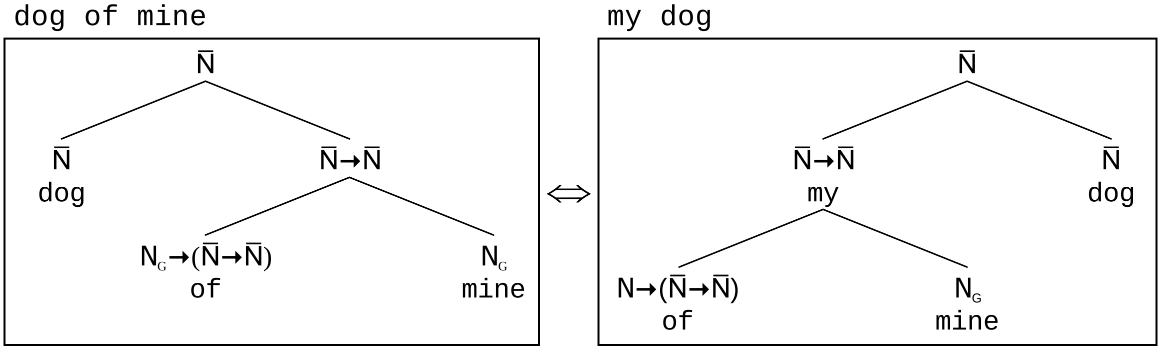
dog of-mine	my dog
cat of-hers	her cat
horse of-theirs	their horse

The following trees illustrate the grammar.

brother of mine my brother



dog of mine my dog



In other words, `'my'` is a phonetic allomorph of `'of mine'`, which arises precisely when `'of mine'` leads its complement.

[7] However, see Section 11 for our revised account.

7. Covert Determiners

The current proposal presents an immediate grammatical problem, since `'brother/dog of mine'` generally behaves like a common-noun phrase, whereas `'my brother/dog'` generally behaves like a determiner phrase. In order to account for this apparent discrepancy, we propose that when `'my brother/dog'` is used as a DP, the underlying form contains a covert unpronounced determiner, which can take one of three forms

(1)	indefinite-determiner	`a[s∘m]`[8]
(2)	indefinite-quantifier	`a[≈ some]`
(3)	definite-determiner	`the`

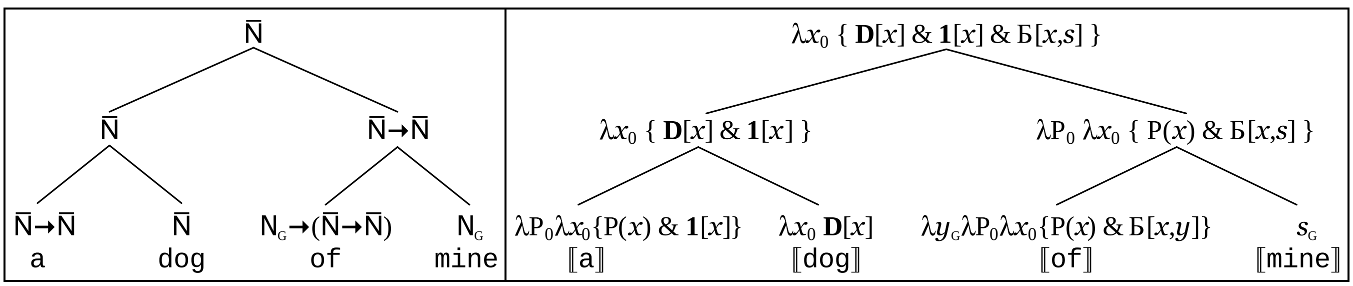
in virtue of which the overt phrase `'my'` is ambiguous.

By way of illustration, we offer several examples.

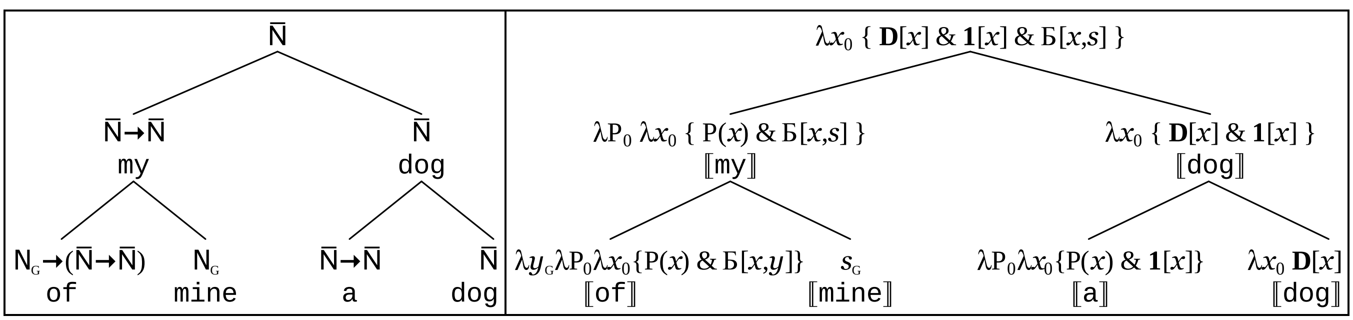
1. Indefinite-Determiner reading of 'my'

1. Possessive 'my'

`a dog of mine`



`my dog`



Here, we employ the following new identities.

$$⟦\mathrm{a}⟧ \quad = \quad \lambda P_0\, \lambda x_0 \,\{\, P(x)\ \&\ \mathbf{1}[x] \,\}$$

$$\mathbf{1}[\alpha] \quad =_{df} \quad \lambda(\alpha \text{ is a unit-entity})$$

$$\approx \quad \lambda(\alpha \text{ is an individual})$$

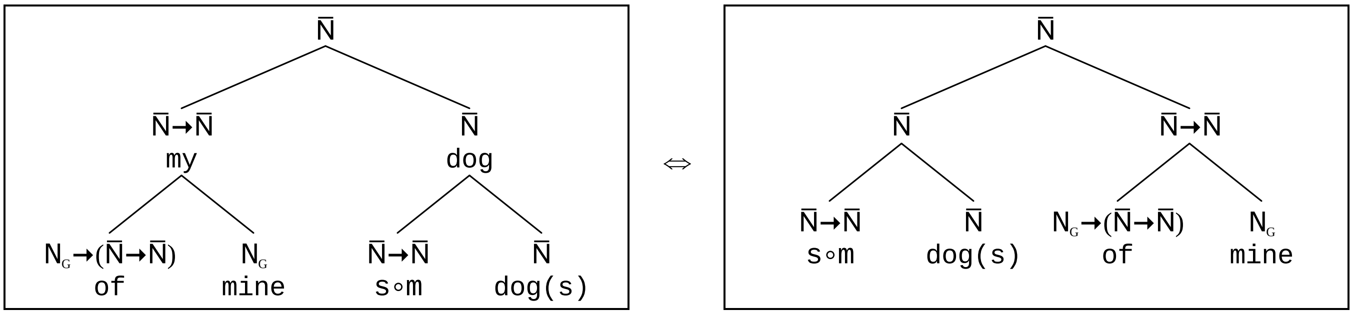
Note, in particular, that we treat the indefinite-determiner `'a'` as *syntactically* integral to singular-number inflection, in virtue of which it is paired in the above trees with its common noun. On the other hand, we categorially render `'a'` as an adjective [largely equivalent to `'one'`]. For example, in the

[8] We propose the spelling `'s∘m'` for unstressed `'some'`, which serves as the (optionally unpronounced) indefinite determiner associated with mass nouns and plural nouns. Note also that `'someone'` also has an indefinite reading according to which it is equivalent to `'a person'`.

above tree, ⟦a⟧ takes the denotation of uninflected `'dog₋'` [the class of dog-entities, including dog-units, dog-pluralities, and dog-matter] and pares it down to the sub-class of dog-units, which are presumable individual "whole" dogs. Note also that, oftentimes, the paring furnished by ⟦a⟧ is semantically superfluous; for example, we may be concentrating on singular (unit/individual) entities, as in standard first-order logic, or we may be tacitly excluding dog-matter from consideration, in which case `'dog'` is automatically singular.

For the sake of comparison, the following are the corresponding syntactic trees involving the mass/plural inflections of `'dog'`.

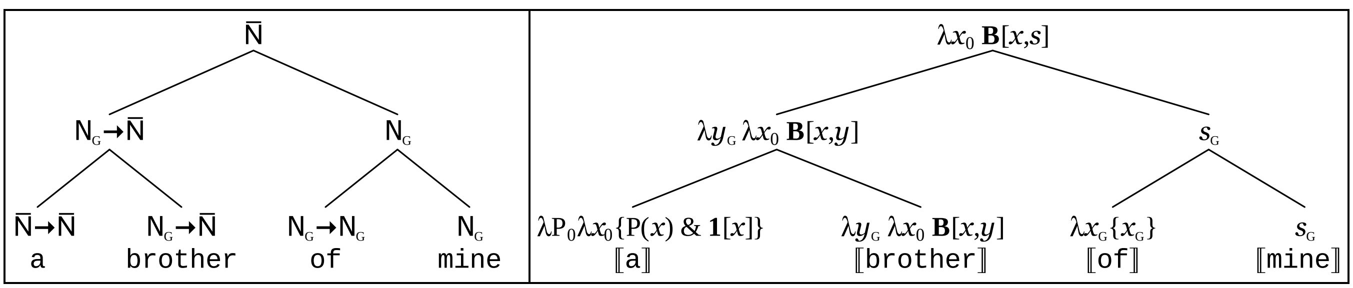
`my dog(s)` `[s∘m] dog(s) of mine`



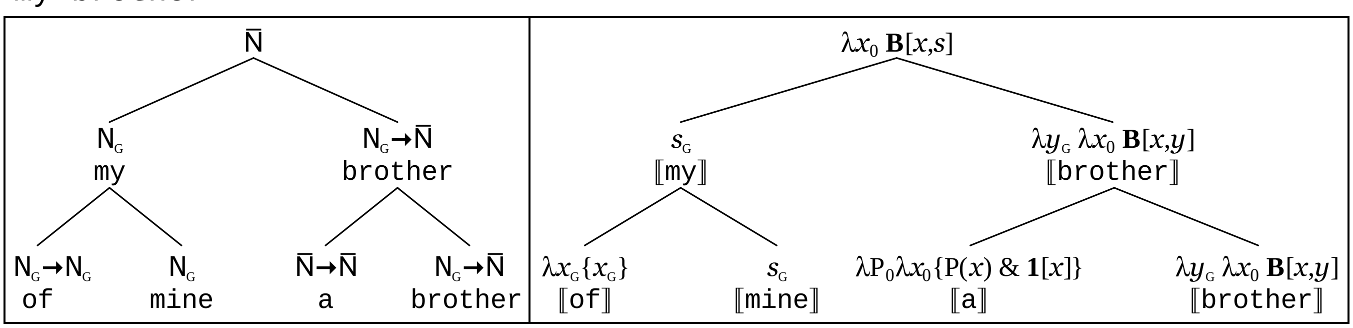
Note that in `'s∘m dog'`, `'dog'` is a mass noun that refers to dog-matter. This is less plausible for `'dog'` than for similar words like `'chicken'` or `'fish'`, which are commonly used as mass nouns.

2. Genitive 'my'

`a brother of mine`



`my brother`



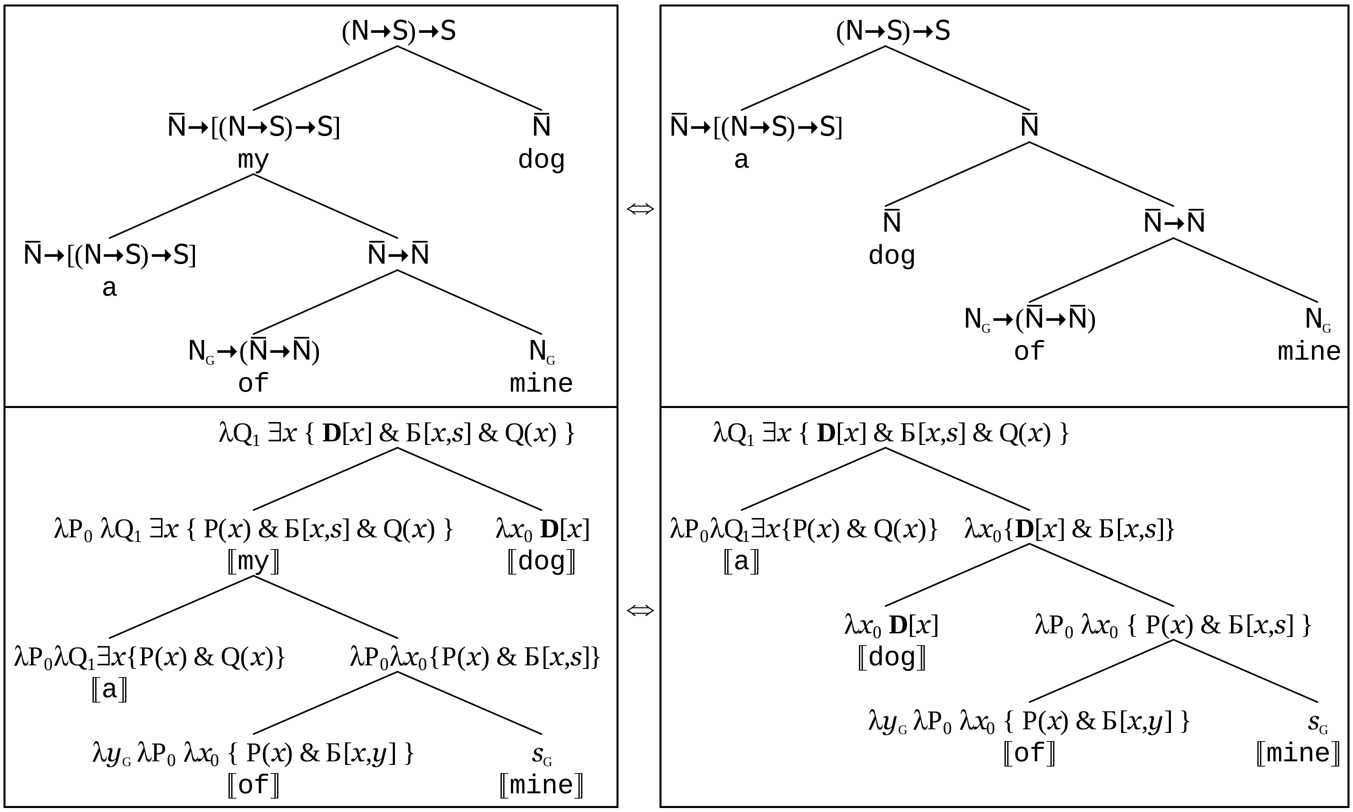
The derivation presumes that genitive nouns do not have mass readings. Accordingly, once we have inflected `'brother'` as singular, the addition of the adjective `'a'` is semantically redundant. However, even if a mass reading is ruled out *a priori*, in which case `'a'` performs no real semantic work, it is nevertheless *syntactically*-integral to the singular-number inflection, although it obligatorily deleted when preceded by `'my'`.

2. Indefinite-Quantifier reading of 'my'

The indefinite-quantifier reading of `'my'` is exemplified in the following trees, the plausibility of which is discussed later in Section 8.5.3.

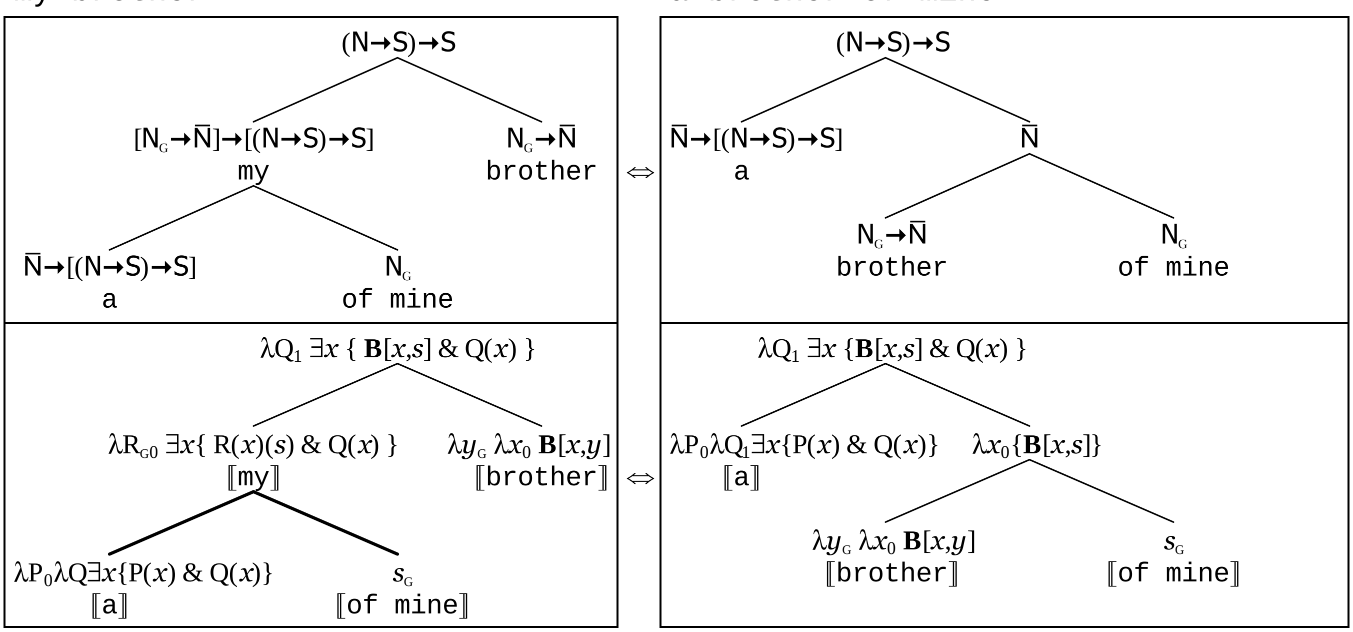
1. Possessive 'my'

`my dog` `a dog of mine`



2. Genitive 'my'

`my brother` `a brother of mine`



The following derivation underwrites the highlighted derivation.

(1)	$\bar{N}\to[(N\to S)\to S)$	1	Pr	$\lambda P_0\, \lambda Q\, \exists x\, \{\, P(x)\ \&\ Q(x)\, \}$	
(2)	N_G	2	Pr	s_G	
(3)	$N_G\to\bar{N}$	3	As	R_{G0}	$\lambda y_G \lambda x_0 R(x)(y)$
(4)	$\bar{N}$	23	2,3,→O	$\lambda x_0\, R(x)(s)$	
(5)	$(N\to S)\to S$	123	1,4,→O	$\lambda Q\, \exists x\, \{\, R(x)(s)\ \&\ Q(x)\, \}$	
(6)	$[N_G\to\bar{N}]\to[(N\to S)\to S]$	12	3-5,→I	$\lambda R_{G0}\, \lambda Q\, \exists x\, \{\, R(x)(s)\ \&\ Q(x)\, \}$	

3. Definite-Determiner reading of 'my'

The following are syntactically admitted,

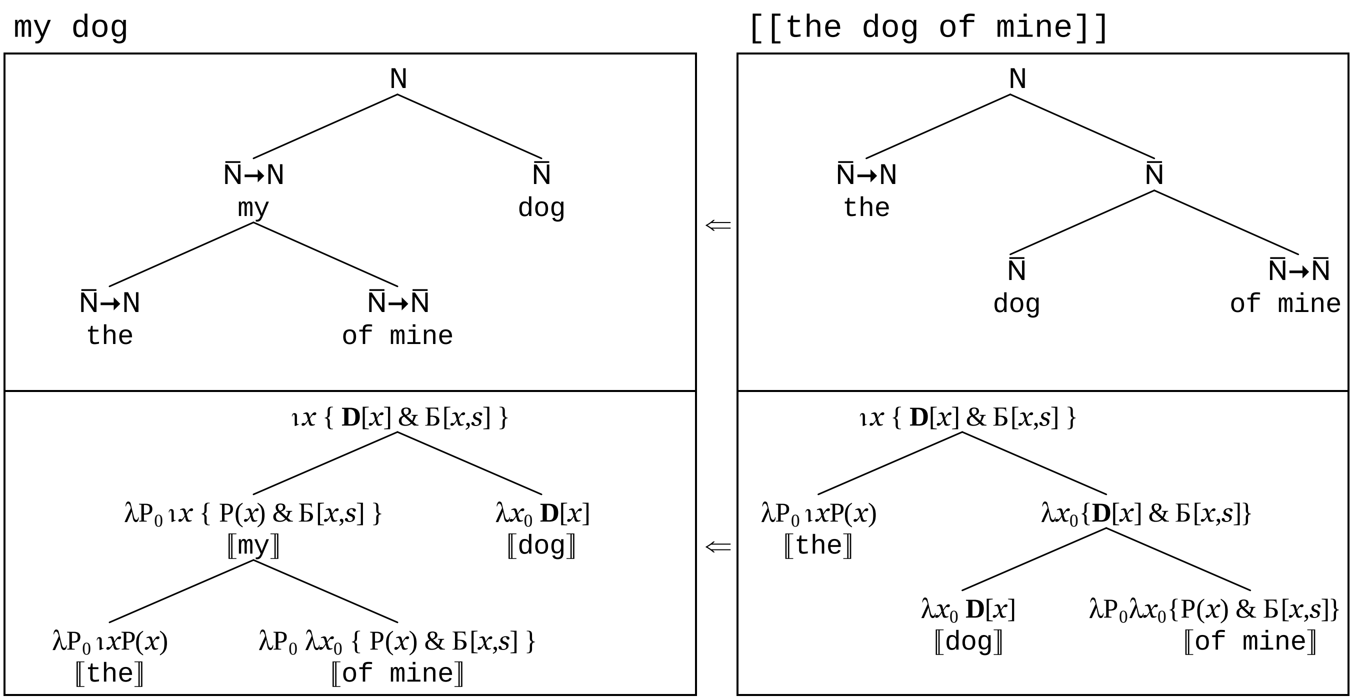
```
the dog of mine
the brother of mine
```

although they are *obligatorily* transformed into the following, respectively.

```
my dog
my brother
```

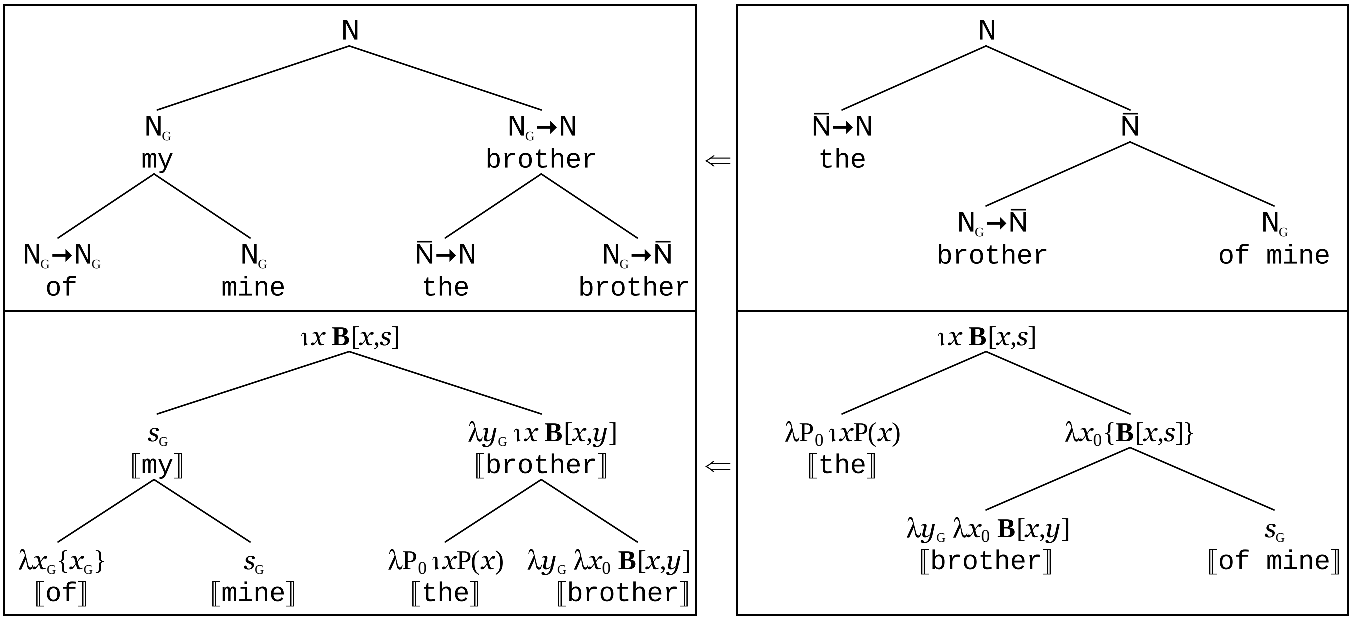
These phrases may be categorially analyzed as follows.

