Rethinking the semantics of embedding[1]

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1 Overview

- *that*-clauses vs. DPs embedded under attitude verbs give rise to meaning alternations.
- Exisiting accounts propose (or presuppose) a syntactic account. This is empirically insufficient, due to evidence from Propositional DPs.
- Taking inspiration from Kratzer (2006), Hacquard (2006) and Moulton (2009, 2015), I propose a semantic analysis, in which (crucially) *the internal argument is severed from the verb*.
- The analysis involves refactoring the way we think about embedded clauses, with consequences for the grammar more generally.

2 Meaning alternations with embedding verbs

2.1 Pietroski (2000) on 'explain'

(1) a. Abed explained [$_{CP}$ that Shirely is upset]. *explanans*
b. Abed explained [$_{DP}$ the fact that Shirley is upset]. *explanandum*

explanans paraphrase: Abed said, by way of explanation, that Shirley is upset.
explanandum paraphrase: Abed gave an explanation for Shirley being upset, e.g., that she was rejected by Jeff.

- Pietroski's analysis – a syntactically nominal complement to explain is assigned a distinct θ-role (THEME) to a syntactically clausal complement (CONTENT).[3]

$$[\![(1a)]\!] = \exists e[\textsc{agent}(e) = \text{Abed} \wedge \textsc{content}(e) = \text{that Shirley is upset} \wedge \text{explaining}(e)]$$

$$[\![(1b)]\!] = \exists e[\textsc{agent}(e) = \text{Abed} \wedge \textsc{theme}(e) = \text{the fact that Shirley is upset} \wedge \text{explaining}(e)]$$

[3] Pietroski cashes out his analysis in terms of neo-Davidsonian event semantics (see, e.g., Parsons 1990, Lasersohn 1995).
I depart slightly from Pietroski here in treating thematic roles as *functions* from eventualities to their unique participants (Pietroski treats them as relations), so as to remain consistent with the framework introduced in subsequent sections.

- Issues with Pietroski's analysis:
  - The source of the meaning alternation is the *syntactic category* of the complement.[4]
  - The meaning alternation results from idiosyncratic properties of $\sqrt{explain}$.[5]

[4] I take issue with this in §2.3.

[5] I take issue with *this* in the next section – §2.2.

2.2 *Beyond "explain"*

(2) Abed { heard / knows / predicted / discovered } { that Shirley is upset / the { rumour / story / fact / proposition / idea } that Shirley is upset }
{ believes }
{ ??? }

- Consider verbs which tolerate both CP and DP complements:[6]
  - *explain*-type: the meaning of a CP complement is fully predictable – it expresses the content of the eventuality expressed by the verb. DP complements give rise to idiosyncratic interpretations.
  - *believe*-type: both DP and CP complements are predictable – they express the content of the eventuality.
  - *missing*: DP complements are predictable – they express the content of the eventuality. CP complements give rise to idiosyncratic interpretations.
- Generalization: The meaning of a CP complement is *always* predictable, whereas the meaning of DP complement is mostly idiosyncratic. If CPs and DPs share an equal status as genuine thematic arguments, this is totally mysterious.
- Goal: an analysis where the gap in the paradigm falls out as a result of how semantic composition *has to* proceeds.

[6] See Uegaki (2015a,b) for an account of which verbs pattern in which ways. Uegaki's generalization is that all *explain*-type predicates are responsive (in the sense of Lahiri 2002), and all *believe*-type predicates are obligatorily declarative-embedding, and his analysis is tailored to derive this. I refrain from discussing Uegaki's analysis in depth, since the empirical status of the generalization remains unclear to me. There are some exceptions, e.g. *expect* (Uegaki p.c.).

