Quantification in event semantics

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1 Introduction

1.1 Quantifiers + event semantics = a happy marriage?

- Beaver and Condoravdi (2007): NO
  "In Davidsonian Event Semantics the analysis of quantification is problematic: either quantifiers are treated externally to the event system and quantified in (cf. Landman, 2000), or else the definitions of the quantifiers must be greatly (and non-uniformly) complicated (cf. Krifka, 1989)"

- This talk: YES!

1.2 Situating this analysis:

	No Events	Events
Syntactic Quantifier Scope	e.g. May (1985)	e.g. Landman (2000)
Semantic Quantifier Scope	e.g. Hendriks (1993)	*this presentation*

- Traditional Montague semantics: a verb is a relation over its arguments, e.g. $\lambda y \lambda x.\text{kiss}(x, y)$

- Neo-Davidsonian event semantics: a verb is a predicate of events, e.g. $\lambda e.\text{kissing}(e)$; linked to its arguments by thematic roles. Event bound by existential quantifier.

(1) Spot barks.

Montague semantics:	$\text{barks}(\textit{spot})$
Neo-Davidsonian event semantics:	$\exists e[\text{barking}(e) \wedge \text{agent}(e) = \textit{spot}]$

1.3 Advantages of the Neo-Davidsonian approach

Davidson (1967); Castañeda (1967); Parsons (1990); Landman (2000)

- Good for formulating analyses without committing to an argument/adjunct distinction

  (2) Brutus stabbed Caesar on the forum at noon
  $\exists e[\text{agent}(e) = brutus \wedge \text{stabbing}(e) \wedge \text{theme}(e) = caesar \wedge \text{loc}(e) = forum \wedge \text{time}(e) = noon]$

- Explains "diamond entailments":

  (3) a. Brutus stabbed Caesar on the forum at noon.
  b. a ⇒ Brutus stabbed Caesar on the forum.
  c. a ⇒ Brutus stabbed Caesar at noon.
  d. a ∨ b ∨ c ⇒ Brutus stabbed Caesar.

1.4 But...

Previous implementations of the Neo-Davidsonian program require covert movement!

Why? As we will see, they require covert movement for quantifier interpretation: Quantifying-In or Quantifier Raising. This is problematic:

- Some authors view QR per se as complex and cumbersome (e.g. Eckardt, 2009)
- QR entails the presence of a representational level (Logical Form) and as such is not directly compositional (Jacobson, 1999; Barker, 2002).
- Positing quantifier raising is problematic for languages in which surface scope determines semantic scope completely: additional stipulations are then needed to explain why quantifiers conspire to keep their relative order after they are raised.

Problem: Can we keep the advantages of event semantics without committing ourselves to a representational view?

Solution: This account relies on type shifting and will not require any covert movement.

2 Combining event semantics and quantification

- **Generalization:** (adapted from Landman (2000), cf. Parsons (1987), fn. 2): The event quantifier always takes lowest possible scope with respect to other quantifiers

(4) No dog barks.

(5) a. $\neg\exists x[\text{dog}(x) \wedge \exists e[\text{barking}(e) \wedge \text{agent}(e) = x]]$ No >> $\exists e$
"There is no barking event that is done by a dog"
b. *$\exists e[\neg\exists x[\text{dog}(x) \wedge \text{barking}(e) \wedge \text{agent}(e) = x]]$ *$\exists e$ >> No
"There is an event that is not a barking by a dog"

Perhaps (5b) is ruled out because it is trivial. That still leaves us with accounting for the possibility of (5a).

Even with respect to fixed scope operators like negation, the event quantifier always seems to take low scope:

(6) Spot didn't bark.
a. ="There is no event in which Spot barks"
b. $\neq$"There is an event in which Spot did not bark"

Independent motivation for the Scope Domain Principle:

- Unique Role Requirement: if a thematic role is specified for an event, it is uniquely specified. Thematic roles are partial functions from events to individuals.[1]

(7) Every dog barks.

(8) a. $\forall x[\text{dog}(x) \rightarrow \exists e[\text{barking}(e) \wedge \text{agent}(e) = x]]$ Every >> $\exists e$
"For every dog there is a barking event that it did"
b. *$\exists e \forall x[\text{dog}(x) \rightarrow [\text{barking}(e) \wedge \text{agent}(e) = x]]$ *$\exists e$ >> Every
"There is a barking event that was done by every dog"

(8b) violates the Scope Domain Principle. It also violates the Unique Role Requirement as long as there is more than one dog.