1. Possessive 'my'



2. Genitive 'my'

`my brother` `[[the brother of mine]]`

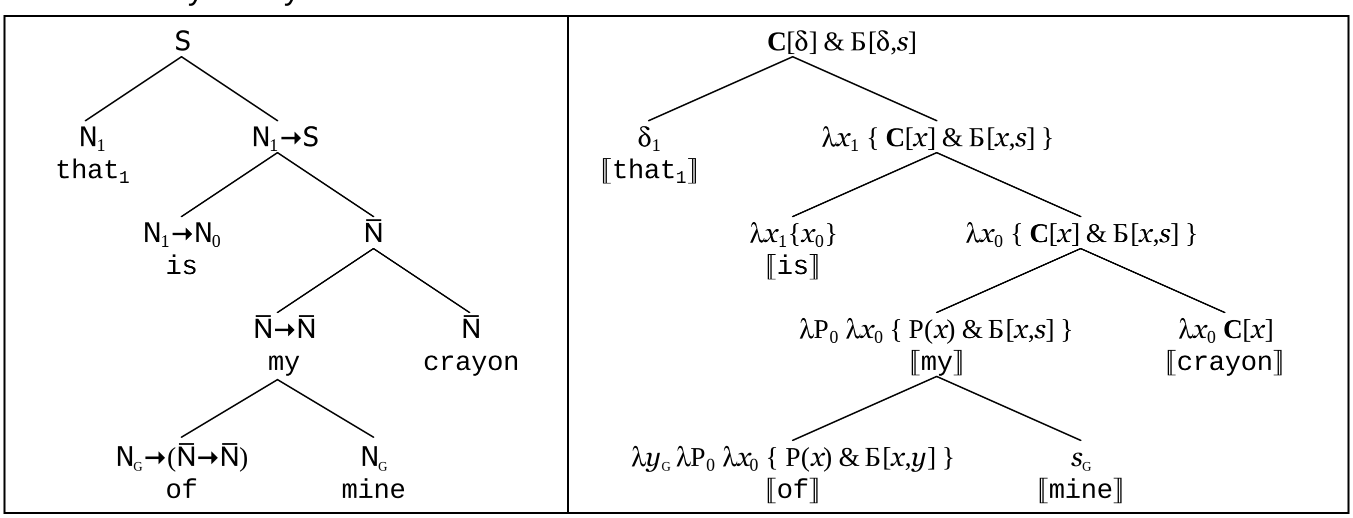


Note the two different placements of 'the' in the examples. In the first example, the placement renders 'my' as a definite-determiner that takes 'dog' as an argument. In the second example, , the placement renders 'brother' as a function-like noun that takes 'my' as an argument. We consider function-like nouns in more detail in Section 9.5.

8. Examples of Sentences

1. Indefinite Possessive 'my'

`that is my crayon`



Here, δ is the contextually-relevant demonstrative-object. Note that the indefinite-use of 'my' – illustrated above – is probably the earliest use of 'my' in childhood. For example, when a child says 'my crayon', he/she does not thereby claim that no *other* crayon is his/hers. Similarly, when an adult pointing at a wide expanse of land proclaims

`someday, all of this will be mine`

he/she likewise does not thereby claim that no *other* property will be his/hers. In this connection, let us consider the simple claim/demand:

`that's mine!`

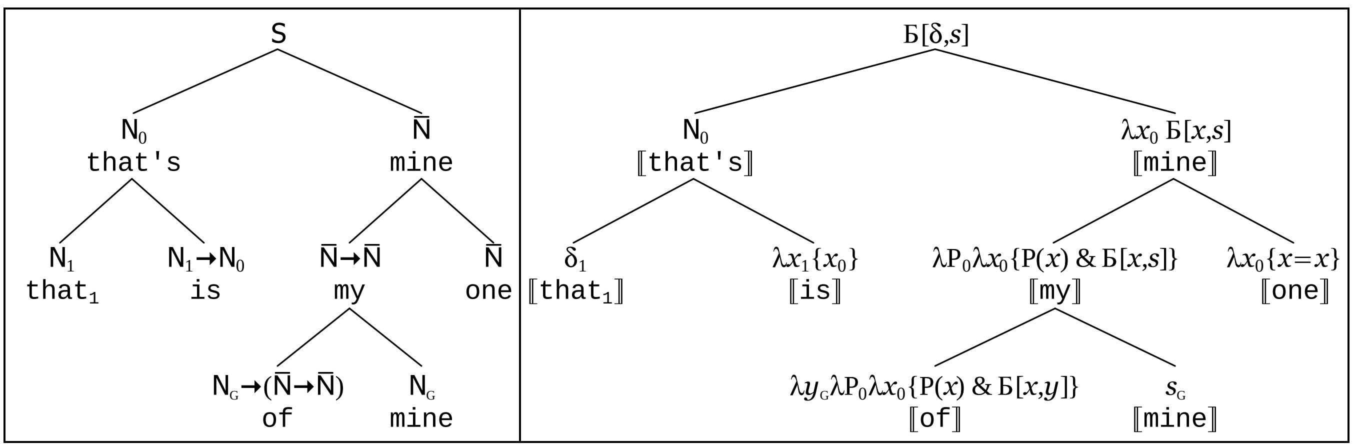
This "primitive" use of `'mine'` is probably best understood in comparison with the following use of `'mine'`, which is closely related to the following use of `'one'`.

```
Kay's dog is a collie; mine is a spaniel
Kay's dog is a collie; this one is a spaniel
```

We propose that this use of `'one'` is a pro-CNP, which in this case is anaphoric to `'dog'`. We further propose that this use of `'mine'` is a phonetic transformation of `'my one'`.[9] We further propose that when there is no salient antecedent, `'one'` is semantically vacuous, being synonymous with `'thing in the domain'`.

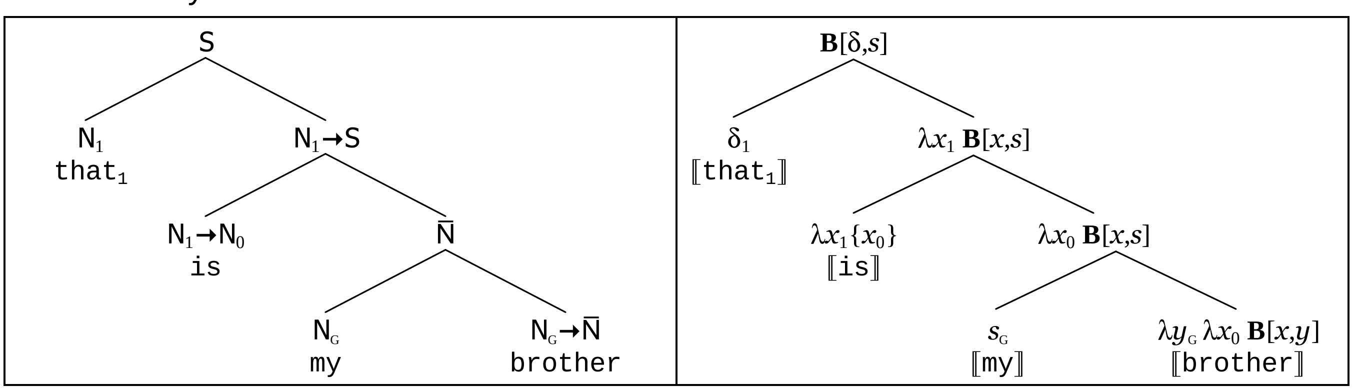
With this in mind, we propose the following analysis.

`that's mine`



2. Indefinite Genitive 'my'

`that is my brother`



[9] In this connection, we note that some southern U.S. rural dialects also have words like `'your'n'` and `'his'n'` [presumably short for `'your one'` and `'his one'`], as well as `'your'ns'` and `'his'ns'` [presumably short for `'your ones'` and `'his ones'`]. We also note the corresponding words `'young'n'` and `'young'ns'`. Of these contractions, only `'mine'` is adopted in the prestige dialect.

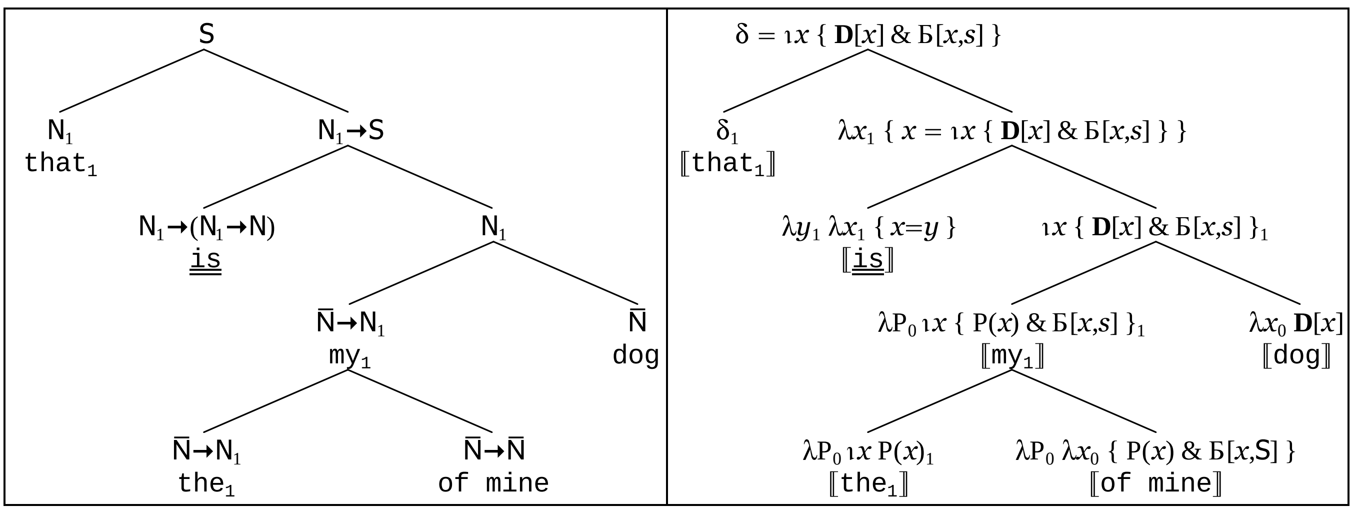
According to the indefinite reading of `'my'`, the thing pointed at is *a* brother of the speaker of the utterance. Note that the indefinite-determiner is syntactically otiose here, since it is trumped by the determiner `'my'`, and it is also semantically otiose, granting genitive nouns do not admit a mass reading.

3. Definite Possessive 'my'

Although `'my'` is sometimes indefinite, it is also used as a definite-determiner. This is illustrated in the following example, in which double-underlined `'is'` is transitive `'be'` [the 'is' of identity], which we recall is a transitive verb that sub-categorizes for two nominative arguments, and is categorially implemented as follows.[10]

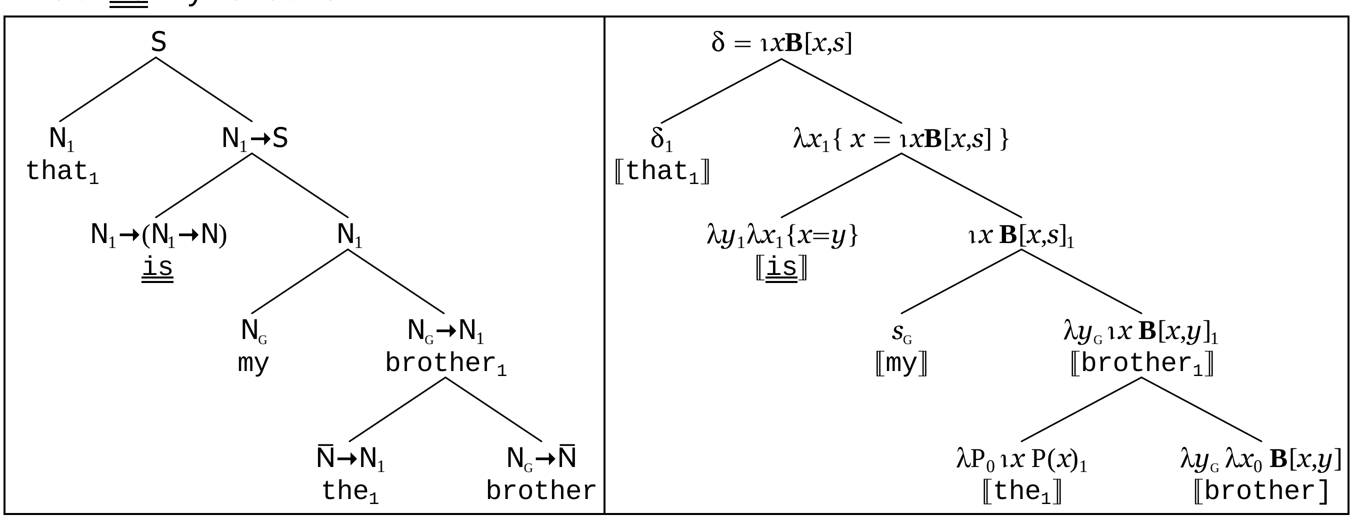
$$\text{type(transitive 'be')} = N_1 \to (N_1 \to S)$$
$$[\![\text{transitive 'be'}]\!] = \lambda y_1\, \lambda x_1 \{\, x=y \,\}$$

`that is my dog`



4. Definite Genitive 'my'

`that is my brother`



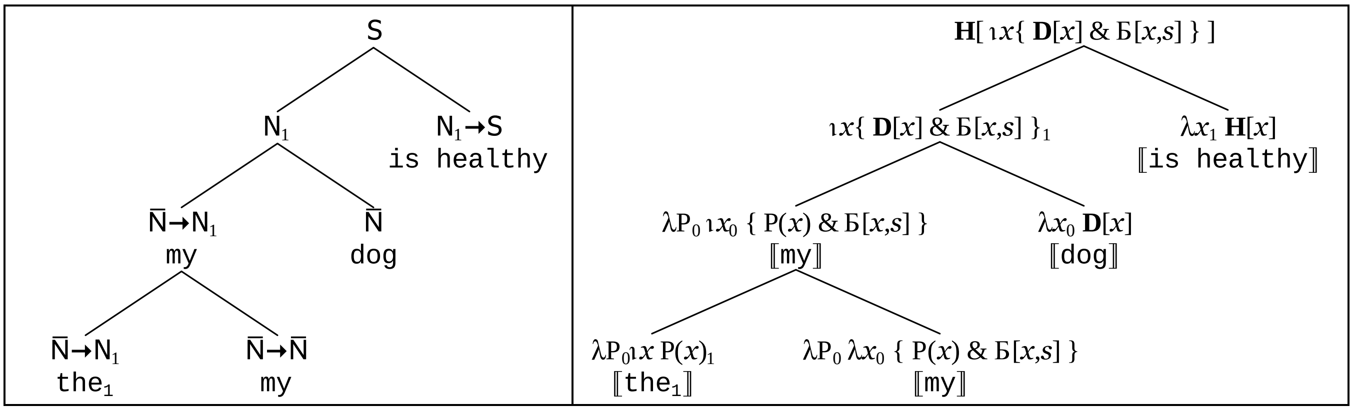
[10] These arguments are traditionally called the *subject* and the *predicate-nominative*. In particular, since transitive `'be'` is symmetrical in its arguments, there is officially no need to have two different cases. Nevertheless, it is common in colloquial English to employ the accusative case for the second argument. For example, I can point at a picture and say `'that's me'`, which sounds to most ears considerably preferable to `'that's I'`. All the same, we will maintain that, officially, transitive `'be'` subcategorizes for two nominative arguments.

5. Genitive Phrases in Subject Position

When a genitive phrase appears in subject-position, it also admits both definite and indefinite readings. The following illustrate the definite reading.

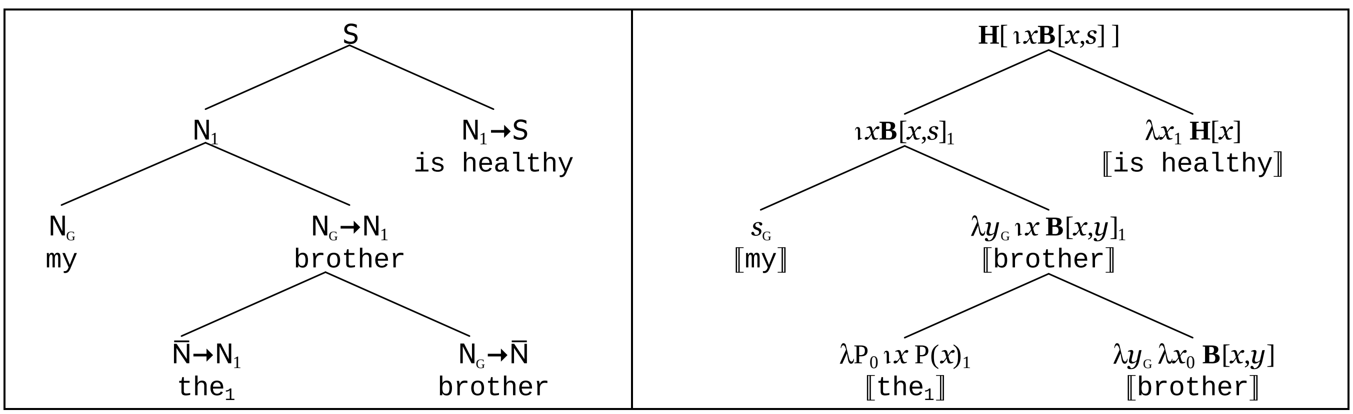
1. Definite Possessive 'my'

`my dog is healthy`



2. Definite Genitive 'my'

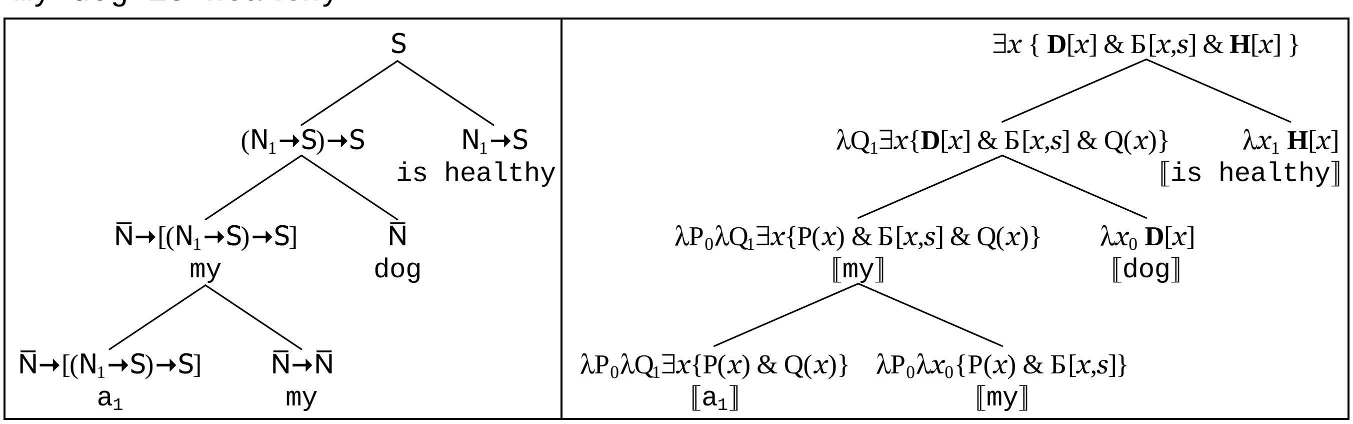
`my brother is healthy`



3. Indefinite Possessive 'my'

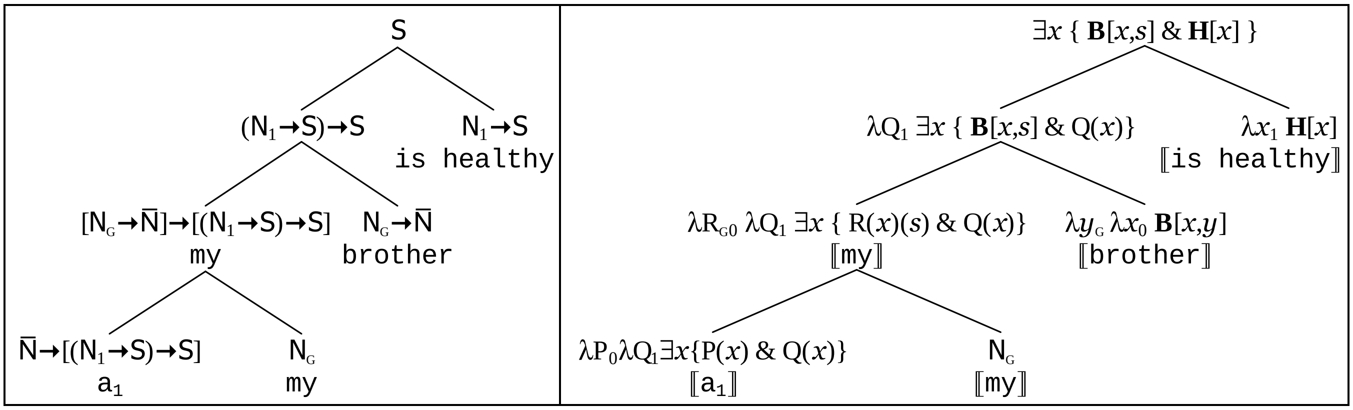
The indefinite reading is somewhat problematic. First, in subject position, the indefinite-determiner `'a'` has no use, but only the indefinite-quantifier `'a'` [≈ `'some'`], which is illustrated in the following examples.

`my dog is healthy`



4. Indefinite Possessive ‘my’

`my brother is healthy`



The above readings are not completely compelling, but they are not completely implausible either. In particular, they *may* explain certain uses of `‘my’` that don’t seem *clearly* definite. For example, suppose someone says:

`my brother is visiting this weekend`

Suppose further that the speaker in fact has[11] two brothers, and suppose that the audience is aware of this fact. Then, how are we to interpret such a claim? There seem to be two possibilities: (1) We take `‘my’` as indefinite, in which case the speaker is saying is that one of his/her brothers is visiting. (2) We take `‘my’` as definite, in which case we perform a pragmatic maneuver by which we understand `‘my brother’` to mean something more like `‘the brother of mine that I/we currently have in mind’`. We think that the indefinite-quantifier reading is theoretically more thrifty.

9. Combining Genitive Nouns with Quantifiers

Combining genitive `‘of’` with quantifiers is fairly straightforward, although an ambiguity arises when the resulting phrase re-combines with the associated genitive noun. This provides interesting readings, both in connection with universal quantifiers, and in connection with existential quantifiers.

1. Universals

For example, consider the following sentence.

`the mother of everyone`

First of all, note that `‘everyone’` lacks overt inflection. If we affix genitive inflection, we obtain

`the mother of everyone's`

which – unlike the original sentence – is obligatorily transformed into:

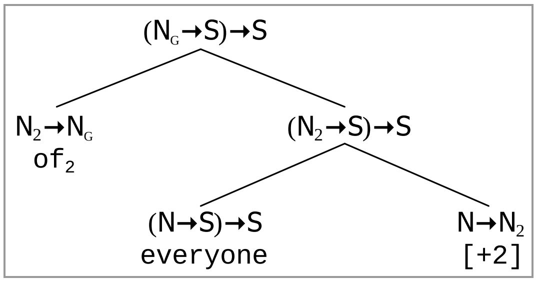
`everyone's mother`

In order to distinguish these two constructions, we propose a variant of inflectional `‘of’`, which is categorially rendered as follows.

[11] We deal with genitive `‘have’` in Section 14.

$$\text{type}(\texttt{of}_2) \quad = \quad \mathsf{N}_2 \rightarrow \mathsf{N}_G$$
$$[\![\texttt{of}_2]\!] \quad = \quad \lambda x_2\{x_G\}$$

Given this treatment, `‘of everyone’` is syntactically analyzed as follows.



We examine this construction further in Section 5. For the moment, we are concerned with how it re-combines with the associated genitive noun. For example, the sentence

`the mother of everyone is here`

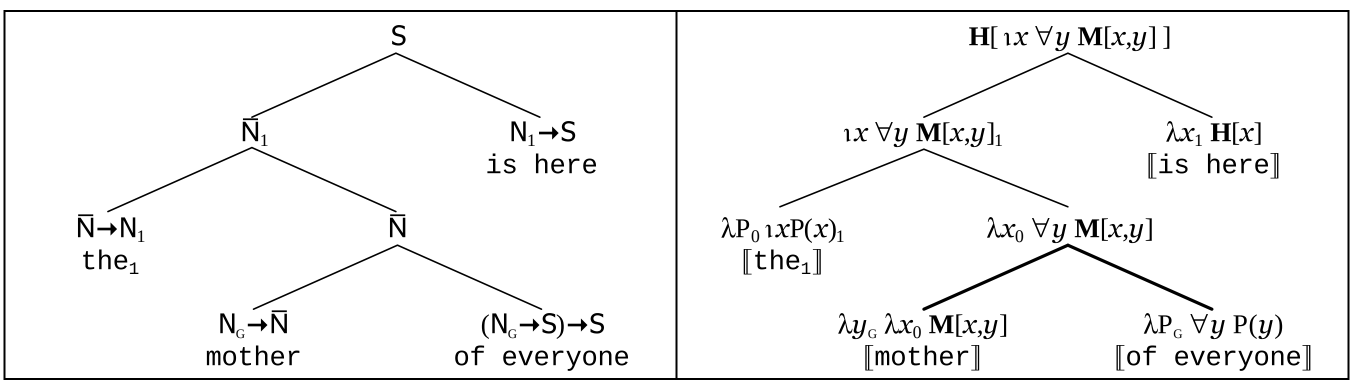
can mean one of two things, although one is less plausible than the other. On one reading, the scope of `‘the’` is wide, and `‘the mother of everyone’` is a determiner phrase (type N) that denotes the unique individual who is mother of everyone (in the domain). In that case, the sentence means:

there is exactly one person who is mother of everyone, and she is here

On the more plausible reading, the scope of `‘everyone’` is wide, and `‘the mother of everyone’` is a quantifier phrase, in which case the sentence means:

for each person, that person has exactly one mother, who is here

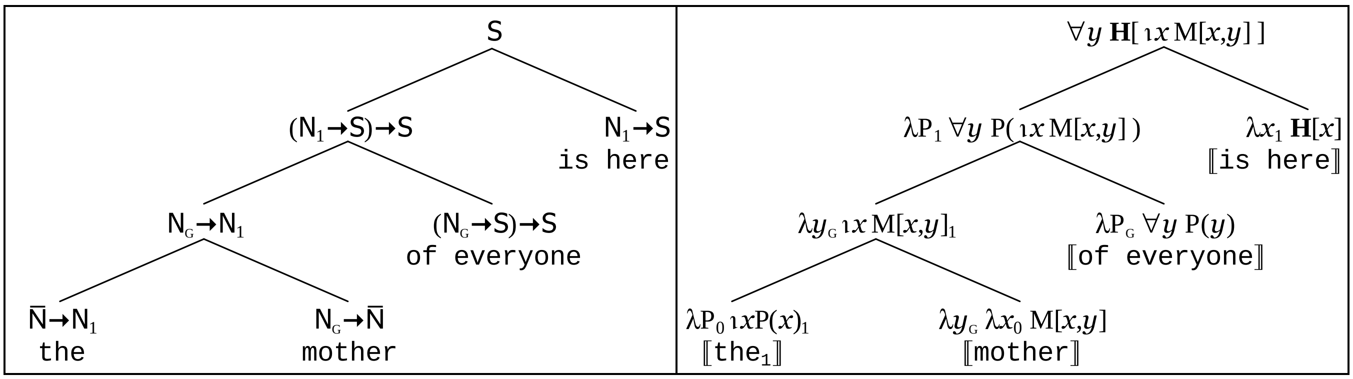
The following is the grammatical analysis of the first reading, where we presume that the entity variables range over persons.



