Nominal Free Choice

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Preamble

https://patrickdelliott.com/pdf/nominal-fc.pdf

Introduction

Roadmap

Big question: how do nouns compose with embedded CPs? Focus on *modal nouns*.

- Background on *content*; the Kratzerian semantics for content nouns and embedded CPs.
- Modal content nouns and modal postulates.
- Background on *free choice*.
- Free choice with modal nouns.
    - Argument from predication that a Kratzerian semantics is insufficient.
- A decompositional analysis.

Contentful entities

- Certain entities are associated with informational content (Kratzer 2006, Pietroski 2000, Uegaki 2016).
- Can be modeled via a partial function in CONT : $D_e \to D_{st}$.

(1) CONT(**the rumor I heard this morning**)

$= \lambda w$. Jack married a philosopher in w

(2) **this chair** $\notin$ **Dom**(CONT)

Contentful entities cont.

- By assumption, a declarative *that*-clauses can be predicated of an entity x iff $x \in$ **Dom**(Cont).

(3) The rumor is [that Jack married a philosopher].

(4) #This chair is [that Jack married a philosopher].

- N.b. this doesn't always track intuitive, conceptual notions of contentfulness:

(5) #This article is [that binding doesn't require c-command].

Embedded declaratives as predicates

- This goes hand-in-hand with Kratzer's influential conjecture that embedded declaratives denote predicates of contentful entities (Kratzer 2006, 2014, 2013a,b, 2022).

(6) $[\![\text{that S}]\!] = \lambda x_\sigma : x \in \textbf{Dom}(\textsc{Cont}) . \textsc{Cont}(x) = [\![\text{S}]\!]$

σ is a basic type

(7) $[\![\text{the rumor is that S}]\!]$

$= [\![\text{that S}]\!] ([\![\text{the rumor}]\!])$

$= 1$ iff $\textsc{Cont}([\![\text{the rumor}]\!]) = [\![\text{S}]\!]$

Clausal embedding

- Straightforward extends to (many) attitude reports via contentful eventualities (Hacquard 2006, Elliott 2017, Bondarenko 2022).

(8) $[\![\text{Tanya believes that S}]\!]$

$\iff \exists e[e \text{ is a believing of Tanya's and } \textsc{Cont}(e) = [\![\text{S}]\!]]$

Inferences and content nouns

- Cont provides a *minimal* interface between entities and informational content.
  - Given that attitude verbs exhibit varying inferential profiles, more needs to be said (see, e.g., Bondarenko & Elliott 2024).
  - Much like attitude verbs, content nouns exhibit varying inferential profiles.

(9) The fact that it's raining upsets me.
⇒ *it's raining*

(10) That the train is running on time is a lie.
⇒ *the train isn't running on time*.

Inferences of content nouns cont.

- Focusing on "fact" for a moment, we can tell that the veridicality inference isn't a presupposition, but rather an ordinary entailment:

(11) That it's raining isn't a fact.

(12) It's not a fact that it's raining.
$\not\Rightarrow$ *it's raining*

- We can capture the veridicality inference descriptively via a meaning postulate:

(13) Veridicality postulate for *facts*:
$[\![\text{fact}]\!]^w(x) = 1 \rightarrow \textsc{Cont}(x)(w) = 1 \qquad \forall x \in D_e, w \in D_s$

- I.e., if x is a fact, we can conclude that x's content is true.

Modal nouns

- The existing literature on content nouns hasn't paid much attention to modal nouns (with the exception of Moltmann 2018).
  - Modal nouns express modal concepts.
  - Frequently transparent nominalizations of modal verbs.

(14) Modal nouns: *possibility, chance, certainty, necessity, ability, capacity, permission, …*

Modal nouns and embedding

- Modal nouns differ in the type of clause they may embed. Several may embed declarative *that*-clauses.

(15) The possibility [that Sam is still asleep].

(16) There's a chance [that Sam is awake].

(17) [That it's raining] is a certainty.

(18) [That Sam be there] is a necessity.

Modal nouns and embedding ii

- Other modal nouns embed infinitival clauses, and often allow for the possibility of an external argument:

(19) The ability [to sing] is greatly prized.