2.3 *Syntactic category*

- Pietroski 2000 and subsequent work (King 2002, Pryor 2007, Kastner 2015) locates the source of the meaning alternation in the syntactic category of the complement.[7]

(4) Propositional DPs (PropDPs)[8]

a. DPs headed by the nouns *thing* or *stuff* (possibly more)

b. The simplex *wh*-expression *what*

c. Some propositional anaphora, e.g.i *that* and *it* (but not *so*)

d. Null operators in comparatives (Kennedy & Merchant 2000)

(5) Abed believes { [$_{CP}$ that Shirley is upset] — *that*-clause / [$_{DP}$ the rumour that Shirley is upset] — contDP / [$_{DP}$ everything that Troy believes] — propDP }

[7] Moulton (2015) doesn't directly address these facts, but I believe that he is forced into a similar position. This is because Moulton adopts a Kratzerian denotation for attitude verbs as below:

(3) $[\![\text{believe}_M]\!] = \lambda w_s.\lambda s_v.\lambda x_e.\text{belief}_w(s, x)$

On Moulton's account, embedded clauses *move*, leaving behind an e-type trace.

[8] What I call propDPs here are discussed in *much* greater depth by, e.g., Moltmann (2013) under the rubric of *special quantifiers*. See also Asher 1993.

(6) Abed thinks
- [$_{CP}$ that Shirley is upset] — *that*-clause
- *[$_{DP}$ the rumour that Shirley is upset] — contDP
- [$_{DP}$ everything that Troy thinks] — propDP

(7) Abed complained
- [$_{CP}$ that Shirley is upset] — *that-clause*
- *[$_{DP}$ the rumour that Shirley is upset] — contDP
- *[$_{DP}$ everything that Troy complained] — propDP

- More examples of propDPs with verbs which don't tolerate other DPs:

(8) a. Abed is a very thoughtful guy;
he's thinking [$_{DP}$ some stuff] right now.

b. Annie hopes Troy will leave soon; and honestly,
I hope [$_{DP}$ the same thing].

c. Abed: Annie says that she's not coming.
Troy: [$_{DP}$ What] did she say?

- Partially on the basis of distributional facts such as these, King (2002) argues that propDPs are syntactically clausal. I briefly give two arguments against this position (see also Pryor 2007).
- *Evidence from Case*

(9) a. It is widely believed [$_{CP}$ that Shirley is upset].

b. *It is widely believed [$_{DP}$ the rumour that Shirley is upset].

c. *It is widely believed [$_{DP}$ everything that Troy believes].

(10) a. It seems [$_{CP}$ that Shirley is upset].

b. *It seems [$_{DP}$ the rumour that Shirley is upset].

c. *It seems [$_{DP}$ everything that Troy believes].

- *Evidence from prepositional complements*

(11) a. *Annie heard about [$_{CP}$ that Jeff is getting married].

b. Annie heard about [$_{DP}$ the rumour that Jeff is getting married].

c. Annie heard about [$_{DP}$ something] – namely, that Jeff is getting married.

- *PropDPs and 'explain'*

(12) Abed explained [$_{DP}$ something] – namely, that Shirley is upset. ✓*explanans*

(13) Abed explained [$_{DP}$ something] – namely, the fact that Shirley is upset. ✓*explanandum*

- The availability of the *explanans* reading in (12) is crucial – it means that it is not feasible to blame the meaning alternations associated with DPs vs. CPs as a reflex of syntactic category. Were this true, we would explain a propDP such as *something* to be compatible only with the *explanandum* reading.

3 *Analysis*

3.1 *Property theory of that-clauses*

- See Kratzer 2006, 2013, 2014, Moulton 2009, 2015, Uegaki 2015a, Bogal-Allbritten 2016, Bogal-Allbritten & Moulton 2016 a.o.