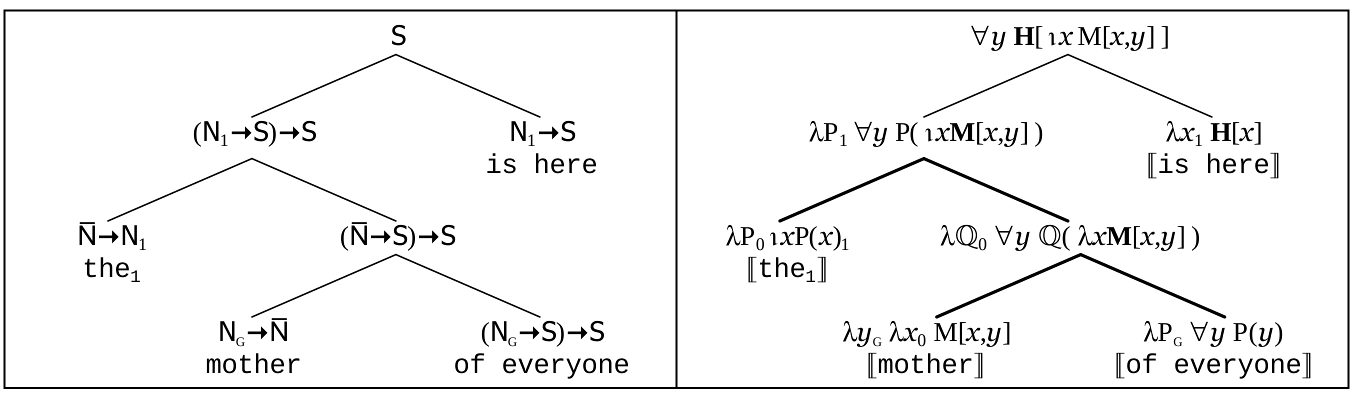
The highlighted composition is underwritten by the following derivation, where we presume that the entity-variables range over persons.

(1)	$N_G \to (N_0 \to S)$	1	Pr	$\lambda y_G\, \lambda x_0\, \mathbf{M}[x,y]$
(2)	$(N_G \to S) \to S$	2	Pr	$\lambda P_G\, \forall y\, P(y)$
(3)	N_0	3	As	x_0
(4)	N_G	4	As	y_G
(5)	$N_0 \to S$	14	1,4,→O	$\lambda x_0\, \mathbf{M}[x,y]$
(6)	S	134	3,5,→O	$\mathbf{M}[x,y]$
(7)	$N_G \to S$	13	4-6,→I	$\lambda y_G\, \mathbf{M}[x,y]$
(8)	S	123	2,7,→O	$\forall y\, \mathbf{M}[x,y]$
(9)	$N_0 \to S$	12	3-8,→I	$\lambda x_0\, \forall y\, \mathbf{M}[x,y]$

On the other hand, the following is a grammatical analysis of the second reading.



Notice that this analysis employs the usual syntactic account of scope, according to which the wide-scope phrase assumes a commanding position in the tree. We, however, do not adhere to the purely syntactic account of scope, but rather prefer a semantic account, which is implemented in the following analysis.



Notice that raising `‘everyone’` is achieved semantically – by utilizing an alternative admissible composition of ⟦`mother`⟧ and ⟦`of everyone`⟧, which is underwritten by the following derivation.

(1)	$N_G \to \bar{N}$	1	Pr	$\lambda y_G \lambda x_0\ \mathbf{M}[x,y]$	
(2)	$(N_G \to S) \to S$	2	Pr	$\lambda P_G\ \forall y\ P(y)$	
(3)	$\bar{N} \to S$	3	As	$\mathbb{Q}_0$	$\lambda P_0 \mathbb{Q}(P)$
(4)	N_G	4	As	y_G	
(5)	$\bar{N}$	14	1,4,→O	$\lambda x_0\ \mathbf{M}[x,y]$	
(6)	S	134	3,5,→O	$\mathbb{Q}_0(\ \lambda x_0\ \mathbf{M}[x,y]\ )$	$\mathbb{Q}(\ \lambda x \mathbf{M}[x,y]\ )$
(7)	$N_G \to S$	13	4-6,→I	$\lambda y_G\ \mathbb{Q}(\ \lambda x \mathbf{M}[x,y]\ )$	
(8)	S	123	2,7,→O	$\exists y\ \mathbb{Q}(\ \lambda x \mathbf{M}[x,y]\ )$	
(9)	$(\bar{N} \to S) \to S$	12	3-8,→I	$\lambda \mathbb{Q}_0\ \forall y\ \mathbb{Q}(\ \lambda x \mathbf{M}[x,y]\ )$	

The composition of ⟦`the`⟧ and ⟦`mother of everyone`⟧ is underwritten by the following derivation.

(1)	$(\bar{N} \to S) \to S$	1	Pr	$\lambda \mathbb{Q}_0\ \forall y\ \mathbb{Q}(\ \lambda x \mathbf{M}[x,y]\ )$	
(2)	$\bar{N} \to N_1$	2	Pr	$\lambda P_0\ \iota x\ P(x)_1$	
(3)	$N \to S$	3	As	P_1	$\lambda x_1 P(x)$
(4)	$\bar{N}$	4	As	Q_0	$\lambda x_0 Q(x)$
(5)	N	24	2,4,→O	$\iota x\ Q(x)_1$	
(6)	S	134	3,5,→O	$P_1(\ \iota x\ Q(x)_1\ )$	$P(\ \iota x\ Q(x)\ )$
(7)	$\bar{N} \to S$	13	4-6,→I	$\lambda Q_0\ P(\ \iota x\ Q(x)\ )$	
(8)	S	123	1,7,→O	$\forall y\ P(\ \iota x\ \mathbf{M}[x,y]\ )$	
(9)	$(N \to S) \to S$	12	3-8,→I	$\lambda P_1\ \forall y\ P(\ \iota x\ \mathbf{M}[x,y]\ )$	

2. Existentials

As with the phrase `'mother of everyone'`, the phrase `'mother of someone'` is ambiguous. On one reading, it is a common-noun phrase ($\bar{N}$), which is equivalent to the derivative CNP use of `'mother'`. On the other reading, it is a second-order QP (third-order predicate).

Concentrating on the first reading for the moment, we note the following general principle.

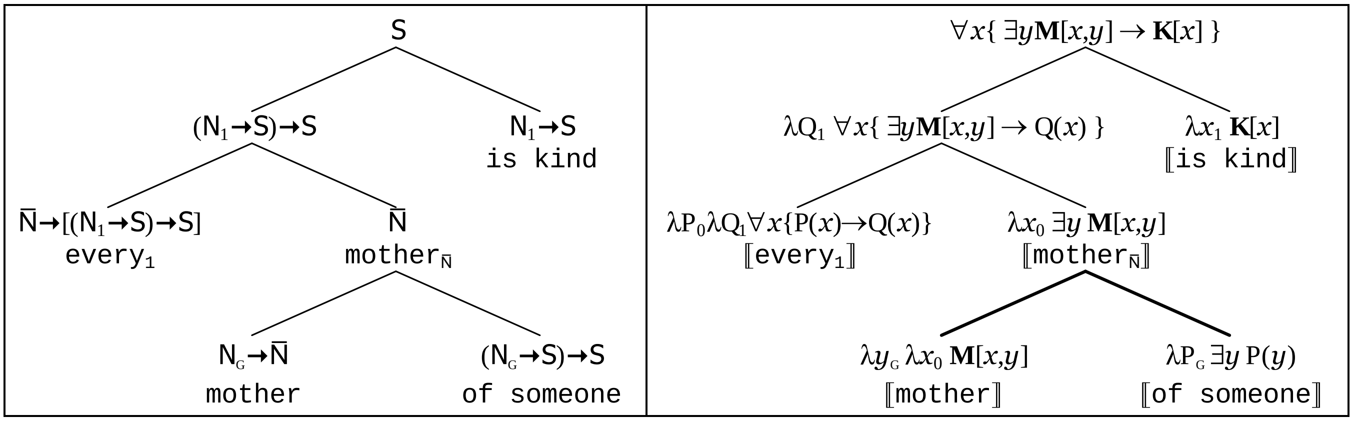
every genitive noun gives rise to an associated ordinary common noun

For example, although the word `'mother'` is *officially* and *fundamentally* a genitive noun, which carries `'of'` as a suffix, it is also frequently used as an ordinary common noun, as in the following sentence.

```
every mother is kind
```

We propose that this use of `'mother'` is derivative, and may be achieved in the underlying form as follows.[12]

[12] This is not the only manner in which a genitive noun gives rise to an associated ordinary common noun. See Section 9.4.

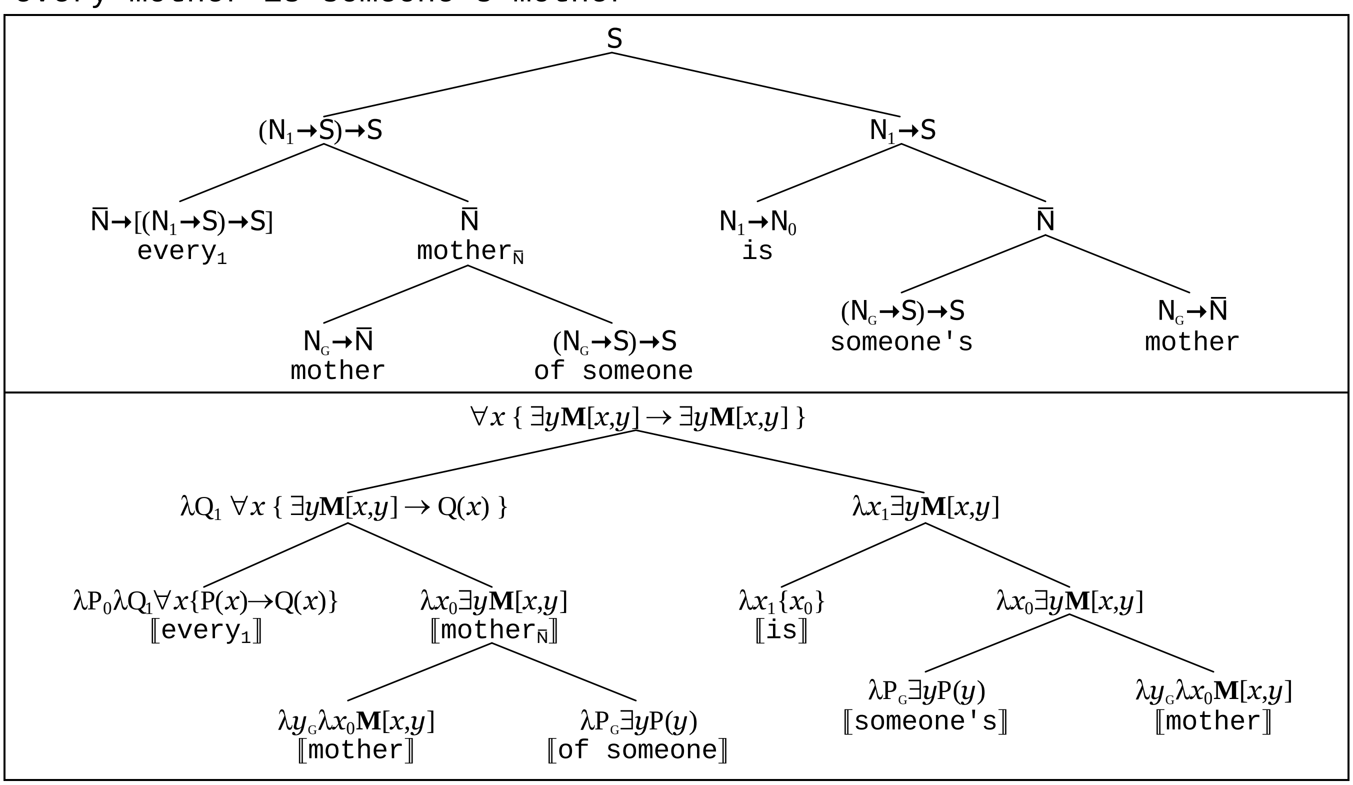


The key composition is underwritten by the following derivation, where we presume that the entity-variables range over persons.

(1)	$(N_G \to S) \to S$	1	Pr	$\lambda P_G\, \exists y_G\, P(y)$
(2)	$N_G \to (N_0 \to S)$	2	Pr	$\lambda y_G\, \lambda x_0\, \mathbf{M}[x,y]$
(3)	N_0	3	As	x_0
(4)	N_G	4	As	y_G
(5)	$N_0 \to S$	24	2,4,→O	$\lambda x_0\, \mathbf{M}[x,y]$
(6)	S	234	3,5,→O	$\mathbf{M}[x,y]$
(7)	$N_G \to S$	23	4-6,→I	$\lambda y_G\, \mathbf{M}[x,y]$
(8)	S	123	1,7,→O	$\forall y_G\, \mathbf{M}[x,y]$
(9)	$N_0 \to S$	12	3-8,→I	$\lambda x_0\, \exists y_G\, \mathbf{M}[x,y]$

The following example recapitulates the principle that to be *a* mother is to be *someone's* mother.

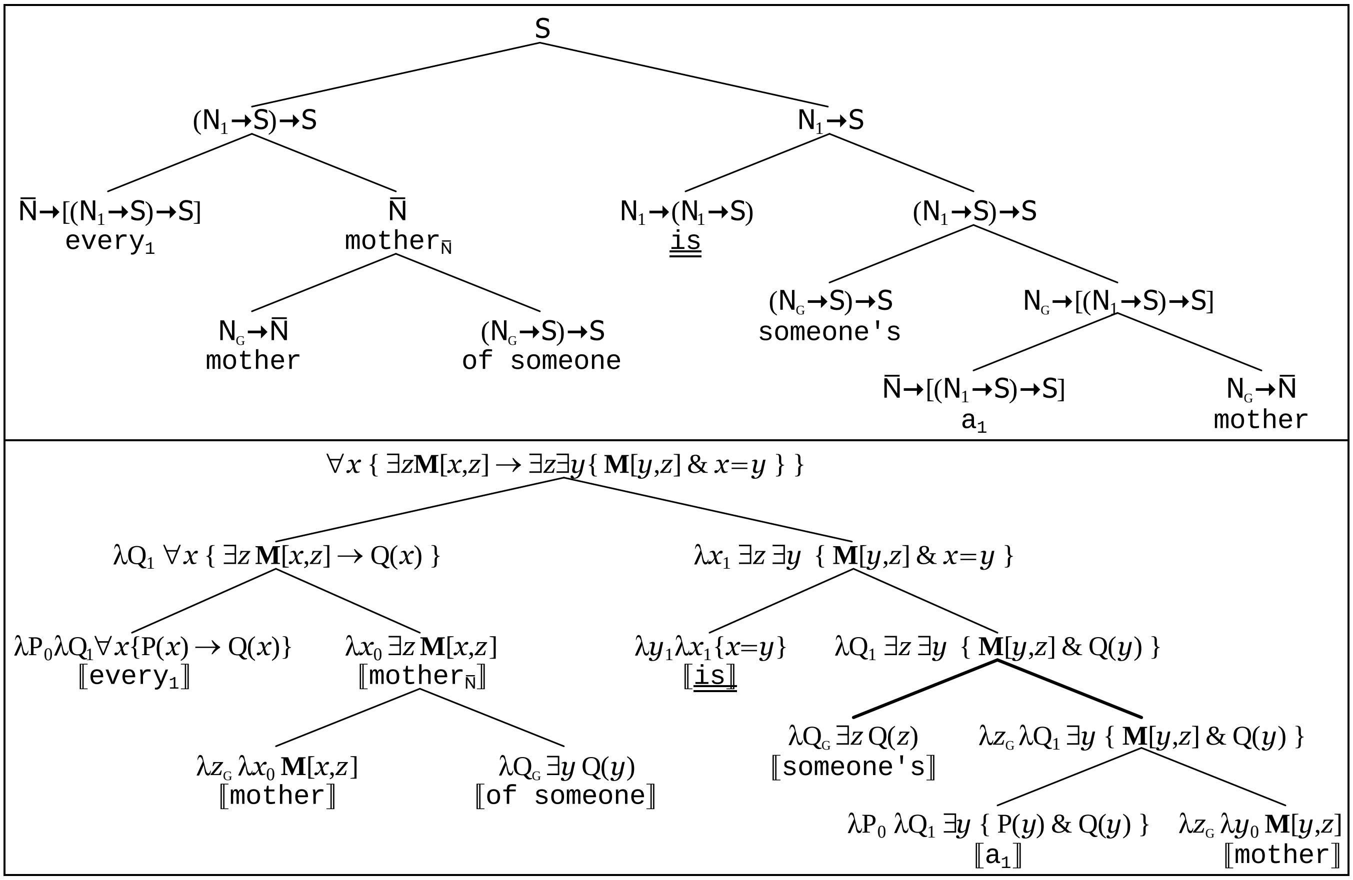
`every mother is someone's mother`



Notice that the semantic tree demonstrates that this sentence is, as expected, logically true

The above analysis treats `‘is’` as a copula, and `‘someone’s mother’` as a CNP. The following treats `‘is’` as a transitive verb, and `‘someone’s mother’` as a QP.

`every mother is someone's mother`

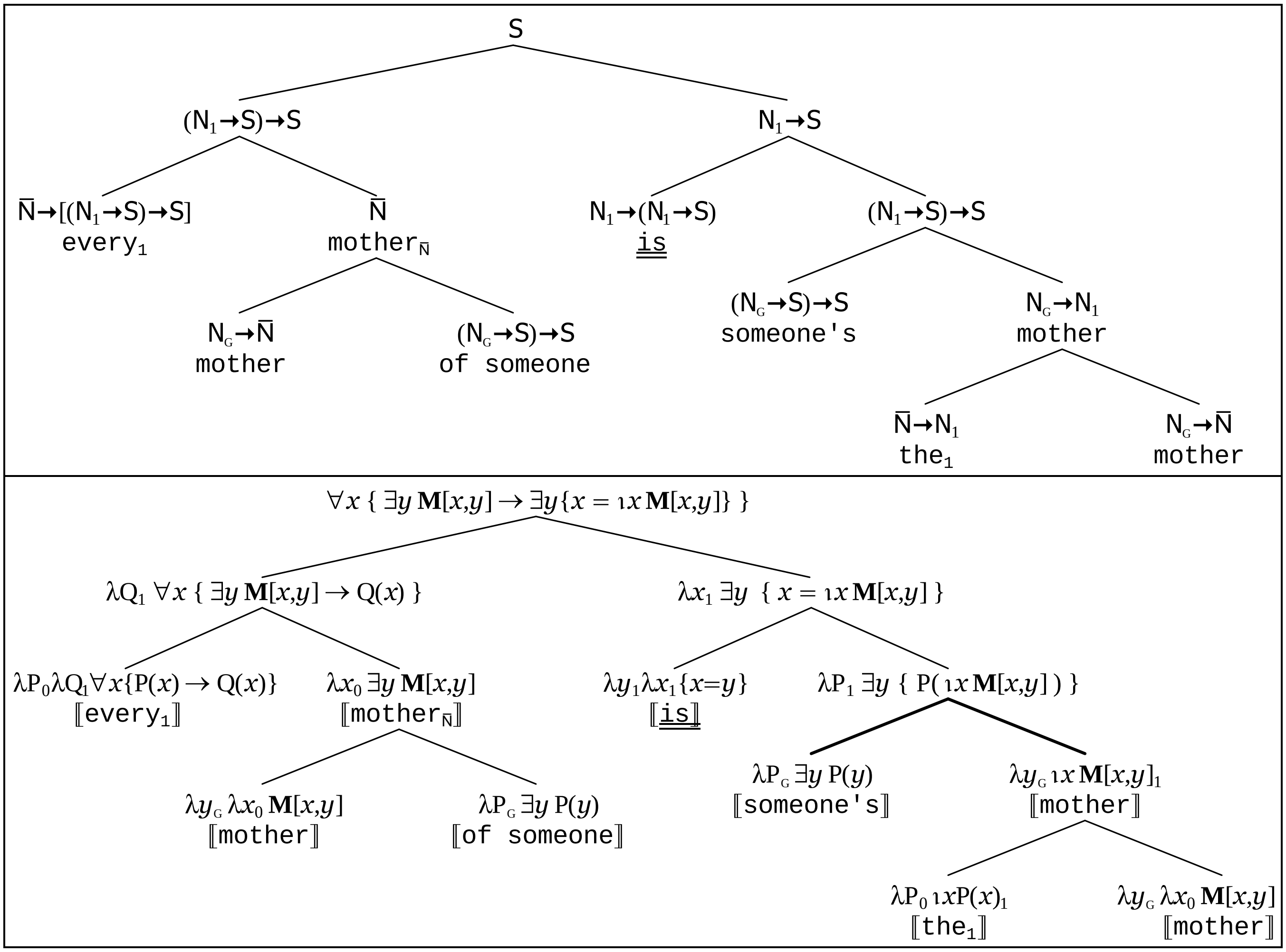


Notice that the top node is also a logical truth of standard first-order logic. The following derivation underwrites the highlighted composition.

(1)	$N_G \to [(N_1 \to S) \to S]$	1	Pr	$\lambda z_G\, \lambda Q_1\, \exists y\ \{\ \mathbf{M}[y,z]\ \&\ Q(y)\ \}$	
(2)	$(N_G \to S) \to S$	2	Pr	$\lambda Q_G\, \exists z\ Q(z)$	
(3)	$N_1 \to S$	3	As	Q_1	$\lambda x_1 Q(x)$
(4)	$N_G \to S$	13	1,3,MP_2	$\lambda z_G\, \exists y\ \{\ \mathbf{M}[y,z]\ \&\ Q(y)\ \}$	
(5)	S	123	2,4,→O	$\exists z\, \exists y\ \{\ \mathbf{M}[y,z]\ \&\ Q(y)\ \}$	
(6)	$(N_1 \to S) \to S$	12	3-5,→I	$\lambda Q_1\, \exists z\, \exists y\ \{\ \mathbf{M}[y,z]\ \&\ Q(y)\ \}$	

The above analyses treat `‘someone's mother’` as indefinite (quantifier). It can also be treated as definite.

every mother <u>is</u> someone's mother



Note that the top node is not logically-true, although it is analytically-true, granting a further postulate to the effect that to be **a** mother of someone is to be **the** mother of someone. The key composition is underwritten by the following derivation.

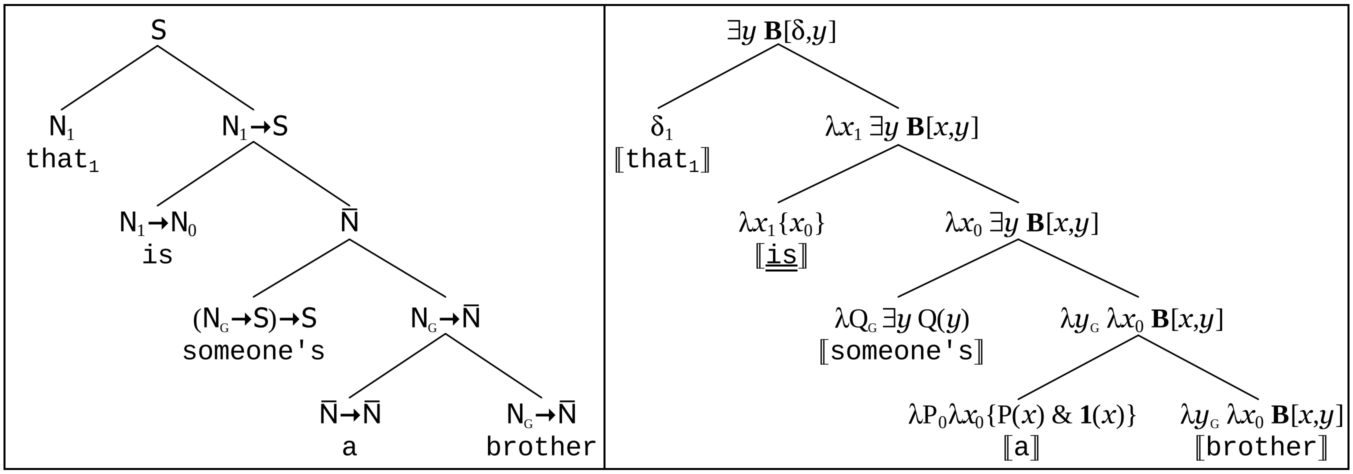
(1)	$(N_G \to S) \to S$	1	Pr	$\lambda P_G\, \exists y\, P(y)$	
(2)	$N_G \to N_1$	2	Pr	$\lambda y_G\, \iota x\, \mathbf{M}[x,y]_1$	
(3)	$N_1 \to S$	3	As	P_1	$\lambda x_1 P(x)$
(4)	N_G	4	As	N_G	$\lambda x_0 Q(x)$
(5)	N_1	24	2,4,→O	$\iota x\, \mathbf{M}[x,y]_1$	
(6)	S	134	3,5,→O	$P_1 (\, \iota x\, \mathbf{M}[x,y]_1)$	$P (\, \iota x\, \mathbf{M}[x,y])$
(7)	$N_G \to S$	13	4-6,→I	$\lambda y_G\, P(\iota x\, \mathbf{M}[x,y])$	
(8)	S	123	1,7,→O	$\exists y\, P(\iota x\, \mathbf{M}[x,y])$	
(9)	$(N_1 \to S) \to S$	12	3-8,→I	$\lambda P_1\, \exists y\, P(\iota x\, \mathbf{M}[x,y])$	

3. Another Example of Combining a Genitive Noun with a Quantifier

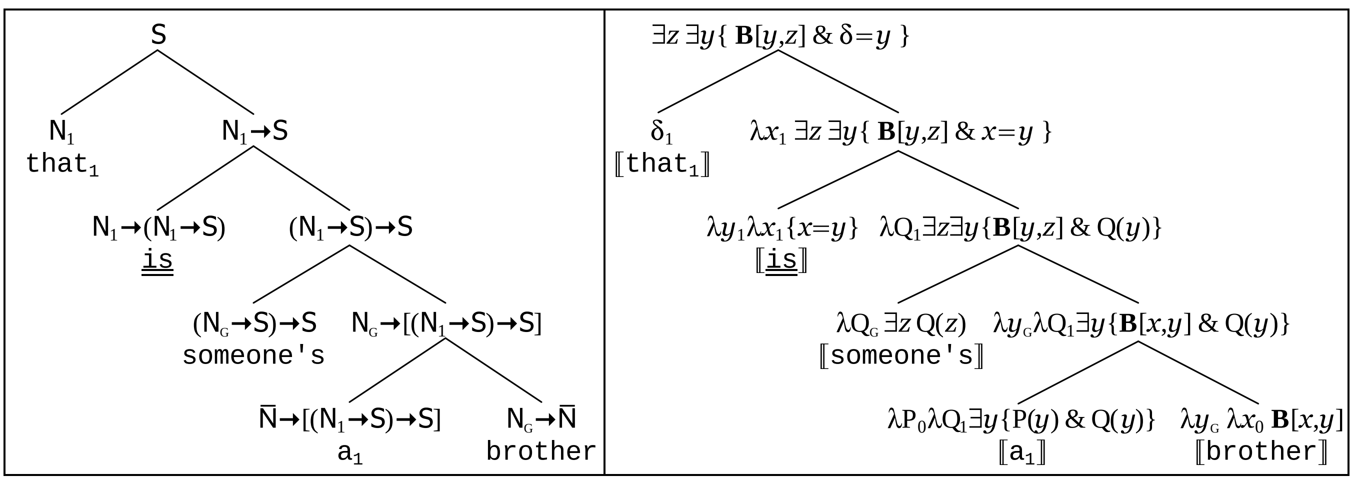
`that is someone's brother`

In the following analyses, we pair the determiner with the noun, in order to make all the trees parallel, and to streamline the computations.