(20) Gabe is proud of his capacity [to play the drums].

(21) Do I have permission [to leave]?

Modal nouns and embedding iii

- The selectional properties of those modal nouns which are transparent nominalizations track those of the corresponding modal predicates.

(22) It's possible [that Sam is still asleep].
cf. The possibility that Sam is still asleep.

(23) I'm certain [that Sam is awake].
cf. The certainty that Sam is awake.

(24) It's necessary [that Sam be there].
cf. The necessity that Sam be there.

(25) John is able [to sing].
cf. The ability to sing.

(26) I permit you [to leave].
cf. The permission to leave.

Modal inferences

- Like other content nouns, modal nouns have distinct inferential profiles, associated with their particular modal flavor.

(27) The possibility [that Sam is awake] bothers me.
⇒ *it's possible that Sam is awake*

(28) Gabe's ability [to play the drums] is impressive.
⇒ *Gabe is able to play the drums*

Modal postulates

- Like with "fact", we can capture certain modal inferences via meaning postulates.
  - Focusing on the case of "possibility", assuming a Kratzerian semantics for epistemic possibility (Kratzer 2012):

(29) Modal postulate for *possibility*:

Given a contextually salient accessibility relation R:

$$[\![\text{possibility}]\!]^w(x) = 1 \rightarrow \exists w', wRw'[\textsc{Cont}(x)(w') = 1]$$

$$\forall x \in D_e, w \in D_s$$

- Since "the possibility that S […]" entails that there's an x that is (i) a possibility, and (ii) has content $[\![\text{S}]\!]$, it also entails that S is true in an epistemically accessible world via (29).

Modal postulates ii

- Let's see how this works:

(30) The possibility that it's raining bothers me.

a. Presupposes: $\exists x[x$ is a possibility in $w \wedge \textsc{Cont}(x) = [\lambda w' .$ it's raining in $w']]$

b. $\Rightarrow \exists w', wRw'$[it's raining in w'] by modal postulate

Modal postulates iii

- Assumption: a specificational copular construction with a covert noun *claim*.

(31) That it's raining isn't a possibility.
~~The claim~~ [that it's raining] isn't a possibility.

(32) $\neg$ [[possibility]]
(ιx[x is a claim in $w \wedge$ Cont(x) = $\lambda w'$. it's raining in w'])

- Since the claim isn't a *possibility*, nothing can be inferred about its modal status.

Nominal Free Choice

Background: Free Choice Disjunction

- Disjunction gives rise to unexpected inferences in the scope of operators with existential force.
  - Original observation for deontic modals (Kamp 1973).
  - Extends to epistemic modals (Zimmermann 2000) and other existential operators (Fox 2007).

(33) You're allowed to have tea or coffee.
⇒ *You're allowed to have tea, and you're allowed to have coffee*

(34) It's possible [that Cunningham or Stanwin is the murderer].
⇒ *It's possible that Cunningham is the murderer,*
and it's possible that Stanwin is the murderer.

(35) Free Choice (FC): $\Diamond(\phi \vee \psi) \vDash \Diamond\phi \wedge \Diamond\psi$

- Importantly, FC doesn't follow from a classical semantics for disjunction interacting with a standard semantics for existential modals:
  - Roughly: $\Diamond\phi$ is true at w iff there's a world accessible from w at which ϕ is true.
  - Given classical disjunction, the existence of an accessible $\phi \vee \psi$-world neither guarantees the existence of an accessible ϕ-world, nor an accessible ψ-world.
  - This semantics is too weak to validate FC.

Approaches to Free Choice

- Free Choice has been a significant inflection point in research on disjunction, and semantics-pragmatics more generally.
- Recent, prominent approaches include:
  - Deriving FC as a kind of implicature (Fox 2007, Bar-Lev 2018, Bar-Lev & Fox 2020, del Pinal, Bassi & Sauerland 2022).
  - Deriving FC via non-classical disjunction (Zimmermann 2000, Aloni 2022, Goldstein 2019).
  - We'll ultimately focus on the implicature approach for expository reasons, but we believe that our main point is independent of this.