(14) $[\![\text{that Shirley is upset}]\!] = \begin{cases} \lambda w'.S \text{ is upset in } w' & \text{standard } \textit{that}\text{-clause denotation} \\ \lambda x.\mathscr{F}_{\mathtt{cont}}(w)(x) = \lambda w'.S \text{ is upset in } w' & \text{Revised } \textit{that}\text{-clause denotation} \end{cases}$

- $\mathscr{F}_{\mathtt{cont}}$ is a partial function in the meta-language that takes two arguments: a world $w \in D_s$ and an entity $x \in D_e$ and maps them to x's *content* in w: a proposition $p \in D_{\langle s,t\rangle}$.
- Accounts for composition of *that*-clauses and content nouns.[9]

(15)
$e : \iota x[\text{rumour}_w(x) \wedge \mathscr{F}_{\mathtt{cont}}(w)(x) = \lambda w'.S \text{ is upset in } w']$

$\langle et, e\rangle : \lambda P.\iota x[P(x)]$ the

$\langle e, t\rangle : \lambda x.\text{rumour}_w(x) \wedge \mathscr{F}_{\mathtt{cont}}(w)(x) = \lambda w'.s \text{ is upset in } w'$ ⇐ Predicate Modification (PM) (Heim & Kratzer 1998)

$\langle e, t\rangle : \lambda x.\text{rumour}_w(x)$ rumour$_w$

$\langle e, t\rangle : \lambda x.\mathscr{F}_{\mathtt{cont}}(w)(x) = \lambda w'.S \text{ is upset in } w'$

that Shirley is upset

[9] I assume the approach to intensionality discussed in Heim & von Fintel 2011: 8.2; predicates take world arguments, realized as pronominal elements in the object language. In the LFs here, world arguments are indicated via subscripts. The basic type of *rumour* is therefore $\langle s, et\rangle$.

- Unlike previous accounts[10], I treat the relation between the content of an entity and the proposition expressed by a the *that*-clause as *equality*, rather than *entailment*.
- Evidence for this particular implementation comes from a definiteness effect with certain content nouns.[11]

[10] Consider e.g., Kratzer's (2006) denotation for the 'logophoric' complementizer:

(16) $[\![\text{that}_L]\!] = \lambda p.\lambda x.\forall w'[\text{compatible}(x)(w') \rightarrow p(w')]$

[11] Thanks to Ed Keenan for bringing these facts to my attention.

(17) Mary considered
- #a fact that John left early.
- the fact that John left early.
- #every fact that John left early.

(18) Mary considered
- a rumour that John left early.
- the rumour that John left early.
- every rumour that John left early.

- When the noun *fact* composes with a *that*-clause, it is only acceptable in the context of a definite article.
- I claim here that this derived from the semantics proposed here, together with the observation that articles such as *a* trigger an (implicated) anti-uniqueness presupposition (Heim 1991).

(19) $[\![$Mary considered a fact that John left early$]\!]$
$= \lambda w.\exists x[M \text{ considered}_w\ x \wedge \text{fact}_w(x) \wedge \mathscr{F}_{\text{cont}}(w)(x)$
$= \lambda w'.$J left early in w'
Presupposes: $\exists x'[\text{fact}_w(x') \wedge \mathscr{F}_{\text{cont}}(w)(x') = \lambda w'.$J left early in w'
$\wedge\, x' \neq x$

- Remember that $\mathscr{F}_{\text{cont}}$ is a function from an entity x and a world w to x's *unique* content in w.[12] (19) therefore presupposes that there are at least two *facts* with the unique content *that John left early*. On the (uncontroversial) assumption that two *facts* with non-distinct content cannot themselves be unique, this presupposition can never be satisfied.

[12] Kratzer's (2006) proposal, although superficially similar to the framework espoused here, cannot accommodate these facts. This is because in the semantics Kratzer proposes, the relationship between the content of, e.g., a *fact*, and the proposition denoted by a *that*-clause is mediated via entailment rather than equality. There is no reason why two distinct facts, with distinct content, cannot entail the self-same proposition expressed by the *that*-clause.