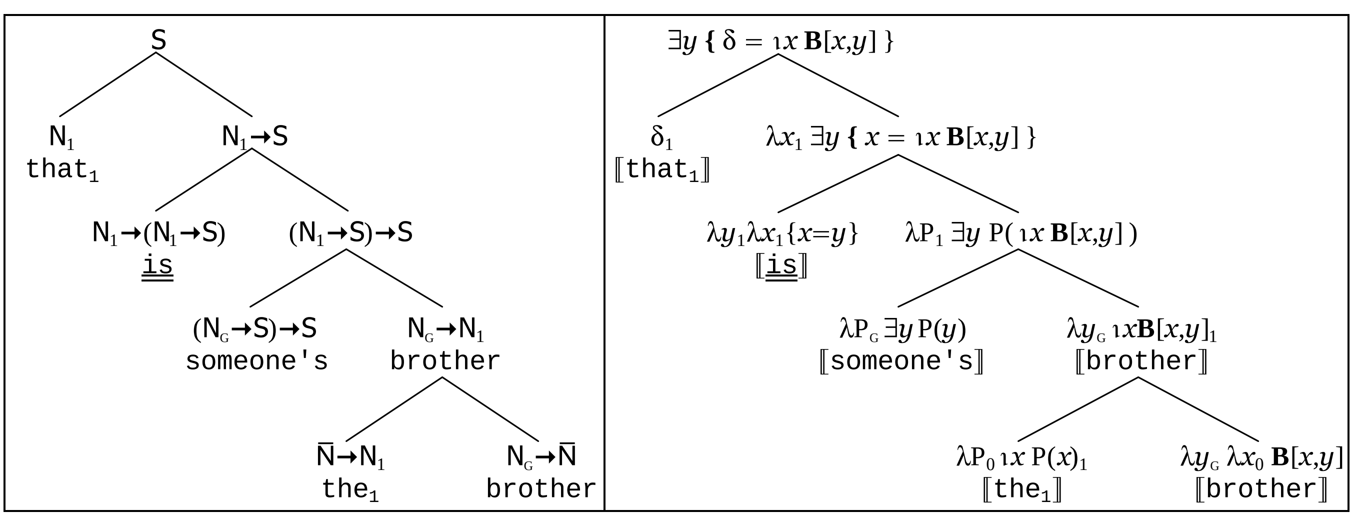
1. Indefinite-Determiner Reading



2. Indefinite-Quantifier Reading



3. Definite-Determiner Reading



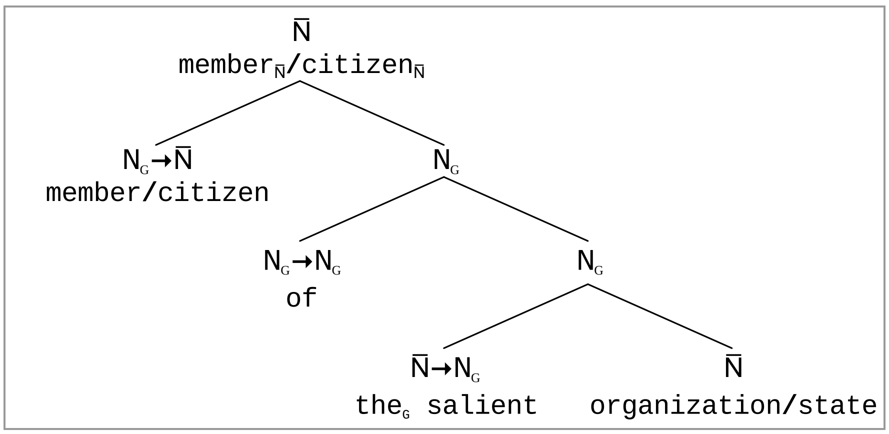
4. Alternative Construction of Associated Ordinary Common Nouns

We have claimed that the secondary CNP-reading of `'mother'` is based on the idea that to be *a* mother is to be *someone's* mother. Nevertheless, some other genitive nouns give rise to ordinary common nouns in a somewhat different manner.

For example, both `'member'` and `'citizen'` are genitive nouns that give rise to associated ordinary common nouns, as in the following example.

`every member/citizen voted in the past election`

Presumably, however, to be a member/citizen in the proposed circumstance is not to be a member/citizen of *some* organization/state, but rather to be a member/citizen of *the salient* organization/state. We accordingly propose the following account of this usage.

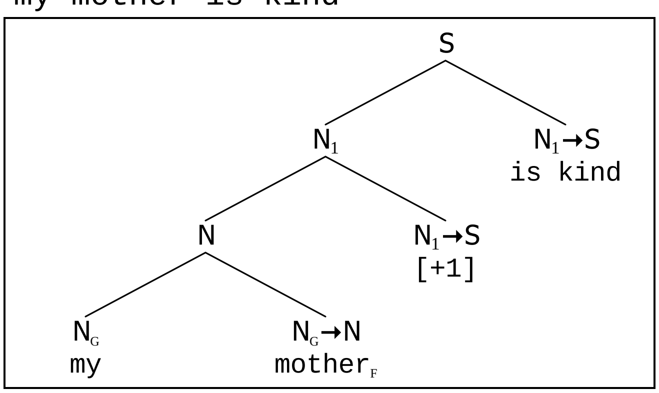


The interpretation of `'the salient'` will of course be context-situation dependent.

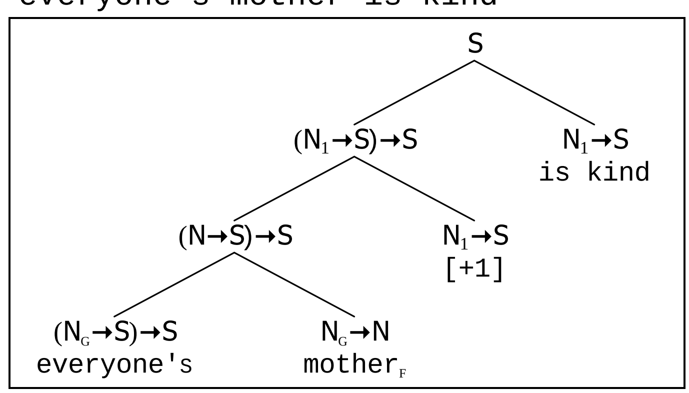
5. Function-Like Nouns

Recall that, in earlier chapters, we treat the term `'mother'` as a *function-like noun* – by which we mean a functor of type $N_G \rightarrow N$ – the following being typical examples.

`my mother is kind`

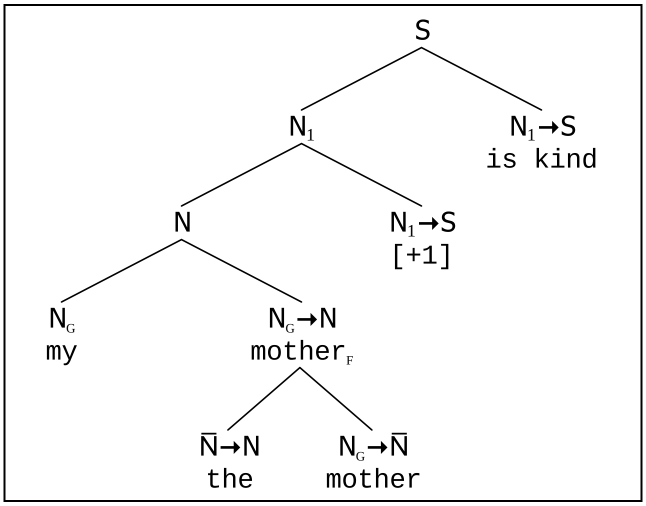


`everyone's mother is kind`

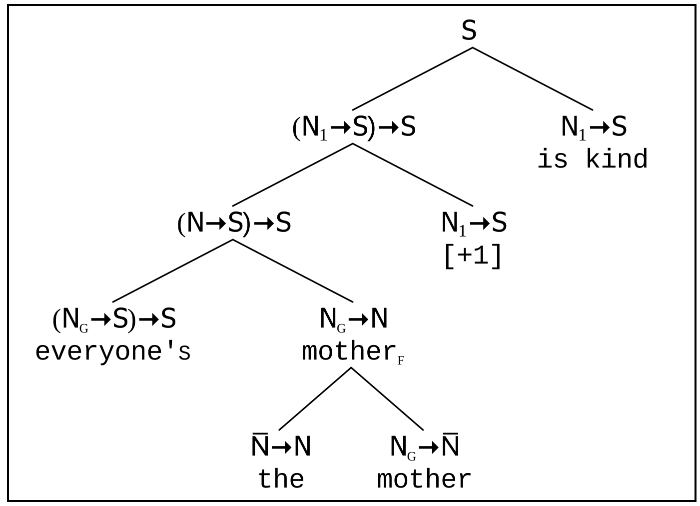


The underlying form, which has already been suggested in earlier examples, is now made official. In particular, we propose the following explication of this further derivative usage of `'mother'`.

`my mother is kind`

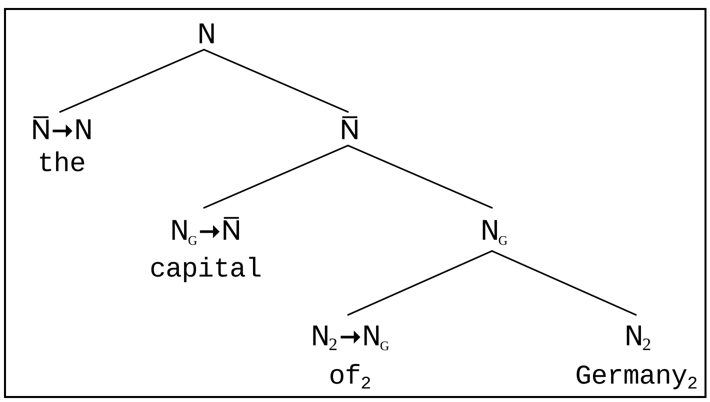


`everyone's mother is kind`



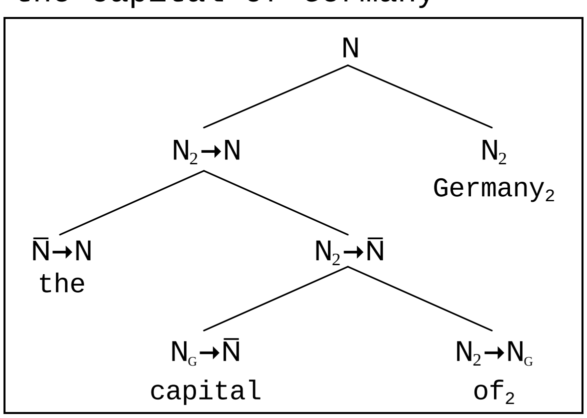
Next, we note that function-like nouns preferentially employ the secondary genitive form of `‘of’`, which has type $N_2 \to N_G$, as seen earlier in connection with `‘the mother of everyone’`. This is further illustrated in the following example, originally proposed by Frege as an ordinary language example of a function-like noun.

`the capital of Germany`

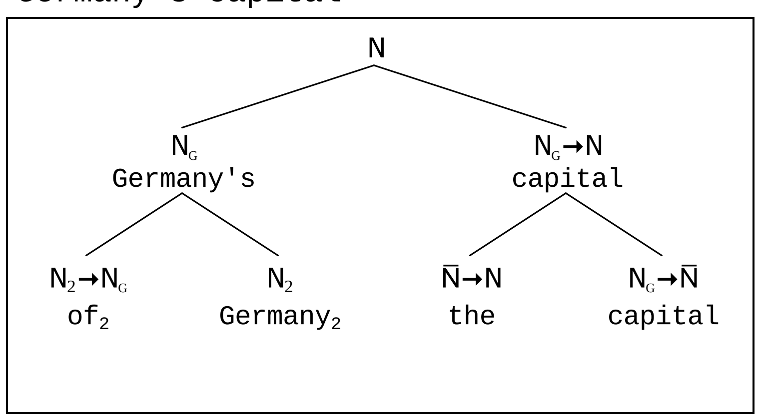


The following, however, is closer in spirit to Frege's grammatical proposal, according to which `‘the capital of’` is a constituent, being in particular a function-sign.

`the capital of Germany`



`Germany's capital`



Function-signs are, of course, prevalent in mathematics, and include the following well-known examples.

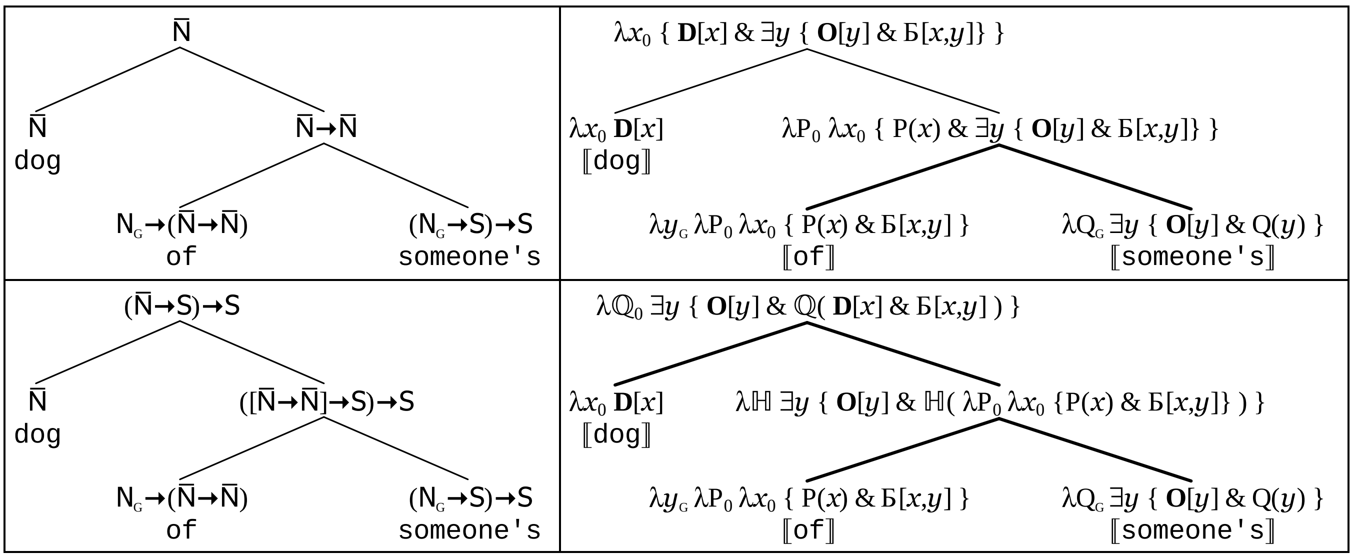
```
the square of, the square root of
the negative of, the absolute value of
the sine of, the cosine of
```

In each example, note that the phrase *taken as a unit* [as in the above analysis of `'the capital of'`] takes an accusative [not genitive!] proper-noun phrase, and delivers a proper noun-phrase.

10. Combining Possessives with Quantifiers

Having examined how genitive `'of'` combines with quantifiers, we next examine how possessive `'of'` does so. As with genitive `'of'`, the composition of '*N* of someone' is ambiguous between the formation of a CNP and the formation of a second-order QP. The difference is that the ambiguity originates in the ambiguity of `'of someone's'`, as seen in the following.

`dog of someone's`



Here, $\mathbf{O}[\alpha] =_{df} \lambda(\alpha \text{ is a person})$. The key derivations go as follows.

(1)	$N_G\to[(N_0\to S)\to(N_0\to S)]$	1	Pr	$\lambda y_G\, \lambda P_0\, \lambda x_0 \{ P(x) \,\&\, \mathbf{?}[x,y] \}$
(2)	$(N_G\to S)\to S$	2	Pr	$\lambda Q_G\, \exists y \{ \mathbf{O}[y] \,\&\, Q(y) \}$
(3)	$N_0\to S$	3	As	P_0
(4)	N_0	4	As	x_0
(5)	N_G	5	As	y_G
(6)	$(N_0\to S)\to(N_0\to S)$	15	1,5,→O	$\lambda P_0\, \lambda x_0 \{ P(x) \,\&\, \mathbf{?}[x,y] \}$
(7)	$N_0\to S$	135	3,6,→O	$\lambda x_0 \{ P(x) \,\&\, \mathbf{?}[x,y] \}$
(8)	S	1345	4,7,→O	$P(x) \,\&\, \mathbf{?}[x,y]$
(9)	$N_G\to S$	134	5-8,→I	$\lambda y_G \{ P(x) \,\&\, \mathbf{?}[x,y] \}$
(10)	S	1234	2,9,→O	$\exists y \{ \mathbf{O}[y] \,\&\, P(x) \,\&\, \mathbf{?}[x,y] \}$
				$\equiv\ P(x) \,\&\, \exists y \{ \mathbf{O}[y] \,\&\, \mathbf{?}[x,y] \}$
(11)	$N_0\to S$	123	4-10,→I	$\lambda x_0 \{ P(x) \,\&\, \exists y \{ \mathbf{O}[y] \,\&\, \mathbf{?}[x,y]\} \}$
(12)	$(N_0\to S)\to(N_0\to S)$	12	3-11,→I	$\lambda P_0\, \lambda x_0 \{ P(x) \,\&\, \exists y \{ \mathbf{O}[y] \,\&\, \mathbf{?}[x,y]\} \}$

(1)	$(N_G \to S) \to S$	1	Pr	$\lambda Q_G \exists y \{ \mathbf{O}[y] \,\&\, Q(y) \}$
(2)	$N_G \to (\bar{N} \to \bar{N})$	2	Pr	$\lambda y_G \lambda P_0 \lambda x_0 \{ P(x) \,\&\, \text{Б}[x,y] \}$
(3)	$(\bar{N} \to \bar{N}) \to S$	3	As	$\mathbb{H}$
(4)	N_G	4	As	y_G
(5)	$\bar{N} \to \bar{N}$	24	2,4,→O	$\lambda P_0 \lambda x_0 \{ P(x) \,\&\, \text{Б}[x,y] \}$
(6)	S	234	3,5,→O	$\mathbb{H}(\lambda P_0 \lambda x_0 \{P(x) \,\&\, \text{Б}[x,y]\})$
(7)	$N_G \to S$	23	4-6,→I	$\lambda y_G \mathbb{H}(\lambda P_0 \lambda x_0 \{P(x) \,\&\, \text{Б}[x,y]\})$
(8)	S	123	1,7,→O	$\exists y \{ \mathbf{O}[y] \,\&\, \mathbb{H}(\lambda P_0 \lambda x_0 \{P(x) \,\&\, \text{Б}[x,y]\}) \}$
(9)	$[(\bar{N} \to \bar{N}) \to S] \to S$	12	3-8,→I	$\lambda \mathbb{H} \exists y \{ \mathbf{O}[y] \,\&\, \mathbb{H}(\lambda P_0 \lambda x_0 \{P(x) \,\&\, \text{Б}[x,y]\}) \}$

(1)	$[(\bar{N} \to \bar{N}) \to S] \to S$	1	Pr	$\lambda \mathbb{H} \exists y \{ \mathbf{O}[y] \,\&\, \mathbb{H}(\lambda P_0 \lambda x_0 \{P(x) \,\&\, \text{Б}[x,y]\}) \}$
(2)	$\bar{N}$	2	Pr	$\lambda x_0 \mathbf{D}[x]$
(3)	$\bar{N} \to S$	3	As	$\mathbb{Q}_0$ $[= \lambda P_0 \mathbb{Q}(P)]$
(4)	$\bar{N} \to \bar{N}$	4	As	η
(5)	$\bar{N}$	24	2,4,→O	$\eta (\lambda x_0 \mathbf{D}[x])$
(6)	S	234	3,5,→O	$\mathbb{Q}_0 (\eta (\lambda x_0 \mathbf{D}[x]))$
(7)	$(\bar{N} \to \bar{N}) \to S$	23	4-6,→I	$\lambda \eta \, \mathbb{Q}_0 (\eta (\lambda x_0 \mathbf{D}[x]))$
(8)	S	123	1,7,→O	$\exists y \{ \mathbf{O}[y] \,\&\, \mathbb{Q}(\lambda x \{\mathbf{D}[x] \,\&\, \text{Б}[x,y]\}) \}$
(9)	$(\bar{N} \to S) \to S$	12	3-8,→I	$\lambda \mathbb{Q}_0 \exists y \{ \mathbf{O}[y] \,\&\, \mathbb{Q}(\lambda x \{\mathbf{D}[x] \,\&\, \text{Б}[x,y]\}) \}$

These two readings are illustrated in the following examples.

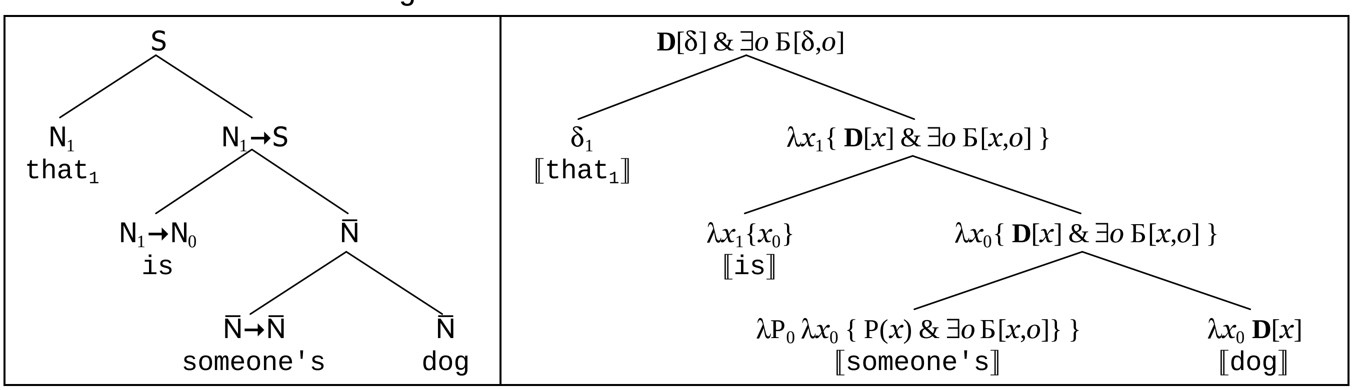
1. Example 1

`that is someone's dog`

This has a number of different analyses, although some end up being equivalent. In what follows, for the sake of brevity, we employ a sortal variable 'o' [short for `'one'`] to range over persons.[13]

1. Indefinite Reading

`that is someone's dog`



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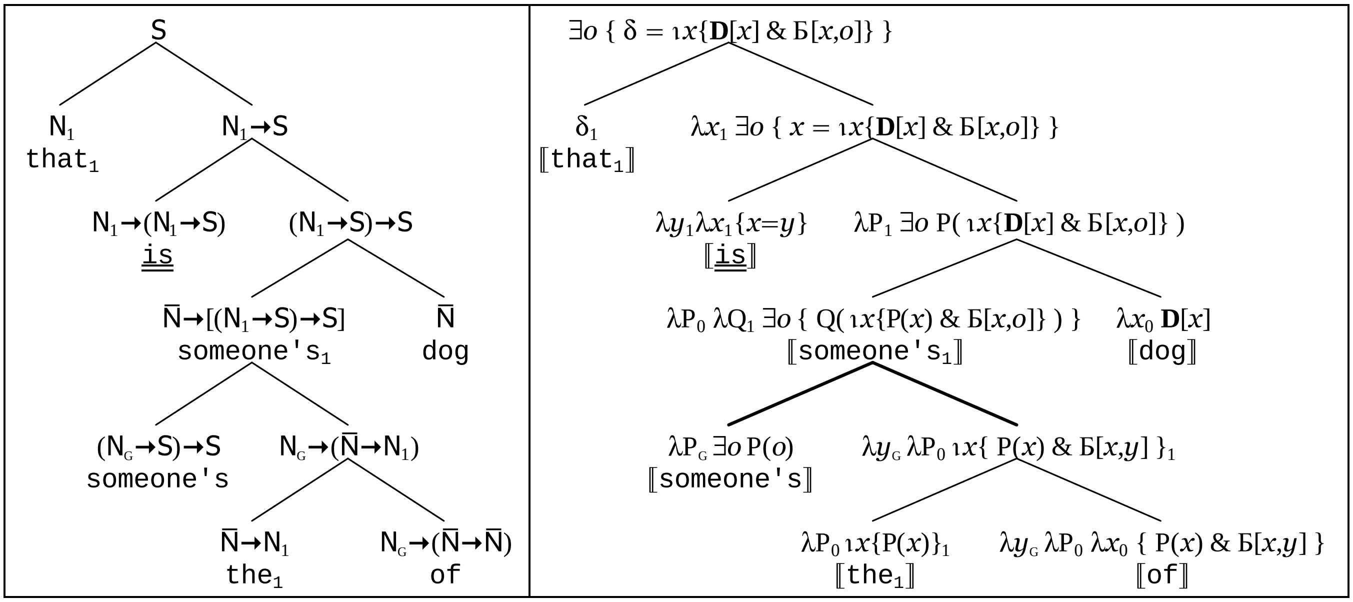
[13] Where o is free for ν in Φ:

$$\exists o \Phi =_{df} \exists \nu \{\nu \text{ is a person} \,\&\, \Phi[\nu/o]\}$$
$$\forall o \Phi =_{df} \forall \nu \{\nu \text{ is a person} \to \Phi[\nu/o]\}$$

According to this reading, in which `'someone's dog'` is treated as a CNP, the item pointed to is a[14] dog that belongs to some person in the contextually relevant domain of individuals.