Free choice with modal nouns

- Our main empirical claim: FC inferences can be observed with modal nouns.
  - Concretely, when the modal noun combines with a disjunctive sentence.
  - This may seem unsurprising giving the modal inferences associated with modal nouns, but it will turn out to be difficult to make sense of.

Free choice with modal nouns ii

- Free choice inferences are particularly salient with nouns expressing epistemic possibility and deontic permission:

(36) There's a possibility it will be raining or snowing.
⇒ *It's possible that it will be raining,*
and it's possible that it will be snowing.

(37) You have permission to leave or stay (whichever suits you).
⇒ *you're permitted to leave,*
and you're permitted to stay.

- We'll now sketch how to derive FC inferences according to the implicature approach, and attempt to extend this to modal nouns.

Computing Free Choice

- The Implicature approach to FC rests on the assumption that disjunctive sentences give rise to *alternatives* via (i) replacing disjunction $\vee$ with conjunction $\wedge$ (ii) deleting disjunction, leaving just the individual disjuncts (Fox & Katzir 2011).

(38) $Alt(\phi \vee \psi) = \{ \overbrace{\phi \wedge \psi}^{\text{scalar alt.}} , \overbrace{\phi, \psi}^{\text{domain alts.}} \}$

(39) $Alt(\Diamond(\phi \vee \psi)) = \{ \underbrace{\Diamond(\phi \wedge \psi)}_{\text{scalar alt.}}, \underbrace{\Diamond\phi, \Diamond\psi}_{\text{domain alts.}} \}$

- Key insight behind the implicature approach: negating the scalar alternative in (38) is incompatible with asserting the domain alternatives, whereas this isn't the case in (39).

Strengthening via exhaustification

- Sentences are *strengthened* relative to their alternatives via a procedure of exhaustification, formalized as a covert operator $\mathcal{E}xh$.
    - This is responsible for *excluding* scalar alternatives, and *including* domain alternatives (Bar-Lev & Fox 2020) .
    - The algorithm encoded in $\mathcal{E}xh$ relies of two auxiliary notions:
        - Innocently-Excludable Alternatives (IE-Alts).
        - Innocently-Includable Alternatives (II-Alts).
- The precise formulation follows:

IE-Alts and II-Alts

- $\psi \in Alt_{IE}(\phi)$ iff ψ is in every Q, where Q is a maximal set of alternatives s.t., $\phi \wedge \bigwedge \{ \neg\rho \mid \rho \in Alt_{IE}(\phi) \}$ is consistent.
- $\psi \in Alt_{II}(\phi)$ iff ψ is in every Q, where Q is a maximal set of alternatives s.t., $\phi \wedge \bigwedge \{ \neg\rho \mid \rho \in Alt_{IE}(\phi) \} \wedge \bigwedge Q$ is consistent.

Results

- Simple disjunctions:
  - $Alt_{IE}(\phi \vee \psi) = \{ \phi \wedge \psi \}$
  - $Alt_{II}(\phi \vee \psi) = \varnothing$
    - (since $(\phi \vee \psi) \wedge \neg(\phi \wedge \psi) \wedge \phi \wedge \psi$ is inconsistent)
  - $Alt_{IE}(\Diamond(\phi \vee \psi)) = \{ \Diamond(\phi \wedge \psi) \}$
  - $Alt_{II}(\Diamond(\phi \vee \psi)) = \{ \Diamond\phi, \Diamond\psi \}$
    - (since $\Diamond(\phi \vee \psi) \wedge \neg\Diamond(\phi \wedge \psi) \wedge \Diamond\phi \wedge \Diamond\psi$ is consistent)

Deriving FC via exhaustification

- The exhaustification operator $\mathcal{E}xh$ negates everything in Alt_{IE} and asserts everything in Alt_{II}.