2.1 Neo-Davidsonian semantics: the standard analysis

A state-of-the-art Neo-Davidsonian derivation is shown in Fig. 1. (See e.g. Kratzer (1996); Landman (2000); details differ).

- Verbs and their projections (VP, v', vP...) are predicates over events
- Functional heads introduce thematic roles (for Kratzer only the agent role)
- A silent operator ("existential closure") binds the event variable

Problem: To derive the Scope Domain Principle, **the standard analysis requires quantifier raising** and therefore a syntactic level of representation (LF) distinct from surface order. This is shown in Fig. 2: the quantifier is displaced compared with surface order.

[1] Carlson (1984); Dowty (1989); Parsons (1990); Landman (2000)

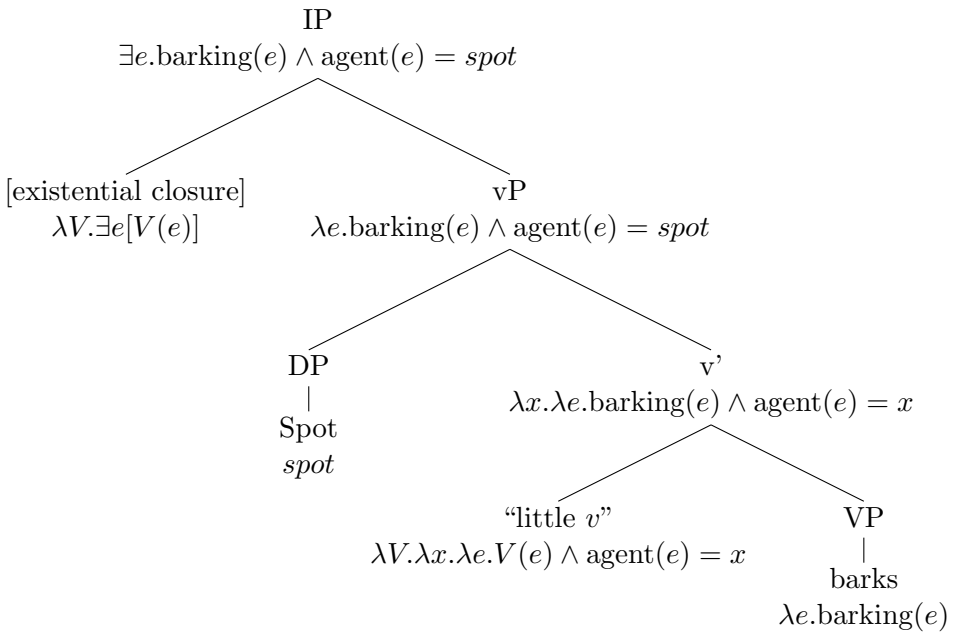

Figure 1: "Spot barks", Neo-Davidsonian style

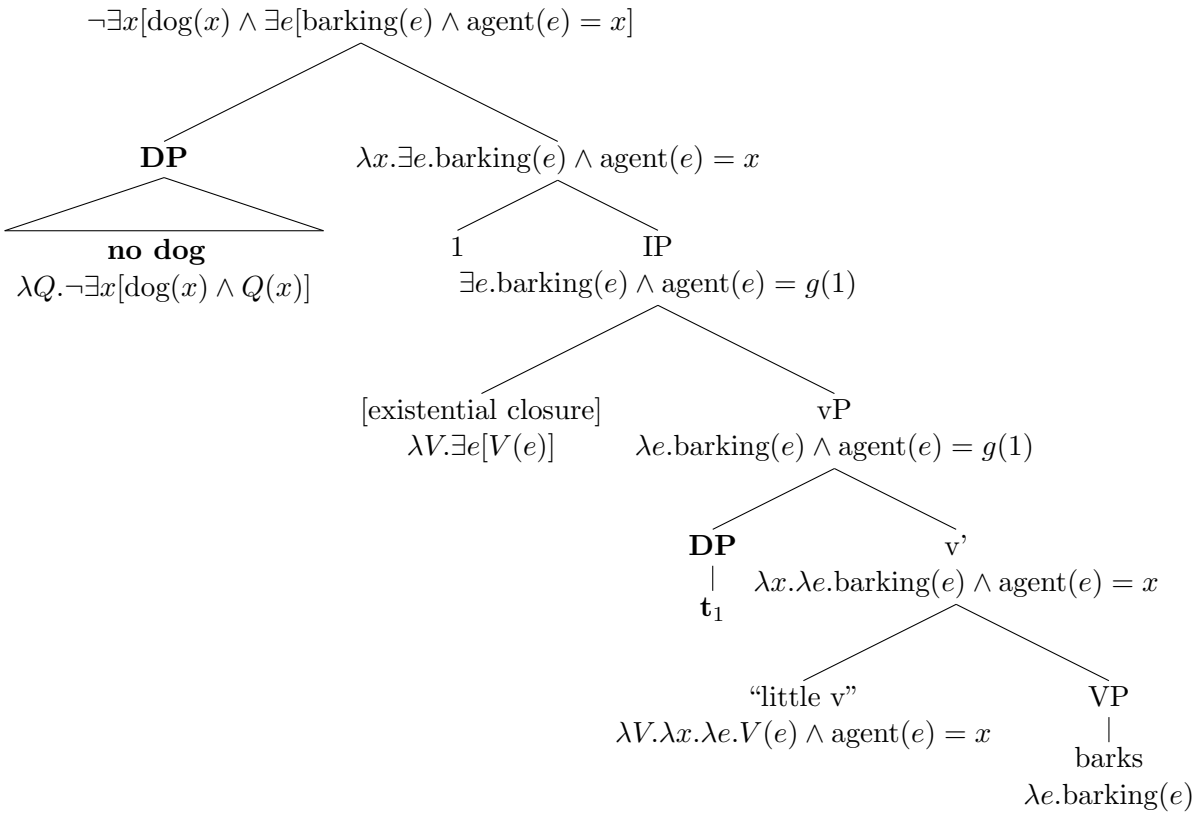

Figure 2: "No dog barks", Neo-Davidsonian style

3 This framework

Shift (in typing/thinking): Think of a verb V as being true of any set that contains a Ving event (instead of denoting the set of all Ving events). Not only verbs but all their projections hold of sets of events. So a VP like "kiss Mary" is true of any set that contains a kissing event whose theme is Mary, and so on up the sentence.

(9) a. Old Neo-Davidsonian approach: $[\![\text{kiss}]\!] = \lambda e.\text{kiss}(e)$
b. This approach: $[\![\text{kiss}]\!] = \lambda f_{\langle vt \rangle}.\exists e.\text{kiss}(e) \wedge f(e)$
(derivable from (9a) by Partee (1987)'s type-shifting principle A. This is similar to continuizing grammars (Barker, 2002) – Chris Potts, p.c.)