2. Definite Reading

`that is someone's dog`



According to this reading, `'someone's'` is treated as analogous to `'my'` in its definite-determiner guise. The highlighted composition is underwritten by the following derivation.

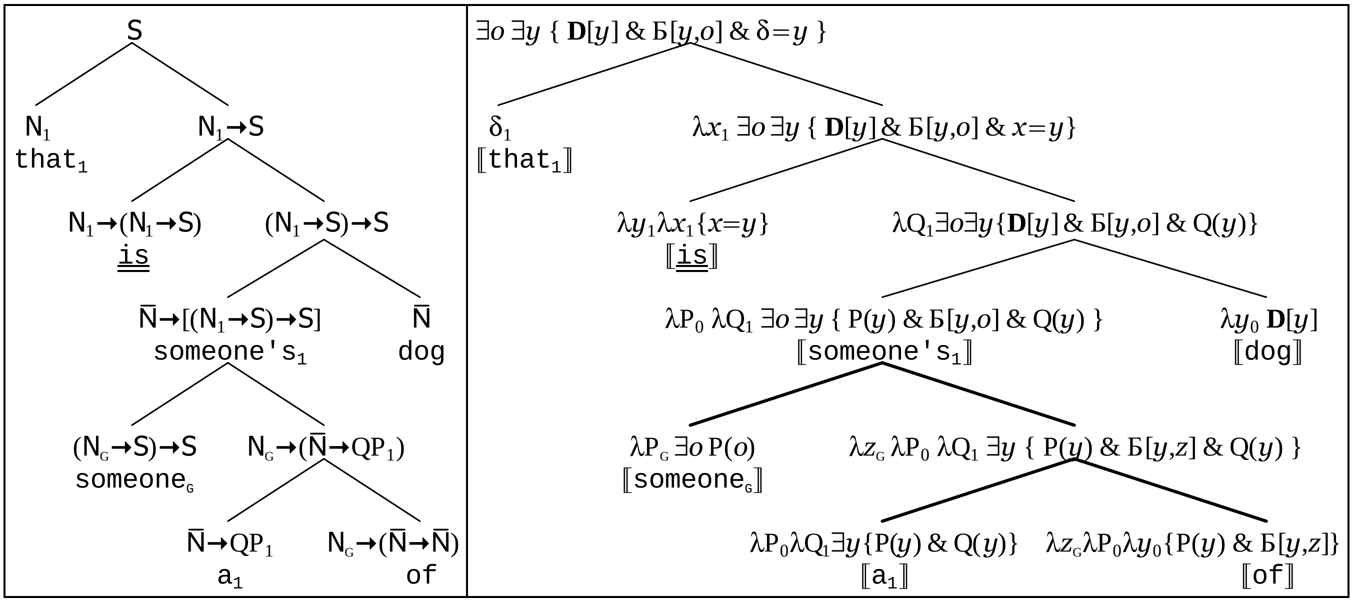
(1)	$N_G \to (\bar{N} \to N_1)$	1	Pr	$\lambda y_G \lambda P_0\, \iota x\{ P(x) \,\&\, Б[x,y] \}_1$	
(2)	$(N_G \to S) \to S$	2	Pr	$\lambda P_G\, \exists o\, P(o)$	
(3)	$\bar{N}$	3	As	P_0	$\lambda x_0 P(x)$
(4)	$N_1 \to S$	4	As	Q_1	$\lambda x_1 Q(x)$
(5)	$N_G \to N_1$	13	1,3,MP$_2$	$\lambda y_G\, \iota x\{ P(x) \,\&\, Б[x,y] \}_1$	
(6)	$N_G \to S$	134	4,5,TR	$\lambda y_G\, Q(\iota x\{ P(x) \,\&\, Б[x,y] \})$	
(7)	S	1234	2,6,→O	$\exists o\, Q(\iota x\{ P(x) \,\&\, Б[x,o] \})$	
(8)	$(N_1 \to S) \to S$	123	4-7,→I	$\lambda Q_1\, \exists o\, Q(\iota x\{ P(x) \,\&\, Б[x,o] \})$	
(9)	$\bar{N} \to [(N_1 \to S) \to S]$	12	3-8→O	$\lambda P_0\, \lambda Q_1\, \exists o\, Q(\iota x\{ P(x) \,\&\, Б[x,o] \})$	

3. Indefinite-Quantifier Reading

In the previous example, given that we interpret `'is'` as identity, the definite reading of `'someone's dog'` is fairly plausible, though not completely compelling. An alternative reading substitutes the indefinite quantifier `'a'` [≈ `'some'`] in place of `'the'`, as follows.

[14] Actually, the mass reading of `'dog'` is permitted here, but we temporarily exclude that from consideration.

`that is someone's dog`



According to this reading, the item pointed to is (identical to) *some dog* that belongs to someone in the contextually relevant domain of individuals. Note that this reading is logically equivalent to the indefinite reading in which `'is'` is a copula [type = $N_1 \rightarrow N_0$]. The highlighted compositions are underwritten by the following derivations.

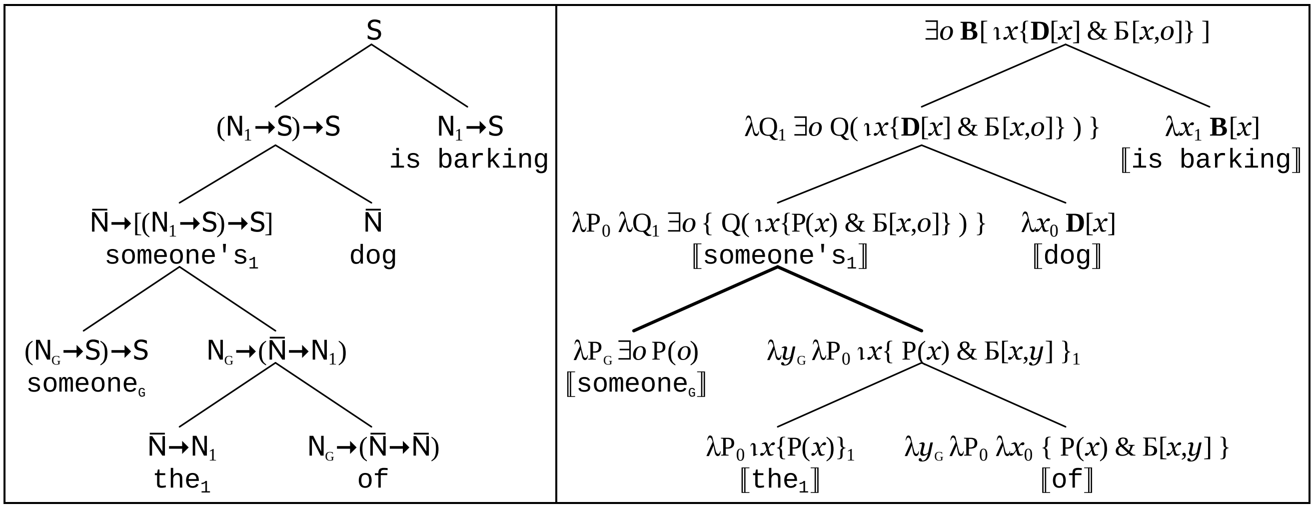
(1)	$\bar{N}\rightarrow QP_1$	1	Pr	$\lambda P_0\, \lambda Q_1\, \exists y\ \{\ P(y)\ \&\ Q(y)\ \}$
(2)	$N_G\rightarrow(\bar{N}\rightarrow\bar{N})$	2	Pr	$\lambda z_G\, \lambda P_0\, \lambda y_0\ \{\ P(y)\ \&\ \text{Б}[y,z]\ \}$
(3)	N_G	3	As	z_G
(4)	$\bar{N}$	4	As	P_0
(5)	$\bar{N}\rightarrow\bar{N}$	23	2,3,→O	$\lambda P_0\, \lambda y_0\ \{\ P(y)\ \&\ \text{Б}[y,z]\ \}$
(6)	$\bar{N}$	234	4,5,→O	$\lambda y_0\ \{\ P(y)\ \&\ \text{Б}[y,z]\ \}$
(7)	QP_1	1234	1,6,→O	$\lambda Q_1\, \exists y\ \{\ P(y)\ \&\ \text{Б}[y,z]\ \&\ Q(y)\ \}$
(8)	$\bar{N}\rightarrow QP_1$	123	4-7,→I	$\lambda P_0\, \lambda Q_1\, \exists y\ \{\ P(y)\ \&\ \text{Б}[y,z]\ \&\ Q(y)\ \}$
(9)	$N_G\rightarrow(\bar{N}\rightarrow QP_1)$	12	3-8,→I	$\lambda z_G\, \lambda P_0\, \lambda Q_1\, \exists y\ \{\ P(y)\ \&\ \text{Б}[y,z]\ \&\ Q(y)\ \}$
	$=_{df}\ N_G\rightarrow(\bar{N}\rightarrow[(N_1\rightarrow S)\rightarrow S)]$			

(1)	$N_G\rightarrow(\bar{N}\rightarrow[(N_1\rightarrow S)\rightarrow S)]$	1	Pr	$\lambda z_G\, \lambda P_0\, \lambda Q_1\, \exists y\ \{\ P(y)\ \&\ \text{Б}[y,z]\ \&\ Q(y)\ \}$
(2)	$(N_G\rightarrow S)\rightarrow S$	2	Pr	$\lambda P_G\, \exists o\, P(o)$
(3)	$\bar{N}$	3	As	P_0
(4)	$N_1\rightarrow S$	4	As	Q_1
(5)	N_G	5	As	z_G
(6)	S	1345	1,5,3,4,→O	$\exists y\ \{\ P(y)\ \&\ \text{Б}[y,z]\ \&\ Q(y)\ \}$
(7)	$N_G\rightarrow S$	134	5,6,→I	$\lambda z_G\, \exists y\ \{\ P(y)\ \&\ \text{Б}[y,z]\ \&\ Q(y)\ \}$
(8)	S	1234	2,7,→O	$\exists o\, \exists y\ \{\ P(y)\ \&\ \text{Б}[y,o]\ \&\ Q(y)\ \}$
(9)	$(N_1\rightarrow S)\rightarrow S$	123	4-8,→I	$\lambda Q_1\, \exists o\, \exists y\ \{\ P(y)\ \&\ \text{Б}[y,o]\ \&\ Q(y)\ \}$
(10)	$\bar{N}\rightarrow[(N_1\rightarrow S)\rightarrow S]$	12	3-9,→I	$\lambda P_0\, \lambda Q_1\, \exists o\, \exists y\ \{\ P(y)\ \&\ \text{Б}[y,o]\ \&\ Q(y)\ \}$

2. Example 2

`someone's dog is barking`

1. Definite Reading



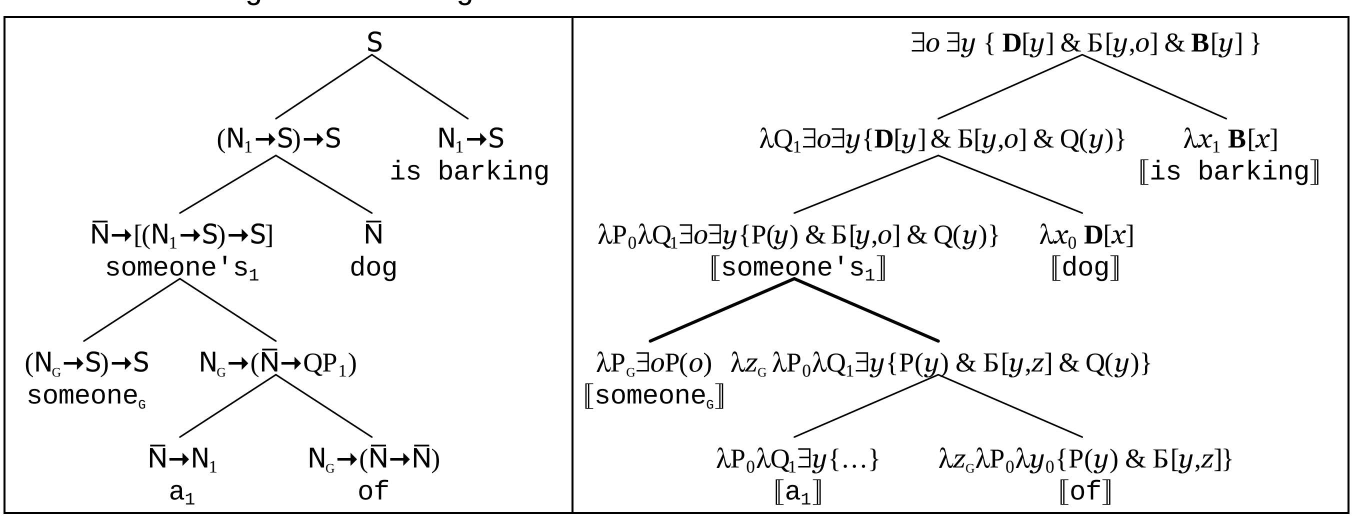
According to this reading, which treats '`someone's`' as a possessive determiner, the sentence basically reads as follows.

`there is someone whose` <u>`one-and-only`</u> `dog is barking`

2. Indefinite-Quantifier Reading

Now, the question is, in uttering such a sentence, do we presume that the "someone" whose dog is barking has *exactly one* dog? Or, do we allow the "someone" to have *one or more* dogs? I think the latter is more plausible. In that case, the sentence depicts a situation in which *some* dog belonging to *some* person is barking. This corresponds to the indefinite-quantifier reading of the genitive, which is depicted in the following trees.

`someone's dog is barking`

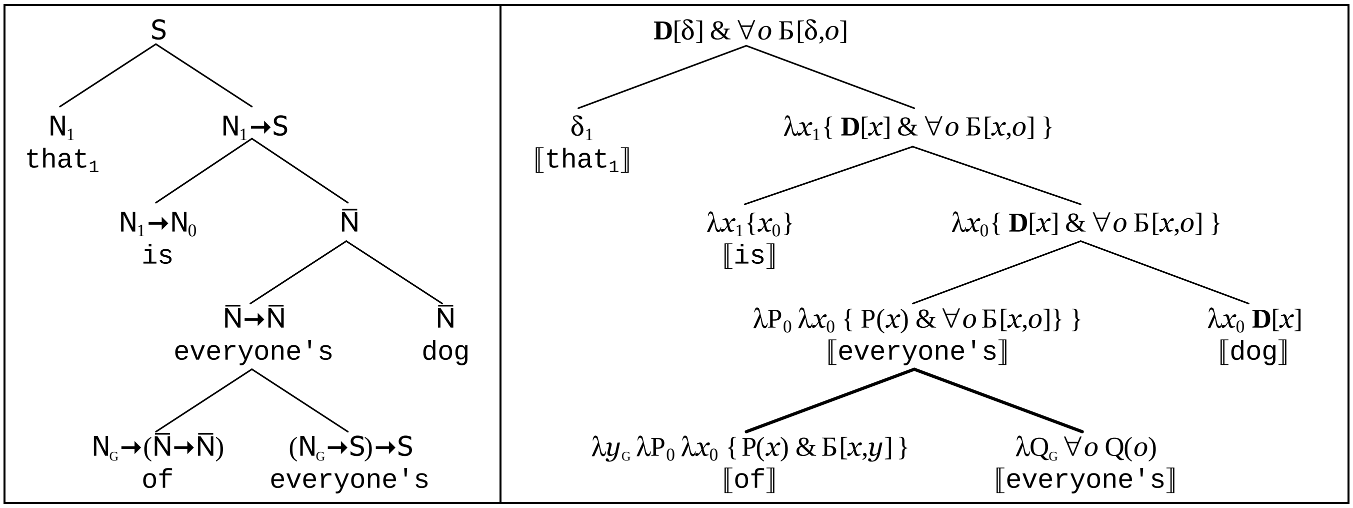


According to this reading some dog belonging to some person (in the relevant domain) is barking.

3. Example 3

`that is everyone's dog`

This example poses an interesting new problem. Recall that, according to one reading, to be someone's dog is to be a dog that belongs to someone. Analogously, to be everyone's dog is to a dog that belongs to everyone.[15] The following tree officially provides this reading.



The key composition is underwritten by the following derivation [where we re-expand '$\forall o$'].

(1)	$N_G \to [(N_0 \to S) \to (N_0 \to S)]$	1	Pr	$\lambda y_G\, \lambda P_0\, \lambda x_0 \{ P(x) \,\&\, \mathbf{?}[x,y] \}$
(2)	$(N_G \to S) \to S$	2	Pr	$\lambda Q_G\, \forall y \{ \mathbf{O}[y] \to Q(y) \}$
(3)	$N_0 \to S$	3	As	P_0
(4)	N_0	4	As	x_0
(5)	N_G	5	As	y_G
(6)	$(N_0 \to S) \to (N_0 \to S)$	15	1,5,→O	$\lambda P_0\, \lambda x_0 \{ P(x) \,\&\, \mathbf{?}[x,y] \}$
(7)	$N_0 \to S$	135	3,6,→O	$\lambda x_0 \{ P(x) \,\&\, \mathbf{?}[x,y] \}$
(8)	S	1345	4,7,→O	$P(x) \,\&\, \mathbf{?}[x,y]$
(9)	$N_G \to S$	134	5-8,→I	$\lambda y_G \{ P(x) \,\&\, \mathbf{?}[x,y] \}$
(10)	S	1234	2,9,→O	$\forall y \{ \mathbf{O}[y] \to \{P(x) \,\&\, \mathbf{?}[x,y]\} \}$
				??? $\equiv$ $P(x) \,\&\, \forall y \{ \mathbf{O}[y] \to \mathbf{?}[x,y] \}$???
(11)	$N_0 \to S$	123	4-10,→I	$\lambda x_0 \{ P(x) \,\&\, \forall y \{ \mathbf{O}[y] \to \mathbf{?}[x,y]\} \}$
(12)	$(N_0 \to S) \to (N_0 \to S)$	12	3-11,→I	$\lambda P_0\, \lambda x_0 \{ P(x) \,\&\, \forall y \{ \mathbf{O}[y] \to \mathbf{?}[x,y]\} \}$

There is a questionable maneuver at line (10), which is critical for making the resulting adjective intersective. The inference is, unfortunately, not valid by the canons of first-order logic. Rather, the transformation employed is only admissible if we grant a further premise – namely, $\exists x \mathbf{O}[x]$. The latter says that there is at least one person in the domain. Although this seems like a pretty harmless assumption, it is nevertheless a cheat, so in the following section, we consider an adjustment to our account.

[15] This is not very plausible for `'dog'`, but other common nouns provide more plausible examples, such as:
`everyone's president`

11. An Alternative, More General, Account of Relational Prepositions

According to our original account of relational prepositions, such as possessive `'of'`, they are categorially implemented as follows.

$$\begin{aligned} \text{type(R-prep)} &= \mathsf{N}_\theta \rightarrow \text{Adj} \\ &=_{\text{df}} \mathsf{N}_\theta \rightarrow [\text{CNP}\rightarrow\text{CNP}] \\ &=_{\text{df}} \mathsf{N}_\theta \rightarrow [(\mathsf{N}_0\rightarrow\mathsf{S})\rightarrow(\mathsf{N}_0\rightarrow\mathsf{S})] \end{aligned}$$

$$[\![\text{R-prep}]\!] = \lambda y_\theta\, \lambda \mathrm{P}_0\, \lambda x_0 \{ \mathrm{P}(x) \;\&\; x\mathbf{R}y \}$$

Here, **R** is the relation that serves as the core-denotation of the given relational preposition, and θ is the affiliated case-inflection.

In light of the problems of correctly constructing the adjective based on the universal quantifier, we propose the following more general account, which directly incorporates the QP into the semantics.

Revised Account Of Relational Prepositions

$$\begin{aligned} \text{type(R-prep)} &= \text{QP}_\theta \rightarrow \text{Adj} \\ &=_{\text{df}} [(\mathsf{N}_\theta\rightarrow\mathsf{S})\rightarrow\mathsf{S}] \rightarrow [\text{CNP}\rightarrow\text{CNP}] \\ &=_{\text{df}} [(\mathsf{N}_\theta\rightarrow\mathsf{S})\rightarrow\mathsf{S}] \rightarrow [(\mathsf{N}_0\rightarrow\mathsf{S})\rightarrow(\mathsf{N}_0\rightarrow\mathsf{S})] \end{aligned}$$

$$[\![\text{R-prep}]\!] = \lambda \mathbb{Q}_\theta\, \lambda \mathrm{P}_0\, \lambda x_0 \{ \mathrm{P}(x) \;\&\; \mathbb{Q}(\, \lambda y[x\mathbf{R}y]\,) \}$$

The following derivation, involving relational `'of'`, demonstrates how the new approach automatically handles universal QPs.

(1)	$[(\mathrm{N_G}\rightarrow\mathrm{S})\rightarrow\mathrm{S}]\rightarrow[\bar{\mathrm{N}}\rightarrow\bar{\mathrm{N}}]$	1	Pr	$\lambda \mathbb{Q}_G\, \lambda \mathrm{P}_0\, \lambda x_0 \{ \mathrm{P}(x) \;\&\; \mathbb{Q}(\, \lambda y\mathbf{?}[x,y]\,) \}$
(2)	$(\mathrm{N_G}\rightarrow\mathrm{S})\rightarrow\mathrm{S}$	2	Pr	$\lambda \mathrm{Q}_G\, \forall y \{ \mathbf{O}[y] \rightarrow \mathrm{Q}(y) \}$
(3)	$\bar{\mathrm{N}}\rightarrow\bar{\mathrm{N}}$	3	1,2,→O	$\lambda \mathrm{P}_0\, \lambda x_0 \{ \mathrm{P}(x) \;\&\; \forall y \{ \mathbf{O}[y] \rightarrow \lambda y\mathbf{?}[x,y] \} \}$

On the other hand, the following derivation – which utilizes N-dualization (lines 2-5) – demonstrates how the new approach subsumes the earlier approach.

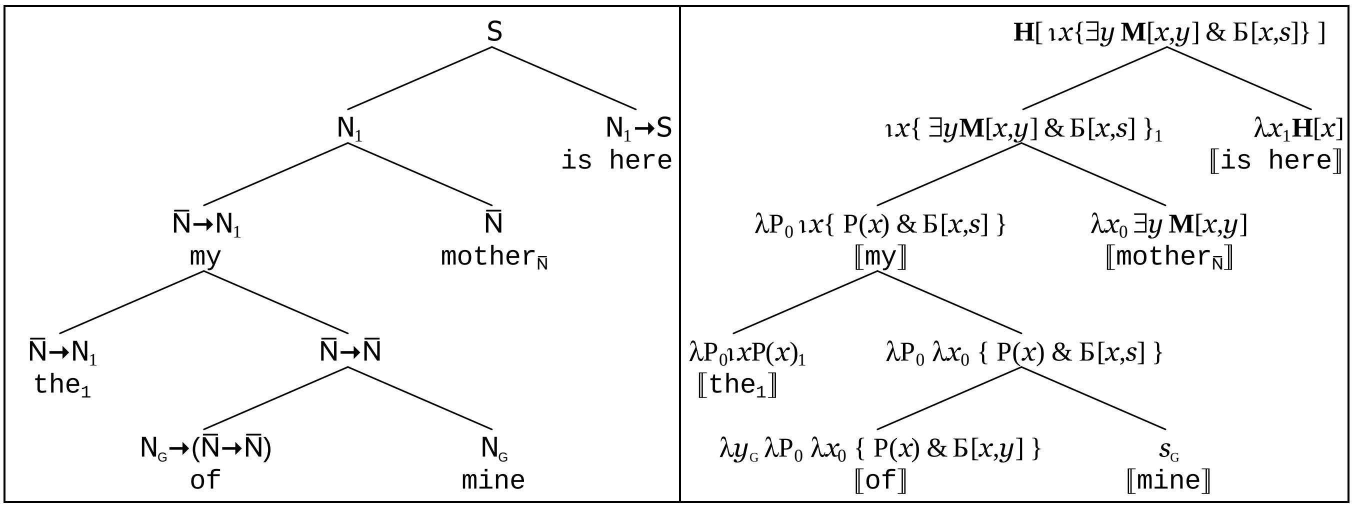
(1)	$[(\mathrm{N_G}\rightarrow\mathrm{S})\rightarrow\mathrm{S}]\rightarrow[\bar{\mathrm{N}}\rightarrow\bar{\mathrm{N}}]$	1	Pr	$\lambda \mathbb{Q}_G\, \lambda \mathrm{P}_0\, \lambda x_0 \{ \mathrm{P}(x) \;\&\; \mathbb{Q}(\, \lambda y\mathbf{?}[x,y]\,) \}$	
(2)	$\mathrm{N_G}$	2	As	y_G	
(3)	$\mathrm{N_G}\rightarrow\mathrm{S}$	3	As	Q_G	$\lambda x_G \mathrm{Q}(x)$
(4)	S	23	2,3,→O	$\mathrm{Q}_G(y_G)$	$\mathrm{Q}(y)$
(5)	$(\mathrm{N_G}\rightarrow\mathrm{S})\rightarrow\mathrm{S}$	2	3-4,→I	$\lambda \mathrm{Q}_G\, \mathrm{Q}(y)$	
(6)	$\bar{\mathrm{N}}\rightarrow\bar{\mathrm{N}}$	12	1,5,→O	$\lambda \mathrm{P}_0\, \lambda x_0 \{ \mathrm{P}(x) \;\&\; \mathbf{?}[x,y] \}$	
(7)	$\mathrm{N_G}\rightarrow(\bar{\mathrm{N}}\rightarrow\bar{\mathrm{N}})$	1	2-6,→I	$\lambda y_G\, \lambda \mathrm{P}_0\, \lambda x_0 \{ \mathrm{P}(x) \;\&\; \mathbf{?}[x,y] \}$	

12. Sometimes 'my mother' is Possessive

Usually `'my mother'` refers to the individual who stands uniquely in the mother-relation to the speaker – but not always! Under certain circumstances, `'mother'` is used as an ordinary common noun, and `'my'` is used possessively. For example, suppose a group of social workers work with single mothers. Further suppose that, by way of dividing up the workload, each social worker is assigned a group of single mothers. It is then entirely appropriate for a social worker to use the phrases `'my mother'` and `'my mothers'` in a "possessive" manner.