3.2 *neo-Davidsonian event semantics*

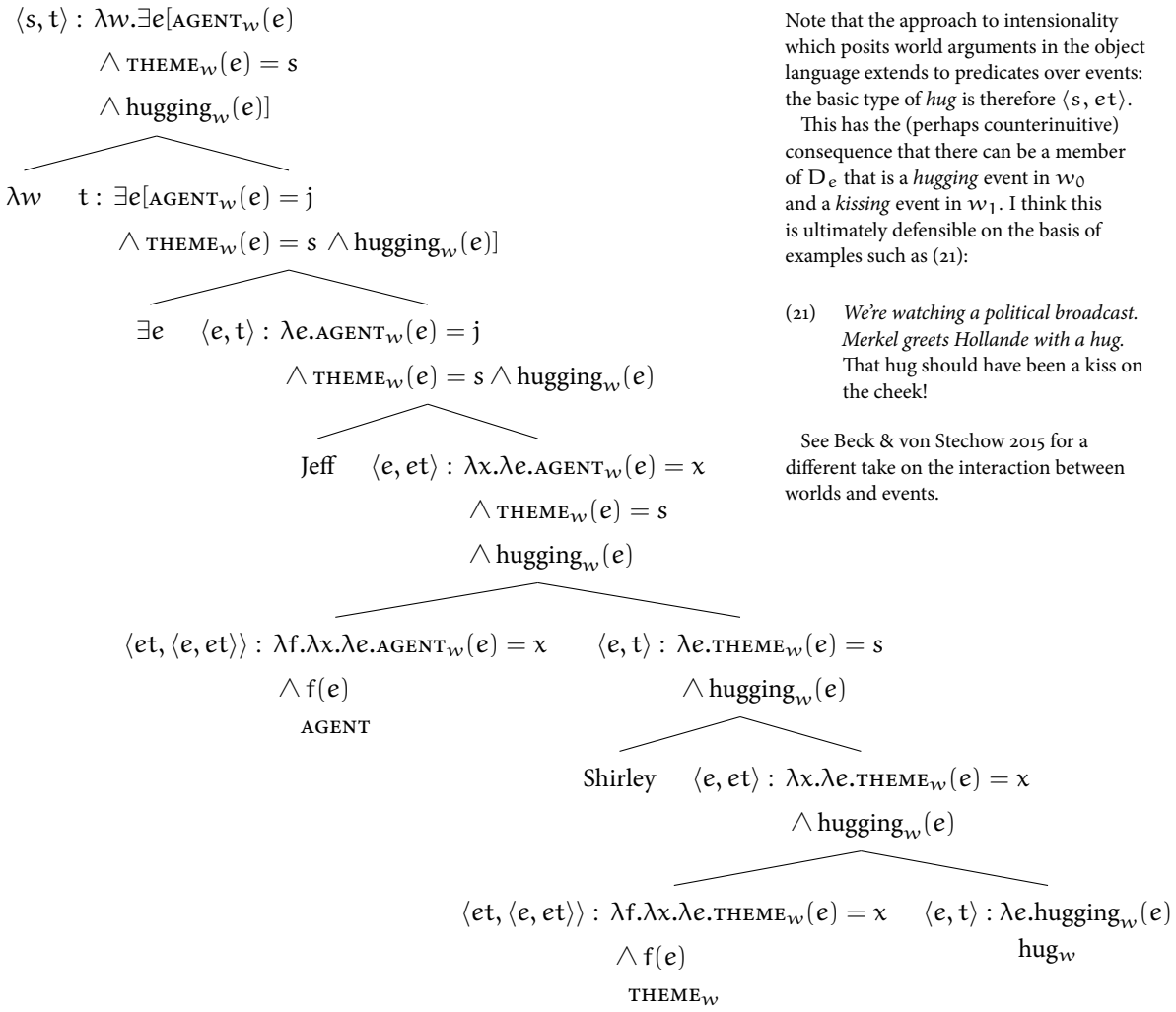
- Central idea: full thematic separation[13].