- Start with a verb and successively apply its arguments and adjuncts to it, as in event semantics. But the verb is now of type $\langle vt, t \rangle$ (where v is the type of events)
- Compared to syntactic approaches, putting existential closure into the lexical entry of the verb will automatically derive the fact that all other quantifiers always have to take scope above existential closure.
- Every argument/adjunct is a function from $\langle vt, t \rangle$ to $\langle vt, t \rangle$.

  (10) $[\![\text{kiss Mary}]\!] = \lambda f.\exists e.\text{kiss}(e) \wedge f(e) \wedge \text{theme}(e) = mary$

- On the old approach, a verb phrase had to apply to an event, but there was no single event to which a verb phrase like "kiss every girl" could apply. Now, "kiss every girl" applies to any set of events that contains a potentially different kissing event for every girl. Noun phrases can retain their usual analysis as quantifiers over individuals.

  (11) $[\![\text{kiss every girl}]\!] = \lambda P.\forall x.\text{girl}(x) \rightarrow \exists e.\text{kiss}(e) \wedge P(e) \wedge \text{theme}(e) = x$

- We can handle scopal ambiguities in situ by type shifting the thematic roles (Figures 4 and 5)
- Every argument/adjunct filters out those event types that don't conform to its denotation (as in event semantics)
  - This also includes quantifiers: no QR, only in-situ application
- At the end you apply (12) to get a truth value. Different from existential closure: it asserts that the predicate is true of the set of all events. (Intuitively, one might think of the world as the set of all events that exist. The operator asserts that the sentence is true of the world.) Or restrict to events in the topic situation ...