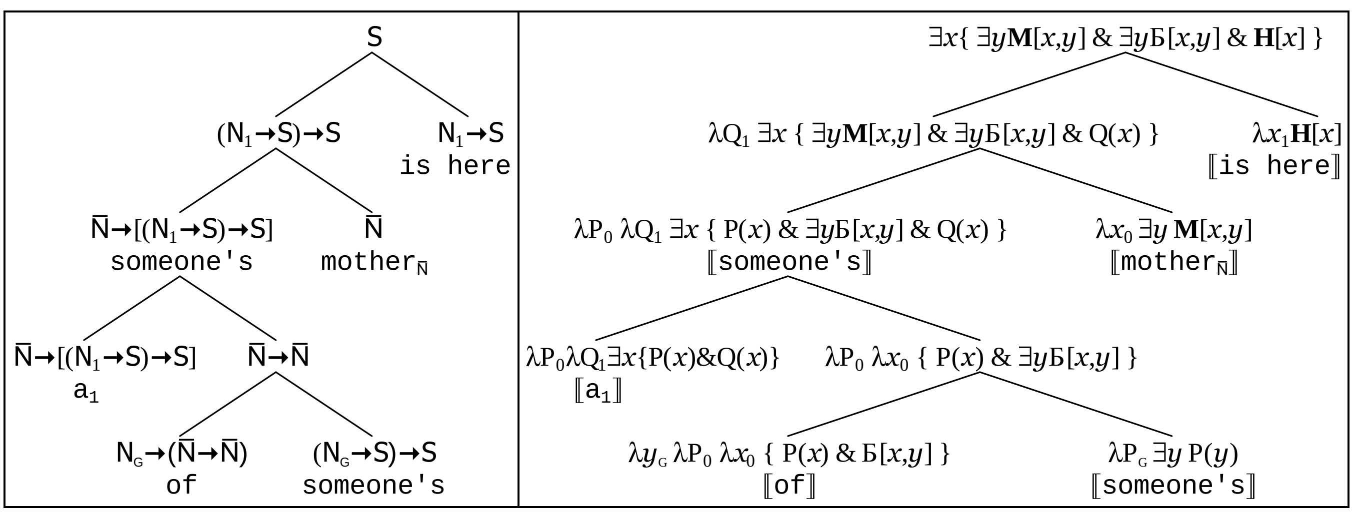
The following examples illustrate how we propose to analyze this usage.

`my mother is here`



This analysis is treats the possessive `'my'` as a definite-determiner, which subsumes `'the'`. The following similar example treats `'my'` as indefinite-quantifier, which correspondingly subsumes `'a'`.

`someone's mother is here`



13. Other Relational Prepositions

1. The Relational Use of 'from'

Like `'of'`, `'from'` has both an inflectional use and a relational use. The inflectional use of `'from'` marks the ablative argument (indirect object) for certain di-transitive verbs – such as `'buy'` – as in the following example.

`Jay bought a car` **`from`** `Kay`

On the other hand, the relational use of `'from'` is exemplified in the following sentences.

`Kay is` **`from`** `California`

The meaning of `'from'` as used here is admittedly a bit nebulous. Basically, for Kay to be *from* California is for Kay to have *originated* (*in some salient sense*) *in* California, or to have *some salient tie* to California. For example, she could have been born there, or she could have spent her formative years there, or she may be a legal resident of California. As usual, since our official concern is *compositional semantics* and not *lexical semantics*, we sidestep issues of lexical-precision, and propose the following *purely-formal* grammatical account of `'from'`.

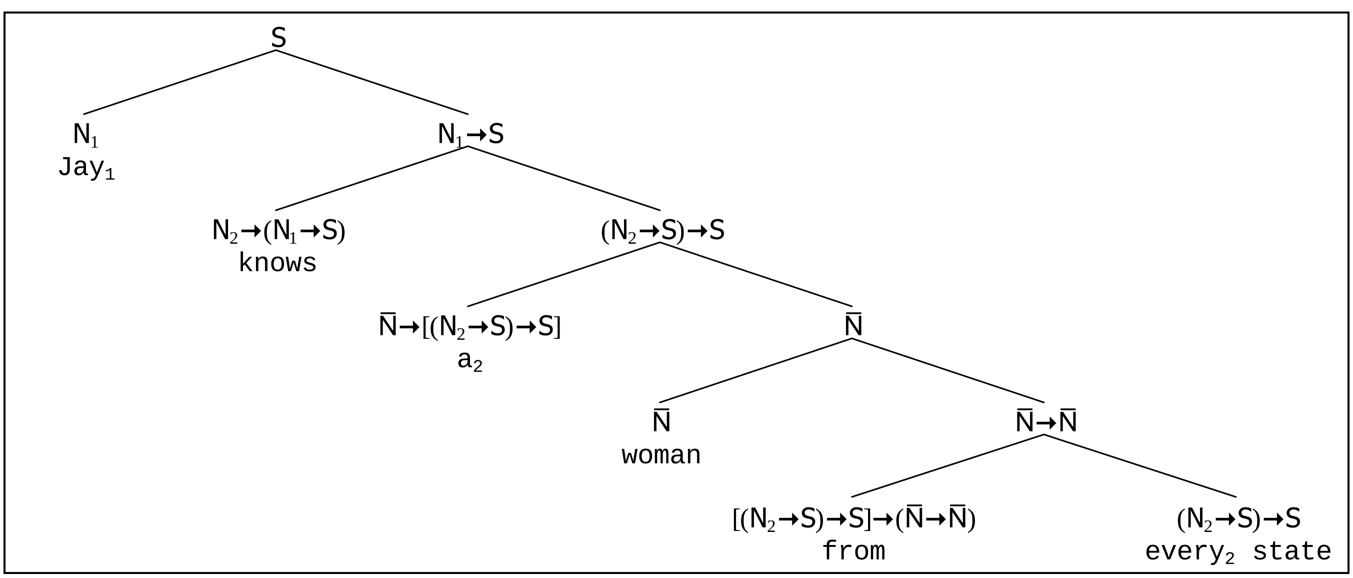
type(from)	$=$	$QP_2 \rightarrow Adj$
	$=_{df}$	$[(N_2 \rightarrow S) \rightarrow S] \rightarrow [(N_0 \rightarrow N_0) \rightarrow (N_0 \rightarrow N_0)]$
$\lVert$from$\rVert$	$=$	$\{ \langle x,y \rangle : x \text{ is } \mathbf{from}\ y \}$
$[\![$from$]\!]$	$=$	$\lambda \mathbb{Q}_2\, \lambda P_0\, \lambda x_0 \{ P(x) \,\&\, \mathbb{Q}(\lambda y \mathbf{F}[x,y]) \}$
$\mathbf{F}[a,\beta]$	$=_{df}$	$\lambda(\alpha \text{ is from } \beta)$

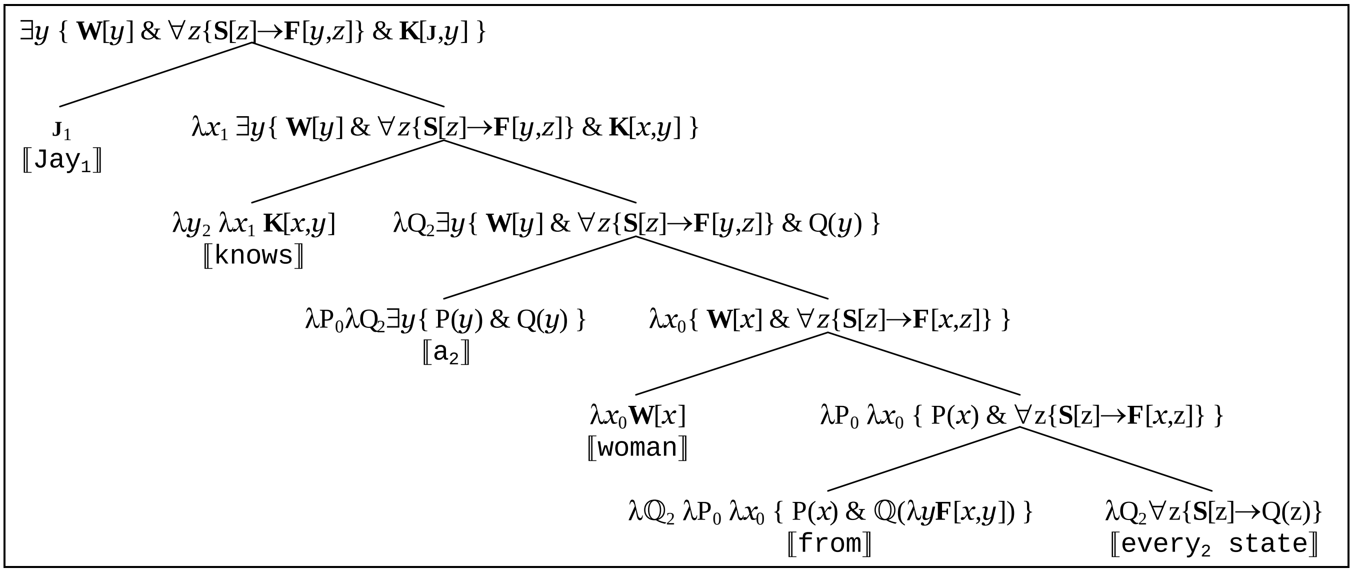
2. Single Scope-Ambiguity

How does `'from'` semantically interact with other words? For example, consider the following.

`Jay knows a woman from every state`

This is ambiguous, although one reading is considerably less plausible than the other. In particular, we have the following analyses.

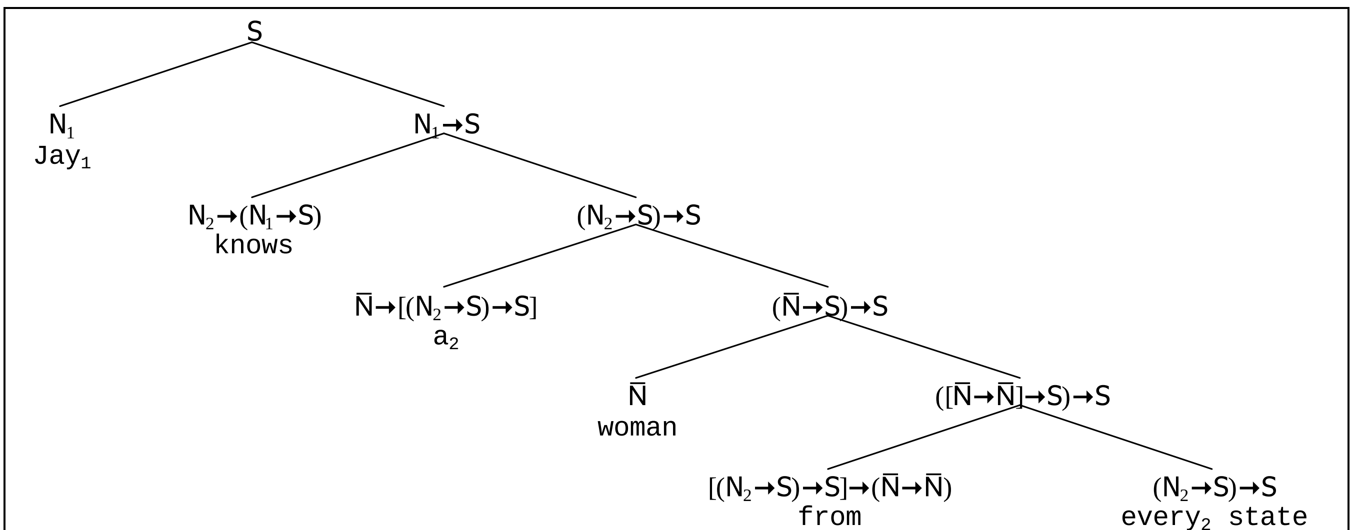


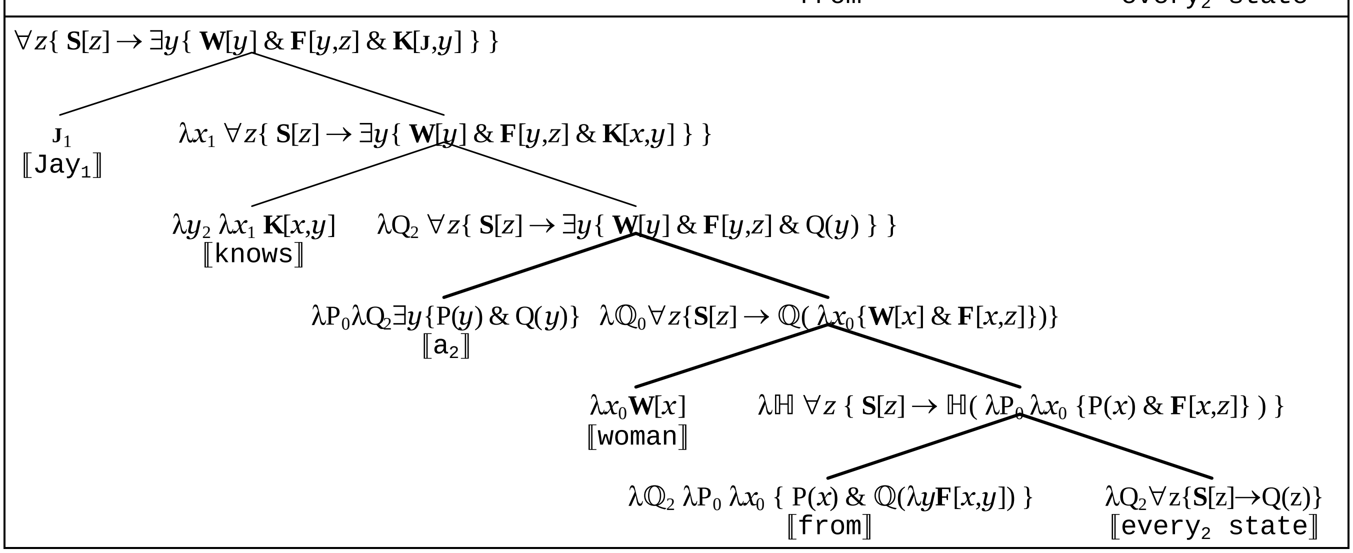


According to this analysis, the says that:

there is a woman, who is from every state, and whom Jay knows

For example, the woman in question has acquired (through clever deception) simultaneous citizenship in every state, in virtue of which she is "from" every state.





According to this analysis, the sentence says that:

for every state, Jay knows a woman from that state

The three highlighted compositions are underwritten by the following derivations.

(1)	$[(N_2\to S)\to S]\to[\bar{N}\to\bar{N}]$	1	Pr	$\lambda\mathbb{Q}_2\,\lambda P_0\,\lambda x_0\,\{\,P(x)\,\&\,\mathbb{Q}(\,\lambda y\mathbf{F}[x,y]\,)\,\}$
(2)	$(N_2\to S)\to S$	2	Pr	$\lambda Q_2\,\forall z\,\{\,\mathbf{S}[z]\to Q(z)\,\}$
(3)	$[\bar{N}\to\bar{N}]\to S$	3	As	$\mathbb{H}$
(4)	N_2	4	As	z_2
(5)	$(N_2\to S)\to S$	4	4,Dual	$\lambda Q_2 Q(z)$
(6)	$\bar{N}\to\bar{N}$	14	1,5,$\to$O	$\lambda P_0\,\lambda x_0\,\{\,P(x)\,\&\,\mathbf{F}[x,z]\,\}$
(7)	S	134	3,6,$\to$O	$\mathbb{H}(\,\lambda P_0\,\lambda x_0\,\{\,P(x)\,\&\,\mathbf{F}[x,z]\,\}\,)$
(8)	$N_2\to S$	13	4-7,$\to$I	$\lambda z_2\,\mathbb{H}(\,\lambda P_0\,\lambda x_0\,\{\,P(x)\,\&\,\mathbf{F}[x,z]\,\}\,)$
(9)	S	123	3,8,$\to$O	$\forall z\,\{\,\mathbf{S}[z]\to\mathbb{H}(\,\lambda P_0\lambda x_0\{\,P(x)\,\&\,\mathbf{F}[x,z]\,\}\,)\,\}$
(10)	$([\bar{N}\to\bar{N}]\to S)\to S$	12	3-9,$\to$I	$\lambda\mathbb{H}\,\forall z\,\{\,\mathbf{S}[z]\to\mathcal{Q}(\lambda P_0\lambda x_0\{P(x)\,\&\,\mathbf{F}[x,z]\})\,\}$

(1)	$([\bar{N}\to\bar{N}]\to S)\to S$	1	Pr	$\lambda\mathbb{H}\,\forall z\,\{\,\mathbf{S}[z]\to\mathbb{H}(\lambda P_0\lambda x_0\{P(x)\,\&\,\mathbf{F}[x,z]\})\,\}$
(2)	$\bar{N}$	2	Pr	$\lambda x_0\,\mathbf{W}[x]$
(3)	$\bar{N}\to S$	3	As	$\mathbb{Q}_0$ $[=\lambda P_0\mathbb{Q}(P)]$
(4)	$\bar{N}\to\bar{N}$	4	As	η
(5)	$\bar{N}$	24	2,4,$\to$O	$\eta\,(\,\lambda x_0\,\mathbf{W}[x]\,)$
(6)	S	234	3,5,$\to$O	$\mathbb{Q}_0\,(\,\eta\,(\,\lambda x_0\,\mathbf{W}[x]\,)\,)$
(7)	$(\bar{N}\to N)\to S$	23	4-6,$\to$I	$\lambda\eta\,\mathbb{Q}_0\,(\,\eta\,(\,\lambda x_0\,\mathbf{W}[x]\,)\,)$
(8)	S	123	1,7,$\to$O	$\forall z\,\{\,\mathbf{S}[z]\to\mathbb{Q}(\,\lambda x\{\mathbf{W}[x]\,\&\,\mathbf{F}[x,z]\}\,)\,\}$
(9)	$(\bar{N}\to S)\to S$	12	3-8,$\to$I	$\lambda\mathbb{Q}_0\,\forall z\,\{\,\mathbf{S}[z]\to\mathbb{Q}(\,\lambda x\{\mathbf{W}[x]\,\&\,\mathbf{F}[x,z]\}\,)\,\}$

(1)	$(\bar{N}\to S)\to S$	1	Pr	$\lambda\mathbb{Q}_0\,\forall z\,\{\,\mathbf{S}[z]\to\mathbb{Q}(\,\lambda x\{\mathbf{W}[x]\,\&\,\mathbf{F}[x,z]\}\,)\,\}$
(2)	$\bar{N}\to[(N_2\to S)\to S]$	2	Pr	$\lambda P_0\,\lambda Q_2\,\exists y\,\{\,P(y)\,\&\,Q(y)\,\}$
(3)	$N_2\to S$	3	As	Q_2 $[=\lambda x_2 Q(x)]$
(4)	$\bar{N}$	4	As	P_0 $[=\lambda x_0 P(x)]$
(5)	$(N_2\to S)\to S$	24	2,4,$\to$O	$\lambda Q_2\,\exists y\,\{\,P(y)\,\&\,Q(y)\,\}$
(6)	S	234	3,5,$\to$O	$\exists y\,\{\,P(y)\,\&\,Q(y)\,\}$
(7)	$\bar{N}\to S$	23	4-6,$\to$I	$\lambda P_0\,\exists y\,\{\,P(y)\,\&\,Q(y)\,\}$
(8)	S	123	1,7,$\to$O	$\forall z\,\{\,\mathbf{S}[z]\to\exists y\,\{\,\mathbf{W}[y]\,\&\,\mathbf{F}[y,z]\}\,\&\,Q(y)\,\}\,\}$
(9)	$(N_2\to S)\to S$	12	3-8,$\to$I	$\lambda Q_2\,\forall z\,\{\,\mathbf{S}[z]\to\exists y\,\{\,\mathbf{W}[y]\,\&\,\mathbf{F}[y,z]\}\,\&\,Q(y)\,\}\,\}$

3. Multiple Scope-Ambiguity

Combining `'a'` with `'every'` twice in the same sentence produces even more interesting scope ambiguities, as illustrated in the following sentence.

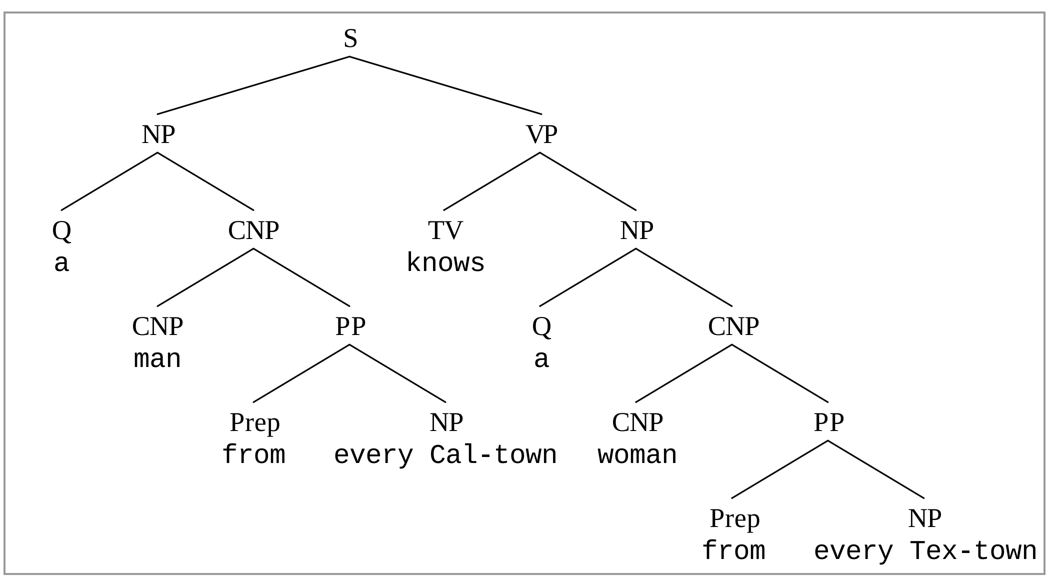
```
a man from every California-town knows
a woman from every Texas-town
```

Since there are four quantifiers in this sentence, there are 24 [4×3×2] scope-combinations.[16] Included among these are the following readings, expressed using standard first-order logic phraseology, where '*m* knows *w*' $=_{df}$ 'the man knows the woman'.

(1)	there is **a M** who is from **every C**, and there is **a W** who is from **every T**, such that *m* **knows** *w*	(5)	there is **a W** who is from **every T**, and there is **a M** who is from **every C**, such that *m* **knows** *w*
(2)	there is **a M** who is from **every C**, and who is such that for **every T** there is **a W** from that T such that *m* **knows** *w*	(6)	there is **a W** who is from **every T**, and who is such that for **every C** there is **a M** who is from that C and who is such that *m* **knows** *w*
(3)	for **every C** there is **a M** who is from that C, and who is such that there is **a W** who is from **every T** and who is such that *m* **knows** *w*	(7)	for **every T** there is **a W** from that T such that there is **a M** who is from **every C** and who is such that *m* **knows** *w*
(4)	for **every C** there is **a M** who is from that C, and who is such that for **every T** there is **a W** who is from that T and who is such that *m* **knows** *w*	(8)	for **every T** there is **a W** from that T such that for **every C** there is **a M** who is from that T and who is such that *m* **knows** *w*
(9)	for **every C** and for **every T**, there is **a M** from that C, and there is **a W** from that T, such that *m* **knows** *w*		

The other scope-combinations are very odd-sounding, and they are equivalent to ones already mentioned, so we omit them.[17]

Now, the task is to provide categorial renderings of the original sentence that capture all these readings. First, the overall surface syntax is plausibly given as follows.