(40) $\mathcal{E}xh(\phi) := \Phi \wedge \bigwedge \{ \neg\psi \mid \psi \in Alt_{IE}(\phi) \} \wedge \bigwedge Alt_{II}(\phi)$

- Scalar implicature:
  - $\mathcal{E}xh(\phi \vee \psi) \vDash (\phi \vee \psi) \wedge \neg(\phi \wedge \psi)$
- Scalar implicature + FC:
  - $\mathcal{E}xh(\Diamond(\phi \vee \psi)) \vDash \Diamond(\phi \vee \psi) \wedge \neg\Diamond(\phi \wedge \psi) \wedge \Diamond\phi \wedge \Diamond\psi$

Applying $\mathcal{E}xh$ to Nominal FC

- Since FC is computed by reasoning about *alternatives*, we can't rely on drawing further inferences via the modal postulate, we must go via alternatives:

(41) There's a possibility that it will be raining or snowing.
$= \exists x[\text{possibility}(x) \wedge \textsc{Cont}(x) = r \vee s] \quad (\Rightarrow \Diamond(r \vee s))$

- $Alt([41])$:
  - *There's a possibility that it will be raining and snowing* $\quad (\Rightarrow \Diamond(r \wedge s))$
  - *There's a possibility that it will be raining* $\quad (\Rightarrow \Diamond r)$
  - *There's a possibility that it will be snowing* $\quad \Rightarrow (\Diamond s)$
- Guided by the modal postulate, it's easy to see that the derivation of the FC inference will be completely parallel to the classical case.

Argument from predication

- The derivation we sketched is "global", in the sense that it involves reasoning about alternatives over the entire sentence.
  - We now present new data involving predication, demonstrating that a global theory of nominal FC is insufficient.
  - The argument will be of the general form:

(42) the NP that $(\phi \vee \psi)$ […]
$\nRightarrow$ the NP that ϕ […] and the NP that ψ […]

- A global approach to nominal FC however based on *alternatives* predicts that nominal FC should be accompanied by this inference.

Argument from predication: *ability*

(43) Matt's ability [to sing or dance] made him a success in musical theater.

a. ⇒ *Matt is able to sing*

b. ⇒ *Matt is able to dance*

c. ⇏ *Matt's ability to sing made him a success in musical theater*

d. ⇏ *Matt's ability to dance made him a success in musical theater*

Argument from predication: *permission*

(44) Context: *Drinking either only beer or only wine does not result in nausea; drinking both beer and wine results in nausea.*
Having permission [to drink beer or wine]
means I'll be sick later.

a. ⇒ *It's permitted to drink beer*

b. ⇒ *It's permitted to drink wine*

c. ⇏ *Having permission to drink beer means i'll be sick later.*

d. ⇏ *Having permission to drink wine means i'll be sick later.*

Argument from predication: *possibility*

(45) The possibility [that Cunningham or Stanwin is murderer] explains why they were both arrested.

a. ⇒ *It's possible that Cunningham is the murderer.*

b. ⇒ *It's possible that Stanwin is the murderer.*

c. ⇏ *#The possibility that Cunningham is the murderer explains why they were both arrested*

d. ⇏ *#The possibility that Stanwin is the murderer explains why they were both arrested*

Argument from predication: payoff

- Nominal FC can't be derived from an LF like the following:
  - In certain cases, the resulting inferences are contextual contradictions, but the FC inference is still present.

(46) $\mathcal{E}xh$ [the possibility [that $\phi \vee \psi$] explains […]]

- Rather, the derivation should involve an *embedded* occurrence of $\mathcal{E}xh$.
  - Since the embedded proposition isn't modalized however, it's not clear how to derive the FC inference in a way consistent with the predication data.
  - We turn to this problem in the next section.

Analysis

Content nouns denote propositions

- Following, e.g., Ginzburg (1995), we will assume that some content nouns directly denote propositions.
  - Concretely, we will propose a compositional regime for modal nouns which predicts that "the possibility that ϕ" denotes a modalized proposition.
  - Embedded $\mathcal{E}xh$ accounts for the otherwise problematic predication data.
- Note: we focus here exclusively on the modal noun *possibility* for exposition.