  (12) $[\![\text{closure}]\!] = \lambda e.\text{true}$ Alternative: $[\![\text{closure}]\!] = \lambda e.e \in s_{topic}$

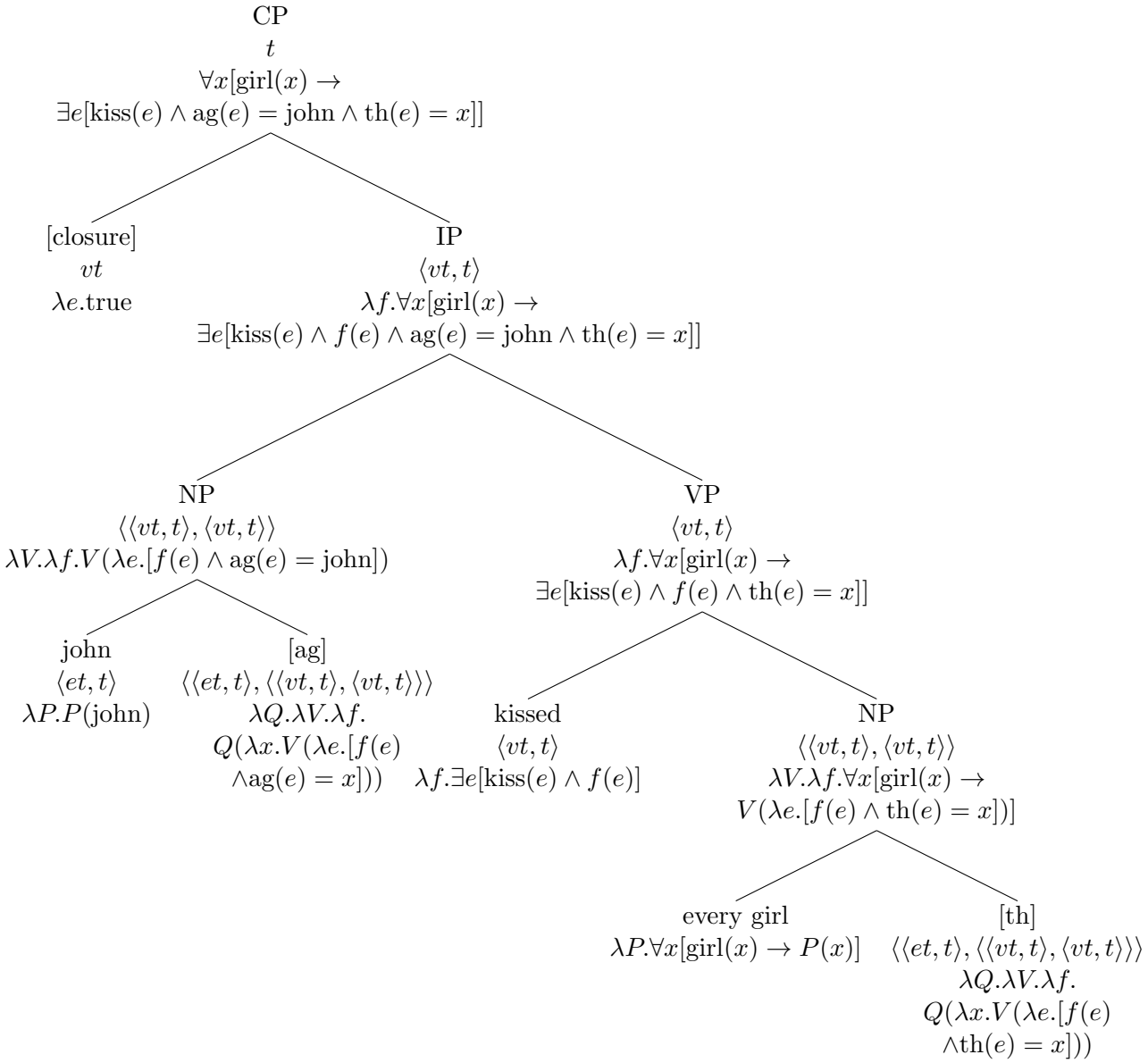

Figure 3: Illustration of this framework, using the sentence "John kissed every girl."