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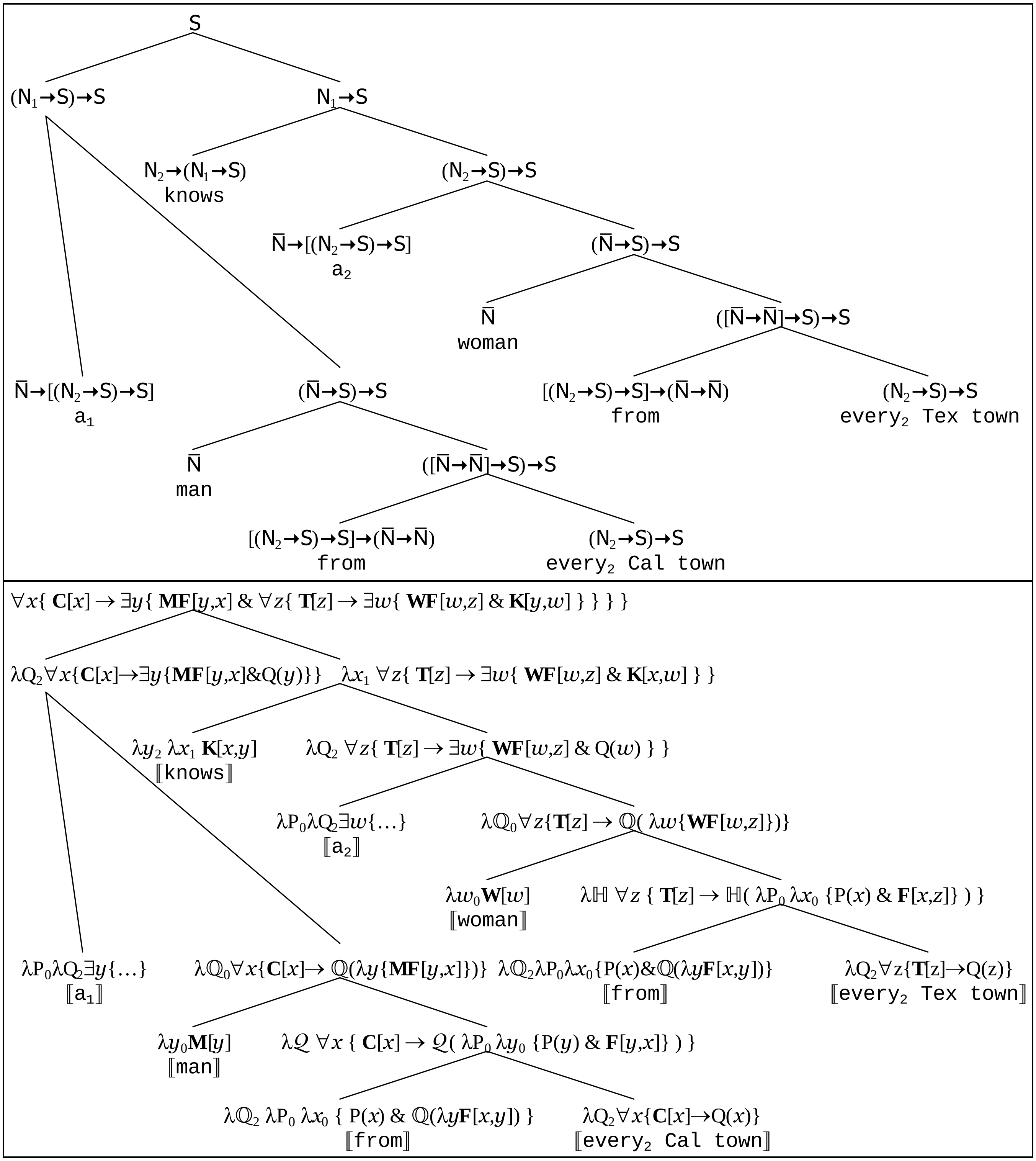
[16] Here, we exclude somewhat extraordinary readings according to which the phrases `'a man from every Cal-town'` and `'a woman from every Tex-town'` have **equal scope**, in accordance with the theory of **branching-quantifiers** [Henkin, Hintikka, Barwise & Cooper, +++].

[17] We also note in passing that (5) is equivalent to (1).

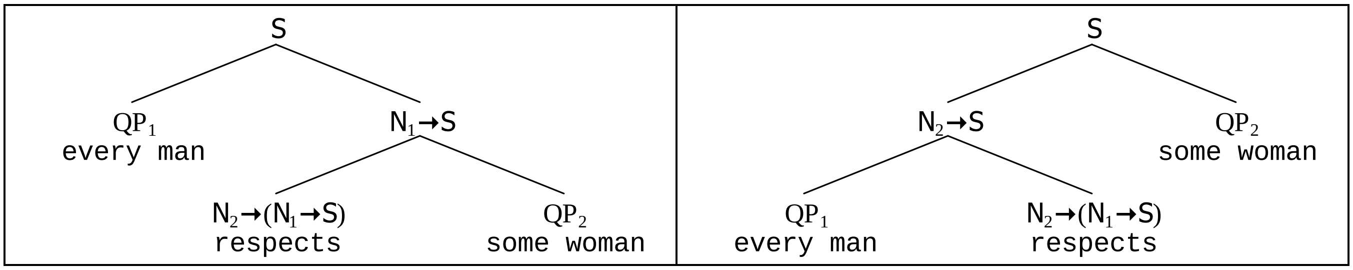
Using this syntactic form, we must provide semantic accounts of all the readings mentioned above. For example, the following is our proposed account of reading (4), where we employ the following abbreviations.

$\mathbf{MF}[\alpha,\beta] =_{df} \mathbf{M}[\alpha] \ \& \ \mathbf{F}[\alpha,\beta]$
$\quad =_{df} \lambda(\alpha \text{ is a man}) \ \& \ \lambda(\alpha \text{ is from } \beta)$
$\quad = \lambda(\alpha \text{ is a man and } \alpha \text{ is from } \beta)$

$\mathbf{WF}[\alpha,\beta] =_{df} \mathbf{W}[\alpha] \ \& \ \mathbf{F}[\alpha,\beta]$
$\quad =_{df} \lambda(\alpha \text{ is a woman}) \ \& \ \lambda(\alpha \text{ is from } \beta)$
$\quad = \lambda(\alpha \text{ is a woman and } \alpha \text{ is from } \beta)$



Others of the first eight readings may be obtained in a similar manner. The first eight readings can also be achieved using syntactic scope techniques. According to the purely syntactic account of scope, one α out-scopes β precisely when α C-commands β, which is to say that the lowest branching node above α is above β, but not conversely. For example, in the following, in the first tree, `every man'` C-commands `'some woman'`, but in the second tree, the reverse is true



The obvious question, then, is whether there is a syntactic-tree for

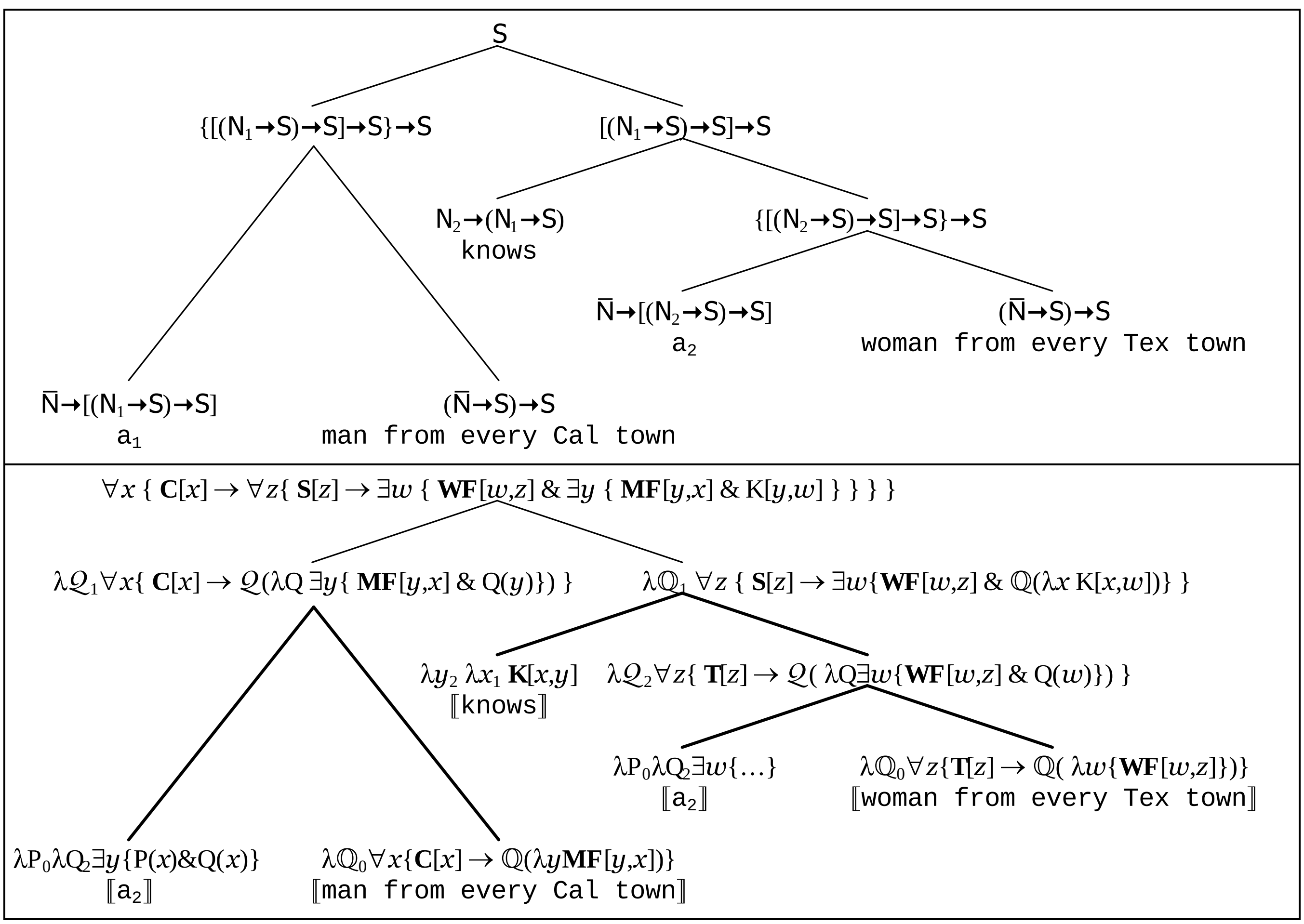
`a man from every Cal-town knows a woman from every Tex-town`

which:

(1) maintains the left-right order;
(2) has no crossing branches;
(3) affords wide scope to `'every Cal-town'` and `'every Tex-town'`.

A little "topological experimentation" will convince one that the answer is negative.

We do not adopt a syntactic account of scope, but rather a purely semantic account, which moreover achieves reading (9) as follows.



The three highlighted compositions are underwritten by the following two derivations, plus a near-duplicate of the first one.

(1)	$(\bar{N}\to S)\to S$	1	Pr	$\lambda\mathbb{Q}_0\ \forall z\ \{\ \mathbf{T}[z]\to\mathbb{Q}(\ \lambda w\{\mathbf{WF}[w,z]\}\ )\ \}$
(2)	$\bar{N}\to[(N_2\to S)\to S]$	2	Pr	$\lambda P_0\ \lambda Q_2\ \exists w\ \{\ P(w)\ \&\ Q(w)\ \}$
(3)	$[(N_2\to S)\to S]\to S$	3	As	$\mathcal{Q}_2$ [$=\lambda\mathbb{Q}_2\mathcal{Q}(\mathbb{Q})$]
(4)	$\bar{N}$	4	As	P_0 [$=\lambda x_0 P(x)$]
(5)	$(N_2\to S)\to S$	24	2,4,→O	$\lambda Q_2\ \exists w\ \{\ P(w)\ \&\ Q(w)\ \}$
(6)	S	234	3,5,→O	$\mathcal{Q}\ (\ \lambda Q\ \exists w\ \{\ P(w)\ \&\ Q(w)\ \}\ )$
(7)	$\bar{N}\to S$	23	4-6,→I	$\lambda P_0\ \mathcal{Q}\ (\ \lambda Q\ \exists w\ \{\ P(w)\ \&\ Q(w)\ \}\ )$
(8)	S	123	1,7,→O	$\forall z\ \{\ \mathbf{T}[z]\to\mathcal{Q}\ (\ \lambda Q\ \exists w\ \{\ \mathbf{WF}[w,z]\}\ \&\ Q(w)\ \}\ )\ \}$
(9)	$\{[(N_2\to S)\to S]\to S\}\to S$	12	3-8,→I	$\lambda\mathcal{Q}_2\ \forall z\ \{\ \mathbf{T}[z]\to\mathcal{Q}\ (\ \lambda Q\ \exists w\ \{\ \mathbf{WF}[w,z]\}\ \&\ Q(w)\})\ \}$

(1)	$\{[(N_2\to S)\to S]\to S\}\to S$	1	Pr	$\lambda\mathcal{Q}_2\ \forall z\ \{\ \mathbf{T}[z]\to\mathcal{Q}\ (\ \lambda Q\ \exists w\ \{\ \mathbf{WF}[w,z]\}\ \&\ Q(w)\})\ \}$
(2)	$N_2\to(N_1\to S)$	2	Pr	$\lambda y_2\ \lambda x_1\ \mathbf{K}[x,y]$
(3)	$(N_1\to S)\to S$	3	As	$\mathbb{Q}_1$ [$=\lambda P_1\mathbb{Q}(P)$]
(4)	$(N_2\to S)\to S$	4	As	$\mathbb{P}_2$ [$=\lambda P_1\mathbb{P}(P)$]
(5)	N_2	5	As	y_2
(6)	$N_1\to S$	25	2,5,→O	$\lambda x_1\ \mathbf{K}[x,y]$
(7)	S	235	3,6,→O	$\mathbb{Q}(\ \lambda x\mathbf{K}[x,y]\ )$
(8)	$N_2\to S$	23	5-7,→I	$\lambda y_2\ \mathbb{Q}(\ \lambda x\mathbf{K}[x,y]\ )$
(9)	S	234	4,8,→O	$\mathbb{P}(\ \lambda y\ \mathbb{Q}(\ \lambda x\ K[x,y]\ )\ )$
(10)	$[(N_2\to S)\to S]\to S$	23	4-9,→I	$\lambda\mathbb{P}_2\ \mathbb{P}(\ \lambda y\ \mathbb{Q}(\ \lambda x\ K[x,y]\ )\ )$
(11)	S	123	1,10,→O	$\forall z\ \{\ \mathbf{T}[z]\to\exists w\ \{\ \mathbf{WF}[w,z]\ \&\ \mathbb{Q}(\ \lambda x\ K[x,w]\ )\ \}\ \}$
(12)	$[(N_1\to S)\to S]\to S$	12	3-11,→I	$\lambda\mathbb{Q}_1\ \forall z\ \{\ \mathbf{T}[z]\to\exists w\ \{\ \mathbf{WF}[w,z]\ \&\ \mathbb{Q}(\ \lambda x\ K[x,w]\ )\ \}\ \}$

14. Genitive *versus* Possessive Uses of ‘have’

1. Introduction

As we have seen, the word `‘of’` has both an inflectional/genitive use and a relational/possessive use. These two uses yield correspondingly diverse uses of `‘have’`, as illustrated in the following examples.

```
I have a wife and a daughter
I have a dog and a cat
```

In particular, both of these can be paraphrased (somewhat awkwardly) using `‘of’`, as follows.

there is someone who is a wife **of** mine,
and someone who is a daughter **of** mine

there is something that is a dog **of** mine,
and something that is a cat **of** mine

The key difference is, whereas the first example employs inflectional `'of'`, the second example employs relational `'of'`.

2. Official Proposal

We officially propose the following two lexical entries for `'have'`.

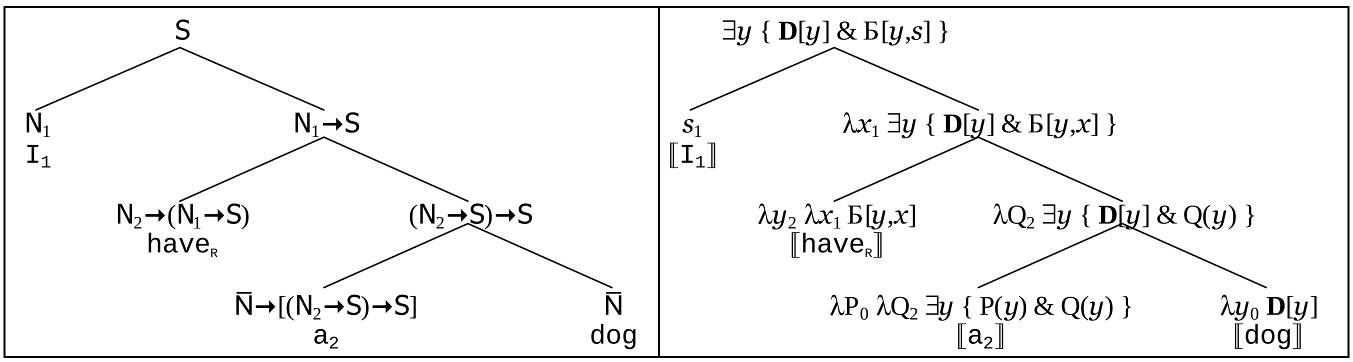
$$\text{type}(\text{have}_R) = N_2 \rightarrow (N_1 \rightarrow S)$$

$$[\![\text{have}_R]\!] = \lambda y_2\, \lambda x_1\, Б[y,x]$$
$$=_{df}\ \lambda y_2\, \lambda x_1\, \{\ y \text{ belongs to } x\ \}$$
$$\approx\ \lambda y_2\, \lambda x_1\, \{\ x \text{ has } y\ \}$$

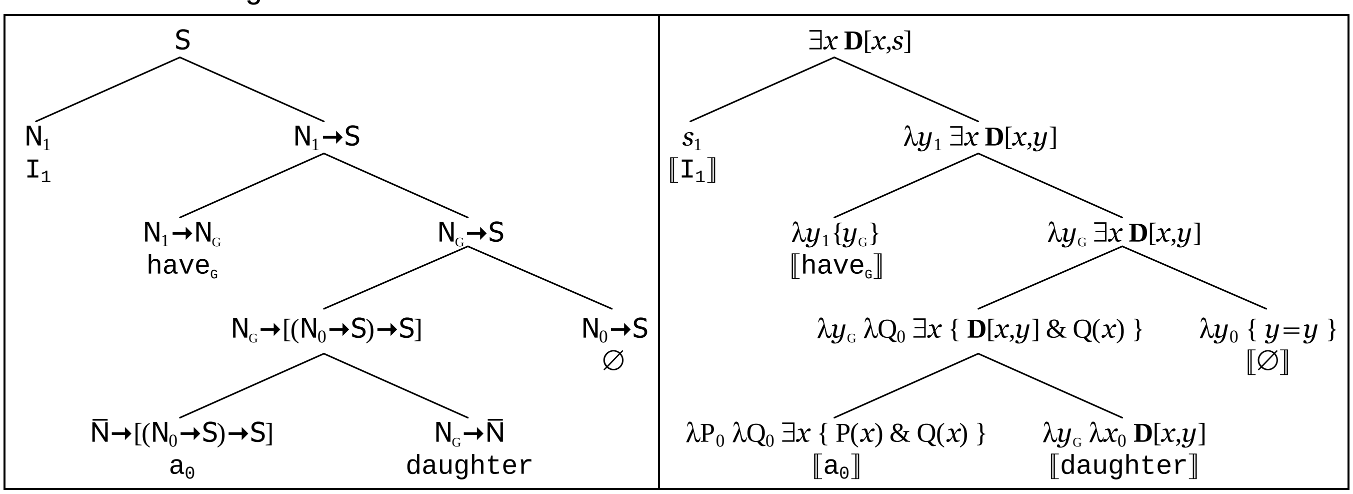
$$\text{type}(\text{have}_G) = N_1 \rightarrow N_G$$
$$[\![\text{have}_G]\!] = \lambda x_1 \{x_G\}$$

Note that `'have`$_G$`'` is basically vacuous, in a manner reminiscent of copular `'be'`. It could accordingly be called copular `'have'`. The following are examples.

`I have a dog`



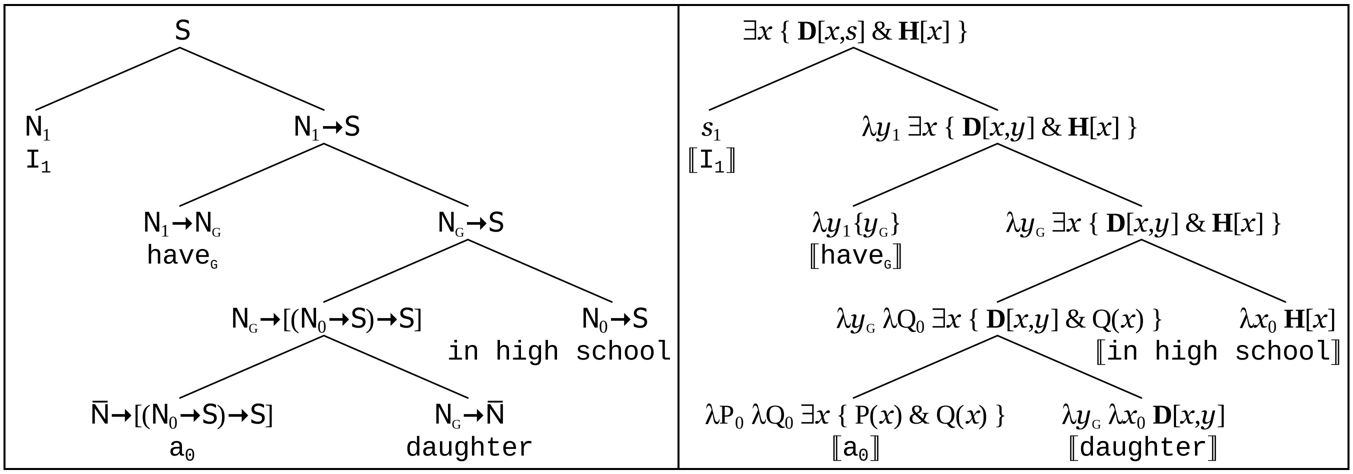
`I have a daughter`



Two points about the genitive use of `'have'`. First, notice that the *apparent* object of the verb `'have`$_i$`'` is case-inflected by the null-case, rather than the accusative case. This is admissible given that genitive `'have'` is not a transitive verb, but is rather more like a copula. Second, notice that the proposed analysis posits a null-CNP, which corresponds semantically to the bare adjective `'in existence'`, which trivially applies to every entity in the domain.

The proposed CNP is what we earlier called a *coda* in connection with `'there'` insertion. Syntactically speaking, a coda is a bare post-fix intersective adjective; categorially speaking, it is in effect a CNP $[N_0 \rightarrow S]$. The following is an example in which the coda is not null.

`I have a daughter` **`in high school`**



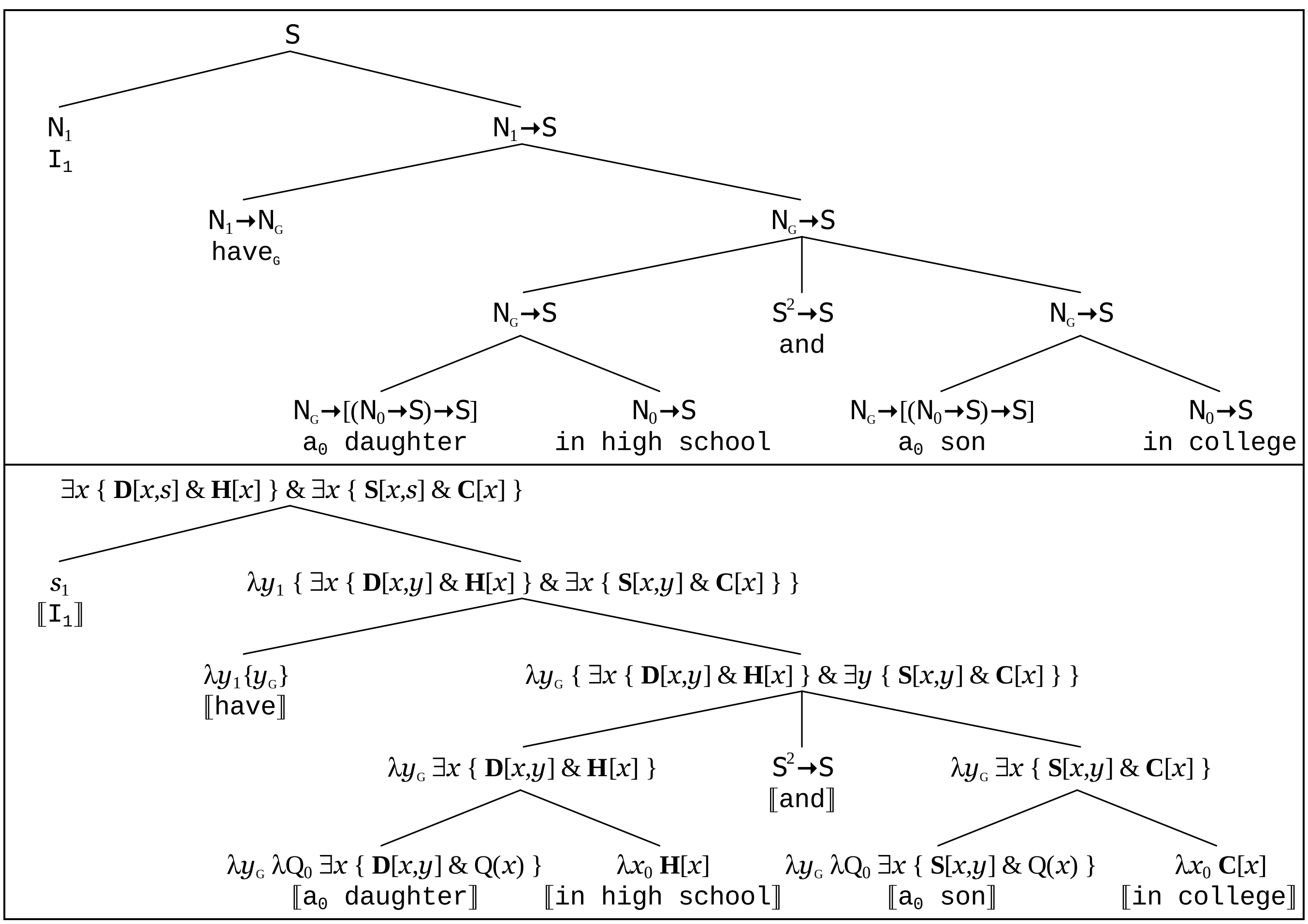
The following examples use different form codas, but are analyzed in exactly the same way as the example above.