Decompositional modal nouns

- A drawback of adopting a Kratzerian perspective on modal nouns is that it renders the relationship between (i) a modal predicate like *possible*, and (ii) it's nominalized counterpart *possibility* opaque.
- We take the morphology seriously, and assume that *possibility* is made up of *possible*, and a nominalizing suffix spelled out as *-ity*.
- For the modal predicate, we simply assume a classical, Kratzerian semantics.
    - For simplicity, we assume that $\{ w' \mid wRw' \} = C$, for any w.

(47) $[\![\text{possible}]\!]^{w,C} := \lambda p_{\langle s,t \rangle} . \exists w' \in C, p(w') = 1$

Nominalization

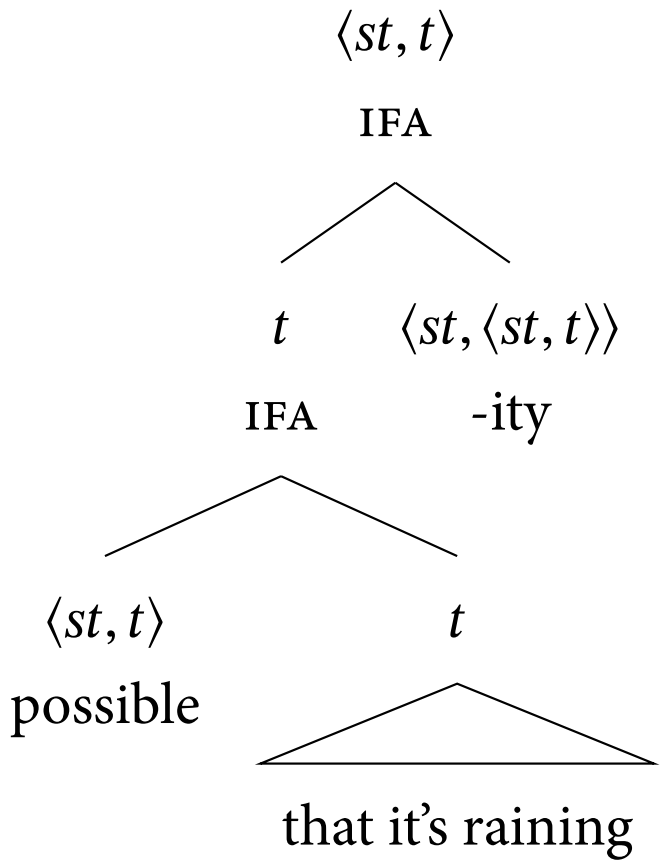
- The denotation we assume for the nominalizing suffix *-ity* is identical to Karttunen's (1977) question-formation operator:

(48) $[\![\text{-ity}]\!]^w := \lambda p_{st} . \lambda q_{st} . q(w) = 1 \wedge q = p$

- N.b. this means that *possible* and *-ity* can't compose directly.
  - *possible* is of type $\langle st, t \rangle$.
  - *-ity* is of type $\langle st, \langle st, t \rangle \rangle$
- Instead, we assume that *possible* first composes with an embedded CP, which subsequently extraposes (see, e.g., the literature on comparative *than*-clauses for a precedent; (Bhatt & Pancheva 2004) a.o.).

Composition

- Composition proceeds via Intensional Functional Application (IFA) (Heim & von Fintel 2011).



Composition ii

$$\lambda q_{st} \,.\, q(w) = 1 \wedge q = [\lambda w' \,.\, \exists w'' \in C, \text{it's raining in } w'']$$

IFA

$$[\![.]\!]^{w'} = 1 \iff \exists w'' \in C, \text{it's raining in } w' \qquad \lambda p_{st} \,.\, \lambda q_{st} \,.\, q(w) = 1 \wedge q = p$$

IFA -ity

$$\lambda p_{st} \,.\, \exists w'' \in C, p(w'') = 1 \qquad [\![.]\!]^{w'} = 1 \iff \text{it's raining in } w$$

possible

that it's raining

$$[\![\text{possibility that it's raining}]\!]^{w}$$
$$= \lambda q_{st} \,.\, q(w) = 1 \wedge q = [\lambda w', . \exists w'' \in C, \text{it's raining in } w'']$$

- The result is that "possibility that p" ends up denoting the property of being a true proposition of the form "it's possible that p".