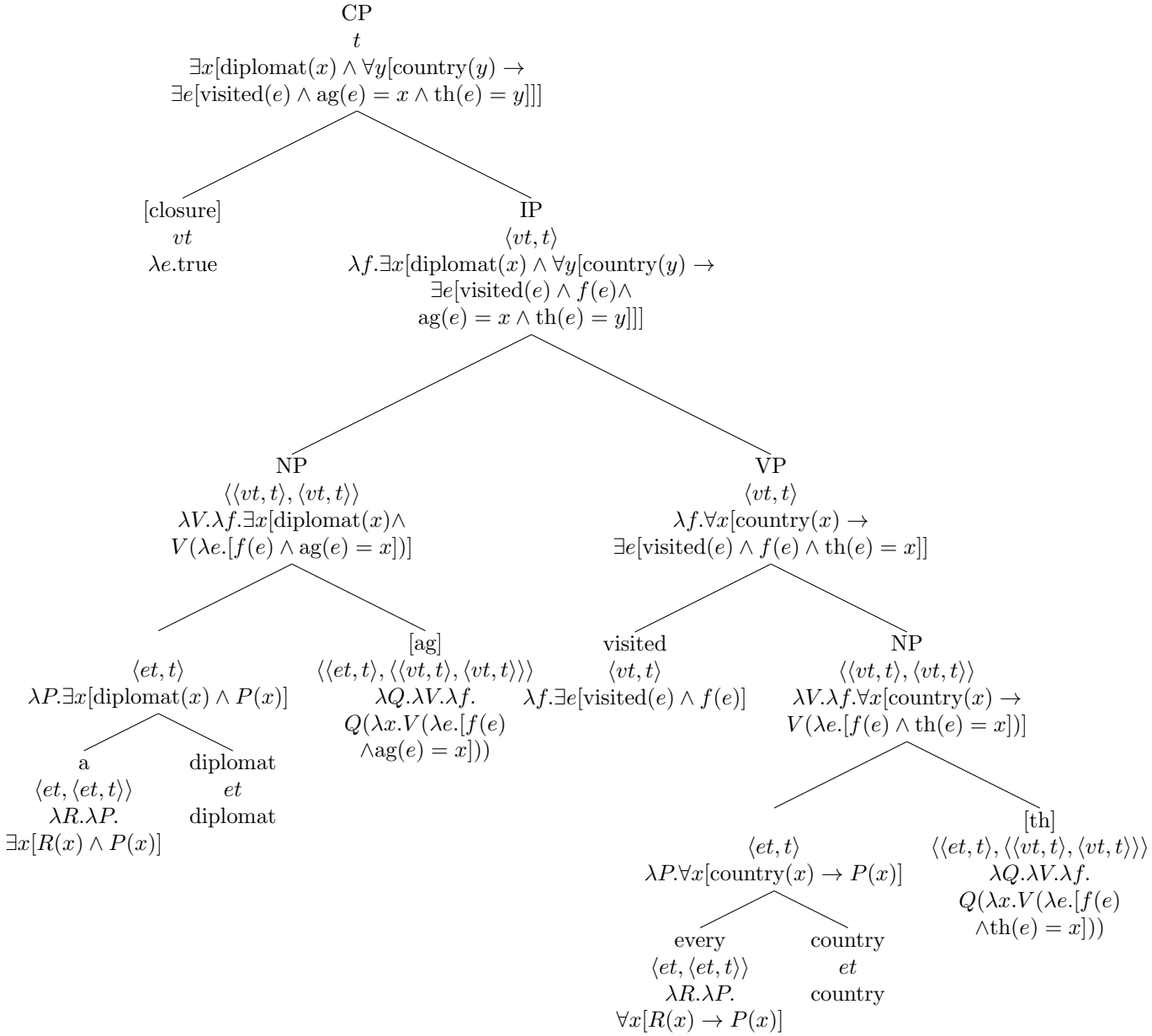

Figure 4: A diplomat visited every country (surface scope)