`I have a cousin` **`who teaches high school`**
`I have an uncle` **`living in Texas`**

3. Conjunctive Forms

Although the coda *could* be placed higher in the sentence, the following example demonstrates the categorial advantage of keeping it next to the QP.

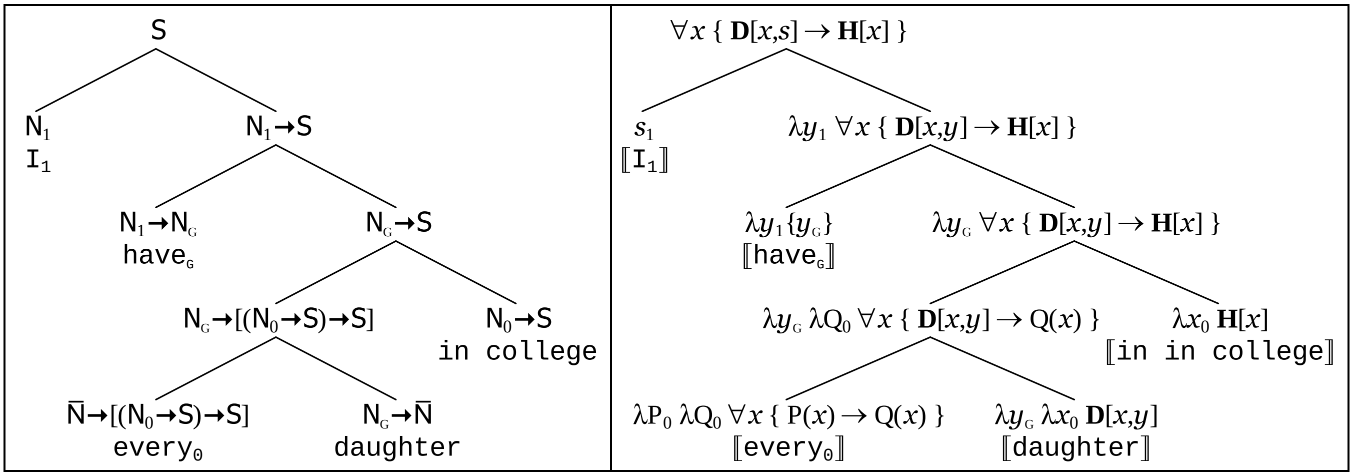
`I have a daughter in high school` **`and`** `a son in college`



4. Universal Quantifiers Are Permitted, but not with a Null Coda

Recall the issues concerning which quantifier-coda combinations are permitted in connection with `‘there be’` insertion. The same issues seem to arise in connection with genitive `‘have’`. For example, universal quantifiers are permitted, as in the following example.

`I have` **`every`** `daughter in college`



On the other hand, a null-coda is not permitted.

※※※ `I have` **`every`** `daughter` ∅ ※※※

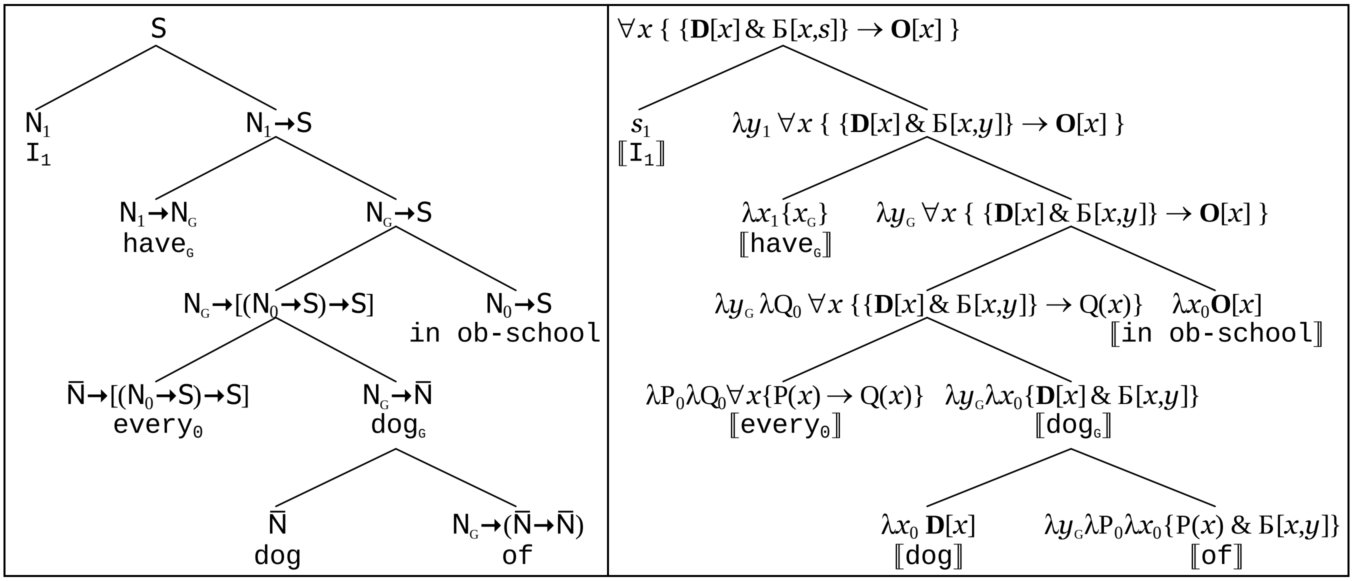
Note carefully that we continue to case-inflect QPs at the level of the Q, but this is simply a device for saving space in the diagrams. The case-inflection *really* occurs at the level of the QP. So, in this example, it appears that the complement noun `‘daughter’` can fill the wrong input-slot in the 0-inflected quantifier `‘every’`, with disastrous results! But this is a mirage, since the 0-inflection *actually* occurs after `‘every’` combines with `‘daughter’`.

The next section offers another example involving `‘every’`, as well as an interesting twist on genitive nouns.

5. Derivatively-Genitive Nouns

So far, we have combined genitive `'have'` with genitive nouns. Interestingly, genitive `'have'` can also be combined with ordinary common nouns that have been (tacitly) converted into derivative genitive nouns, as illustrated in the following example.[18]

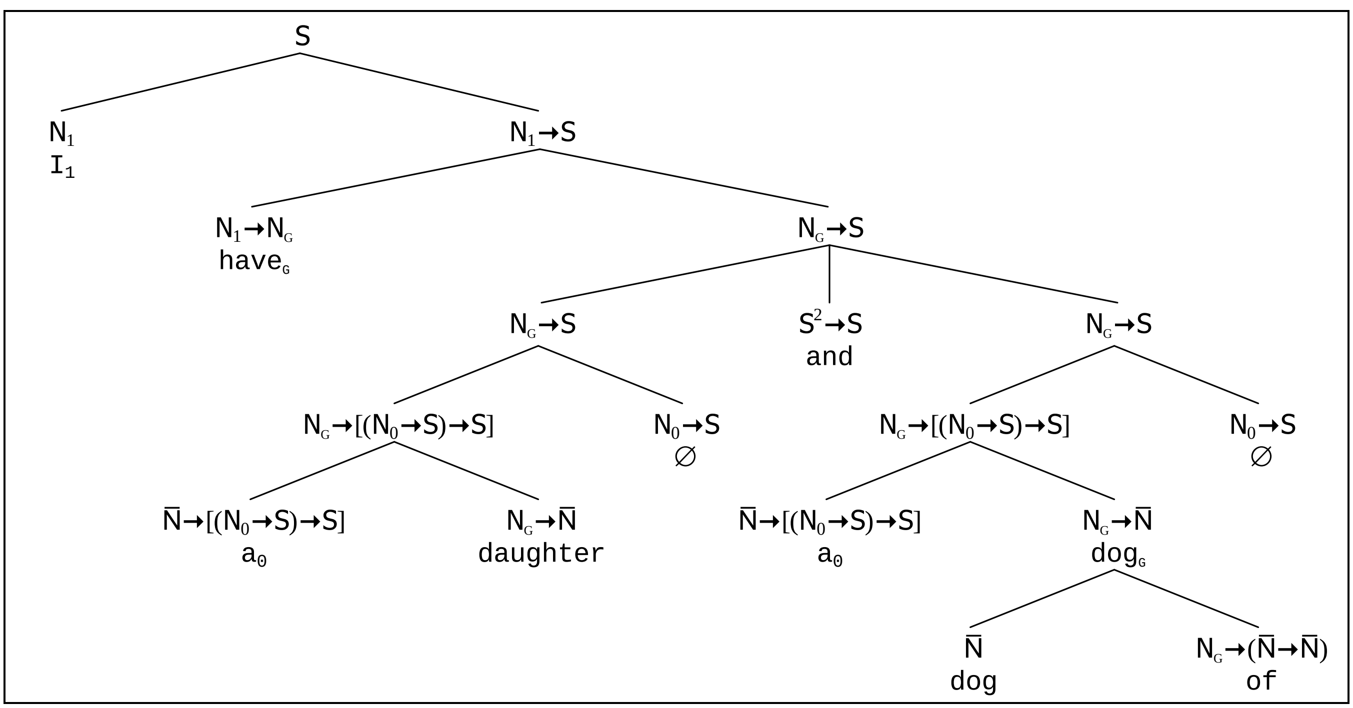
`I have every` **`dog`** `in obedience school`



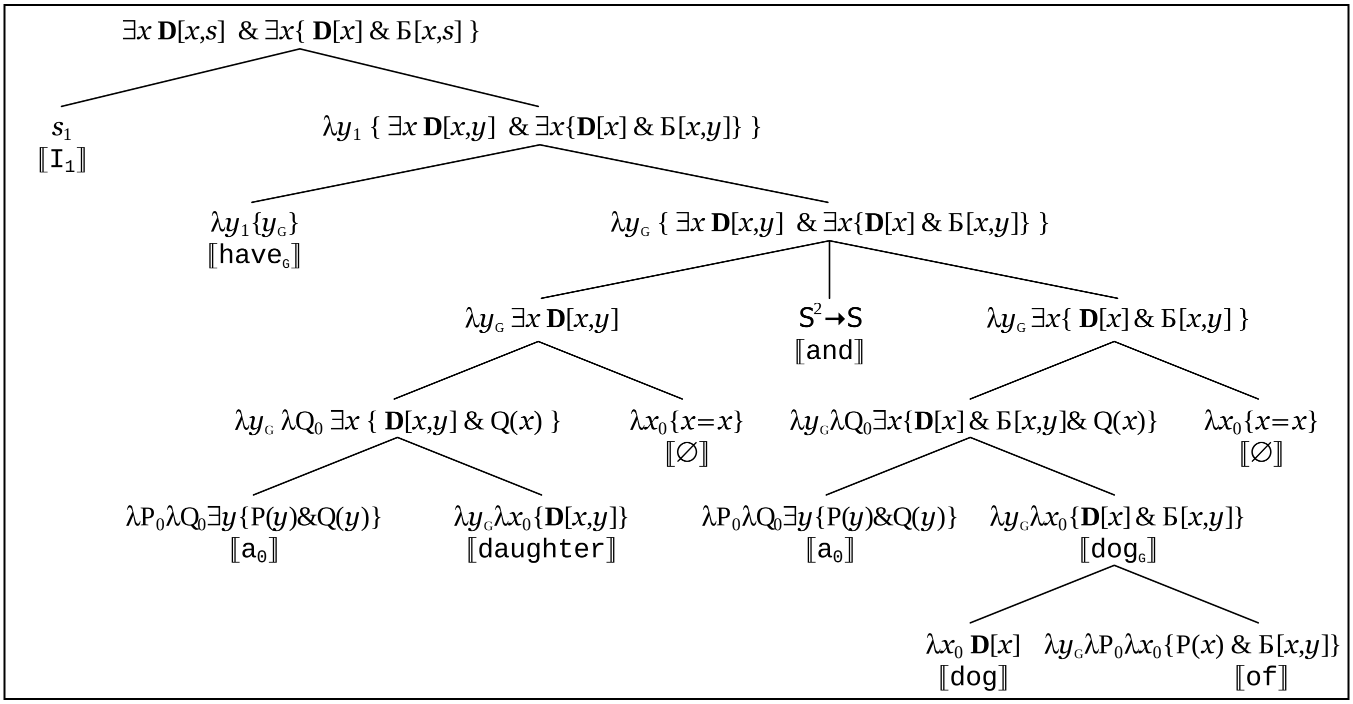
Note carefully how different the genitive reading of `'have'` is from the corresponding relational reading, according to which the sentence says that I *own* every dog in obedience school.

The genitive use of ordinary common nouns is further attested by the following examples.

`I have a daughter` **`and`** `a dog`



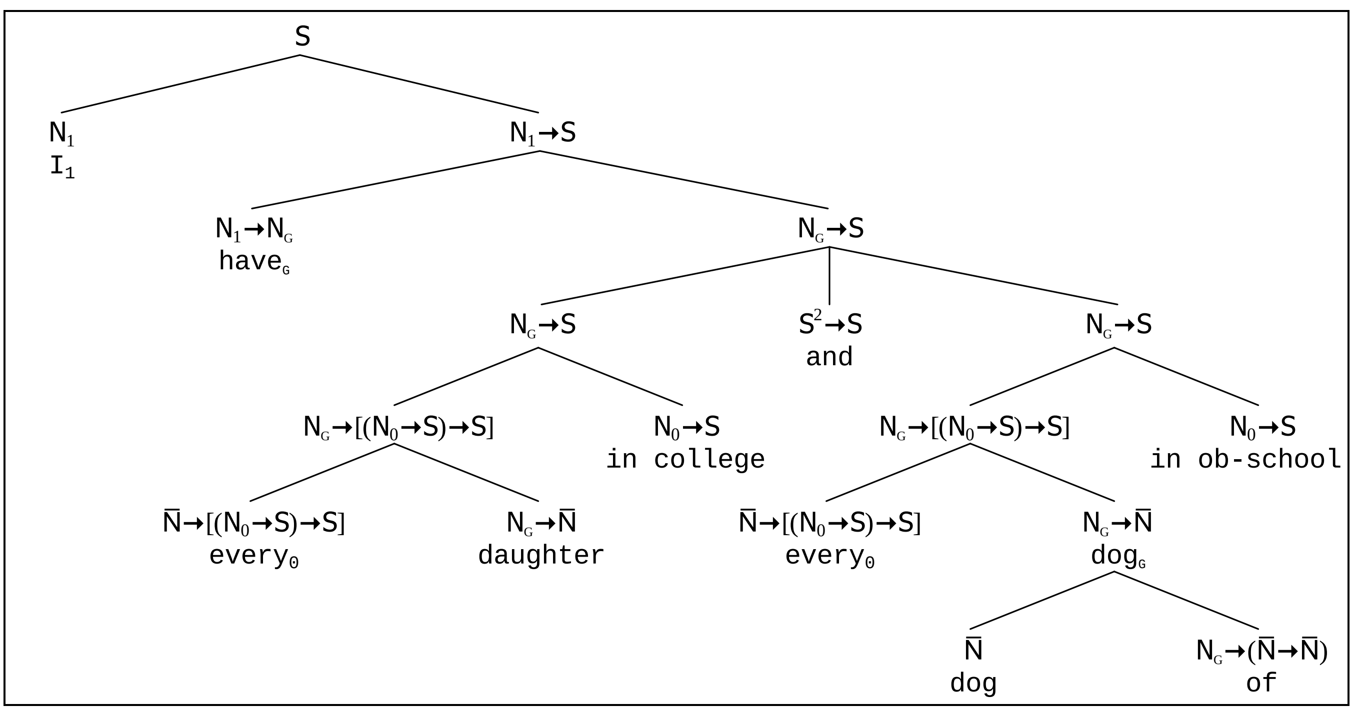
[18] Here, we use the old (simplified) account of possessive `'of'`, which is theoretically permitted, and which simplifies our computations.

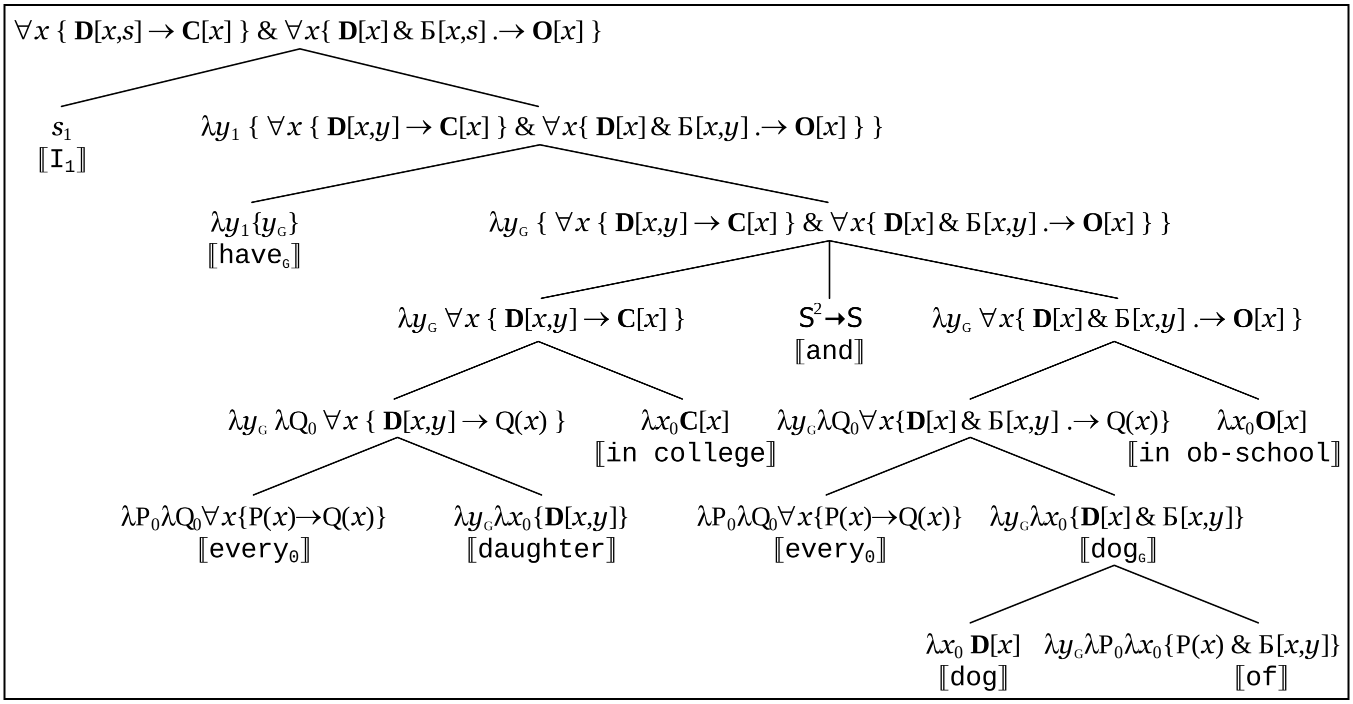


Notice, in particular, that the conjuncts must be parallel, so we must either convert `'dog'` into a genitive noun, or convert `'daughter'` into an ordinary common noun. However, converting `'daughter'` into an ordinary common noun produces a reading according to which the speaker *owns* someone's daughter and a dog. This is, to be sure, an admissible reading of the original sentence, but not the most plausible.

The following example offers a similar ambiguity, but once again the most plausible reading treats `'have'` as genitive `'have'`.

`I have every daughter in college` **`and`** `every dog in obedience school`





Notice, once again, that we can make the conjuncts parallel by converting `'dog'` into a genitive noun. We can also convert `'daughter'` as an ordinary common noun, in which case `'have'` is possessive `'have'`, and the sentence says that I *own* everyone's daughter in college and every dog in obedience school.

6. Another, Closely Related, Use of 'have'

By way of concluding this chapter, we observe that there is another use of `'have'` that is very similar to genitive `'have'`, but not exactly like it. The following is an example sentence.

> `I` **`have`** `my dog in the kennel this week`

There are two overall possibilities concerning the semantic role of `'I have'`.

(h1) `'I have'` has "light" content;
(h2) `'I have'` has "heavy" content.

According to one implementation of (h1), the original sentence says something like the following.

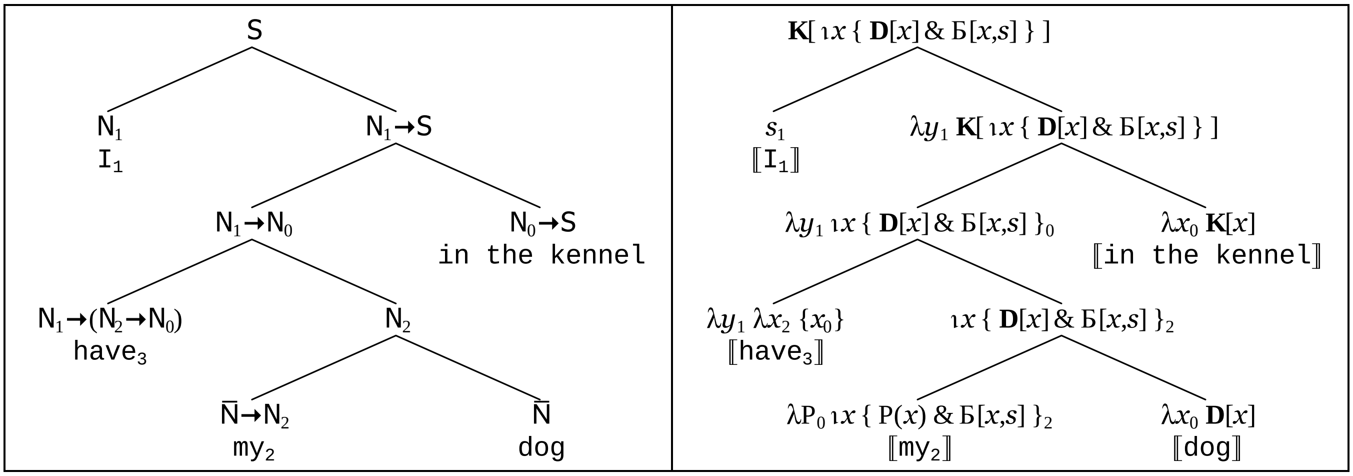
(1) `I` **`am such that`**
`my dog` **`is`** `in the kennel this week`

In this case, `'have'` is a rather peculiar copula,[19] which may be categorially rendered as follows.

type(have₃) = $N_1 \rightarrow (N_2 \rightarrow N_0)$
⟦have₃⟧ = $\lambda y_1\, \lambda x_2\, \{x_0\}$

[19] The copular-use of `'have'` also shows up in certain present-perfect constructions. For example, the sentence
`I have eaten raw fish`
can be understood as attributing a property [more specifically, an experience] to me; specifically I **have** the following property – *ate raw fish*. In this connection, notice that `'I have` **`ate`** `raw fish'` is admitted in some dialects, and indeed perfect forms continue to disappear with each passing generation.

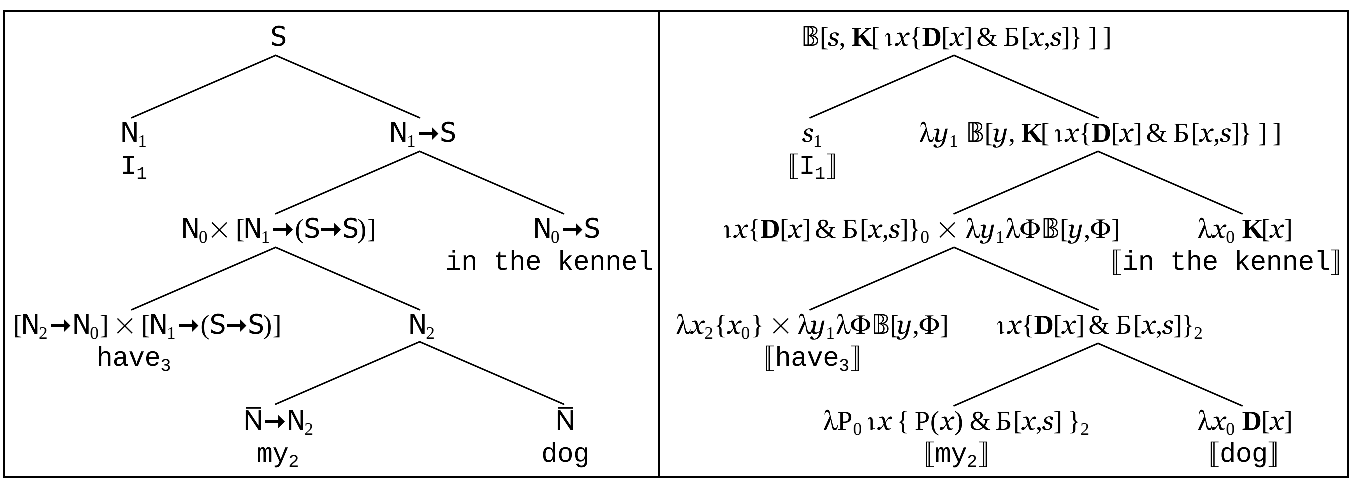
The following is an example, where we place the coda higher up in order to make the computations simpler.



On the other hand, according to one implementation of (h2), the original sentence says something like the following.

(2) `I have` **`brought it about that`**
`my dog` **`is`** `in the kennel this week`

In this case, `'I have'` acts as a complex modal operator. Since we have not officially introduced intentional semantics yet, we cannot say too much at this point. For the moment, we simply offer the following first approximation, where once again we place the coda higher up in order to make the computations simpler.



Here, 'Φ' ranges over propositions – the intentional counterparts of sentences and truth-values – and '$\mathbb{B}$' is defined roughly as follows.

$$\mathbb{B}[\alpha,S] \quad =_{\mathrm{df}} \quad \alpha \text{ has brought it about that } S$$