Composition iii

- For the definite article, we assume a polymorphic, but otherwise standard Fregean entry:

(49) $[\![\text{the}]\!] = \lambda f_{\sigma t} : \exists! x[f(x) = 1] \,.\, \iota x[f(x) = 1] \qquad \sigma \in Typ$

$$[\![\text{the possibility that it's raining}]\!]^w$$

$$= \begin{cases} \lambda w' \,.\, \exists w'' \in C, \text{it's raining in } w'' & \exists w'' \in C, \text{it's raining in } w'' \\ \text{undefined} & \text{else} \end{cases}$$

- This account of *possibility* accounts for modal inferences without modal postulates, by giving a decompositional account of modal nouns.
    - Using "the possibility that *p*" projects a presupposition that the unique proposition of the form *it's possible that p* is true, thus accounting for the modal inference.
- Also accounts for the fact that the selectional properties of modal nouns track the selectional properties of their counterparts.

(50) The possibility (that *p*/*to *p*)

(51) The ability (*that *p*/to *p*)

Optionality

- A putative virtue of the Kratzerian semantics for content nouns is that it accounts for the fact that nouns do not seem to *select* for embedded CPs (Stowell 1981).
- According to our account however, *possibility* does in a sense select for an embedded CP.
- Nevertheless we account for optionality by virtue of the independent fact that modal predicates in English license Null Complement Anaphora (NCA) (Hankamer & Sag 1976).

(52) a. It's possible Δ.

b. The [possibility Δ] upsets me.

(53) a. John is able Δ.

b. John's [ability Δ] impressed me.

Optionality ii

- Moreover, it seems necessary even on a Kratzerian view to posit NCA
    - Otherwise, certain sentences with modal nouns give rise to unwarranted presuppositions.

(54) The possibility upsets me.
doesn't presuppose: *There's a unique possibility.*
presupposes: *There's a unique possibility that p, where p is a contextually salient proposition*

Optionality iii

- Modal nouns in fact sound odd in the predicational copular constructions motivating the Kratzerian treatment of content nouns and predicative CPs as modifiers.

(55) ??The possibility is that it's raining.

(56) ??John's ability is to run quickly.

(57) ??The permission is to drink alcohol.

Back to nominal FC

- Recall our argument from predication against a global derivation of FC with modal nouns:

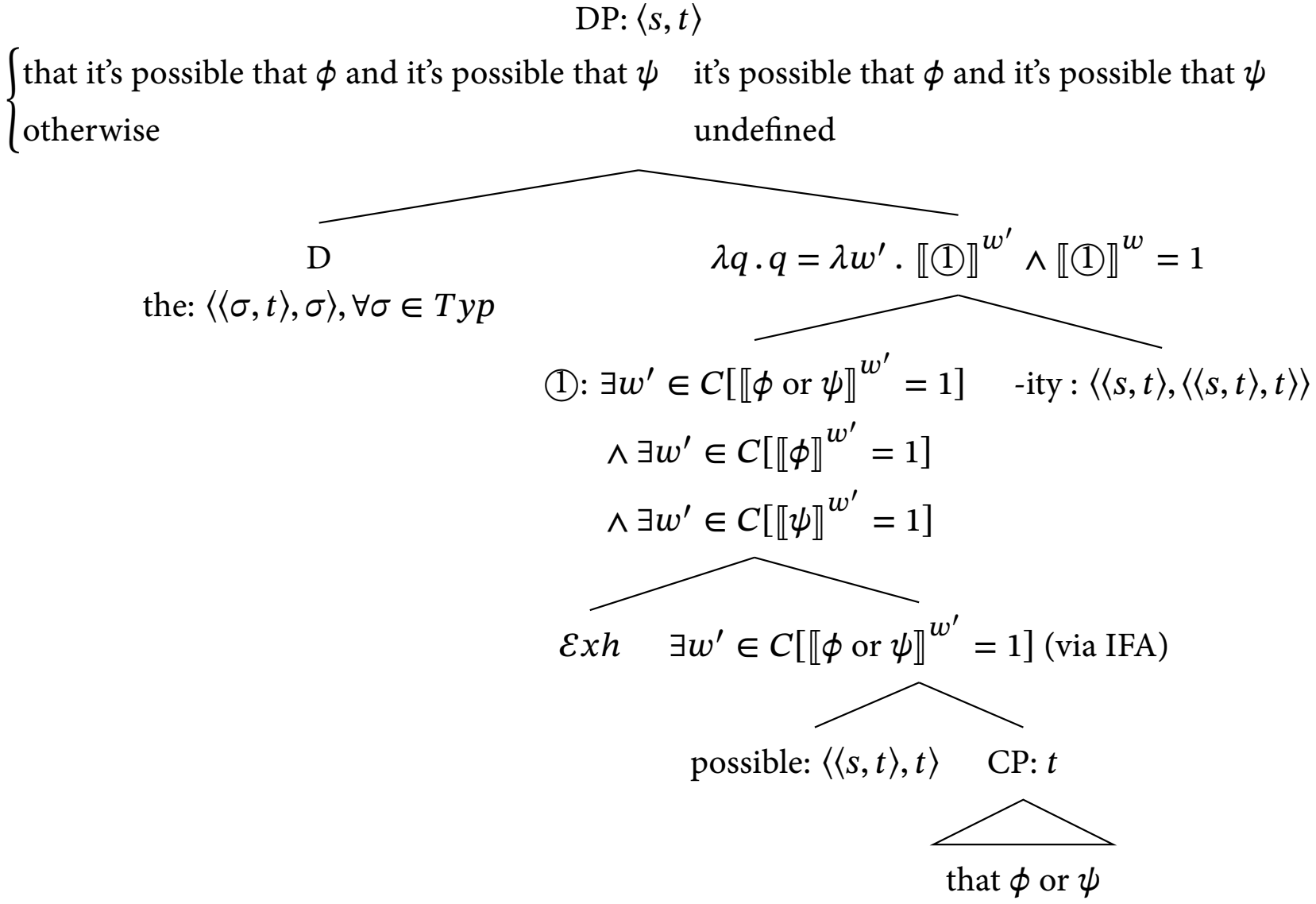
(58) The possibility [that Cunningham or Stanwin is murderer] explains why they were both arrested.

a. ⇒ *It's possible that Cunningham is the murderer.*

b. ⇒ *It's possible that Stanwin is the murderer.*

- According to our account, *-ity* composes directly with a modalized proposition.
  - It's now easy to account for the attested inferences of (58) by positing an embedded occurrence of $\mathcal{E}xh$.

Accounting for nominal FC



Accounting for nominal FC ii

- Assuming that an *explanation* (realized as the external arugment of stative *explain*) is a true proposition, we account for our predication data.

(59) The possibility [that Cunningham or Stanwin is the murderer] explains why they were both arrested.

- According to our analysis, this sentence:
  - Presupposes that it's possible that Cunningham is the murderer, and it's possible that Stanwin is the murderer.
  - Asserts that the true proposition "it's possible that Cunningham is the murderer, and it's possible that Stanwin is murderer" *explains* why Cunningham and Stanwin were both arrested.

Wrapping up

Conclusion

- Kratzer's semantics provides an elegant account of how certain nouns may compose with embedded declaratives.
  - However, treating nouns that compose with embedded declaratives as predicates of contentful individuals can mask decompositionality.
  - We've argued that modal nouns constitute a case where a more classical, decompositional account is essential for accounting for the interaction between modality and the form of the embedded declarative.
- Our empirical focus was on the interaction between modality and disjunction - specifically, nominal FC.

Conclusion ii

- Substitution failures (Prior 1971, Moltmann 2013, Liefke 2019):
  - *possibilities* aren't propositions.
  - *abilities* aren't propositions.
  - *permissions* aren't propositions.

(60) a. The possibility that it will rain is fading away.

b. *That it's possible it will rain is fading away.

(61) a. John's ability to run has improved.

b. *That John is able to run has improved.

(62) a. Permission to land has been granted.

b. That you'er permitted to land has been granted.

Fin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