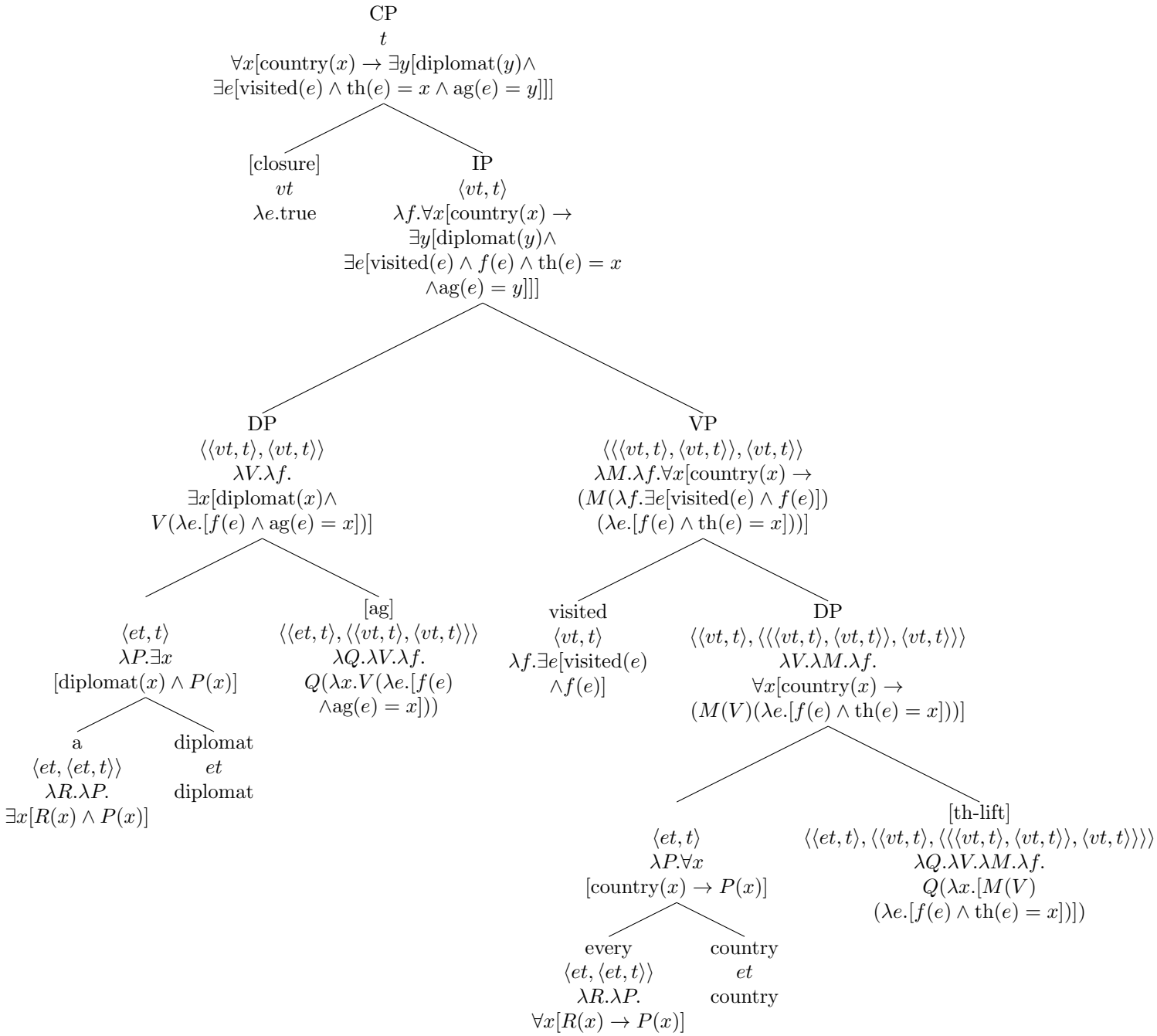

Figure 5: A diplomat visited every country (inverse scope)

4 Conclusion

- Neo-Davidsonian event semantics does not pose a particular problem when it is combined with standard accounts of quantification, be they syntactic or semantic.
- The specific framework proposed here differs from business as usual only in that it places existential closure of the event variable inside the verb, rather than at sentence level.
- This then provides a simple account for the fact that quantifiers always take scope above existential closure, a fact which is difficult to model otherwise since it requires stipulating that quantificational arguments obligatorily take wide scope.
- Such a claim would be problematic especially in case of languages where quantifiers otherwise take scope in situ.
- By making it possible to interpret all quantifiers in situ, the framework proposed here combines the strengths of event semantics and type-shifting accounts of quantifiers and thus does not force the semanticist to posit either a default underlying word order or a syntactic LF-style level. It is therefore well suited for applications to languages where word order is free and quantifier scope is determined by surface order.
- Unlike the accounts in Beaver and Condoravdi (2007) and Eckardt (2009), it is completely standard in its assumptions and its underlying logic and should therefore be highly compatible with accounts of other phenomena formulated in the literature.

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