(20) $[\![\text{hug}]\!] =$
- $\lambda x.\lambda y.\text{hug}(y, x)$ — standard
- $\lambda e.\lambda x.\lambda y.\text{hug}(e, y, x)$ — Davidsonian
- $\lambda e.\lambda x.\text{hug}(e, x)$ — Kratzerian
- $\lambda e.\text{hug}(e)$ — neo-Davidsonian ✓

[13] See Parsons 1990, Lasersohn 1995. For recent arguments in favour of the neo-Davidsonian hypothesis, see e.g., Lohndal 2014, Ahn 2016

- Compositional neo-Davidsonian event semantics for a simple transitive sentence:

(21)



Note that the approach to intensionality which posits world arguments in the object language extends to predicates over events: the basic type of *hug* is therefore $\langle s, et \rangle$.

This has the (perhaps counterinuitive) consequence that there can be a member of D_e that is a *hugging* event in w_0 and a *kissing* event in w_1. I think this is ultimately defensible on the basis of examples such as (21):

(21) *We're watching a political broadcast. Merkel greets Hollande with a hug.* That hug should have been a kiss on the cheek!

See Beck & von Stechow 2015 for a different take on the interaction between worlds and events.

(23) $[\![\text{believe}]\!] = \begin{cases} \lambda w.\lambda p.\lambda x.\forall w'[w' \in \text{Dox}_{x,w} \rightarrow p(w') = 1] & \text{trad. (Hintikkan) denotation} \\ \lambda w.\lambda s.\text{belief}_w(s) & \text{neo-Davidsonian denotation} \end{cases}$

- This does *not* mean that we lose the advantages of a traditional Hintikkan analysis. Instead, we can think of the modal condition imposed by the Hintikkan denotation as a meaning postulate capturing what it means for s to be x's belief state in *w*.
- *Events and individuals*
- We make no type-distinction between individuals and eventualities. Both are members of D_e.[14]
- There is no compelling *linguistic* reason for why the intuitive ontological distinction between individuals and eventualities should be reflected in the type-calculus, and nothing much goes wrong if we fail to encode it.

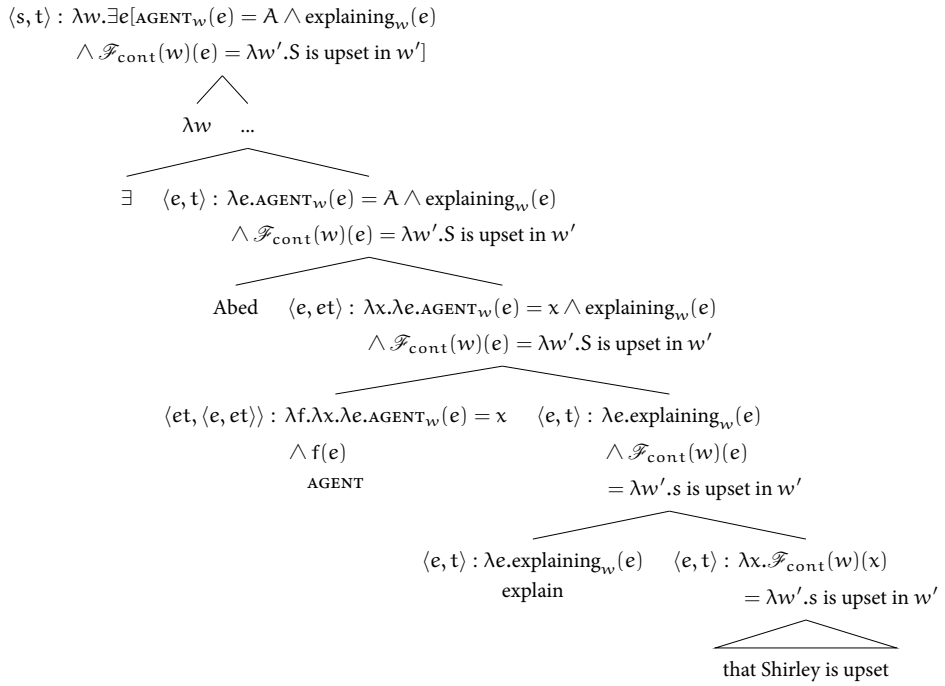
[14] See Lasersohn 1995, and also Bach 1986 for additional discussion of related issues.

4 Analysis

4.1 Meaning alternation with 'explain'

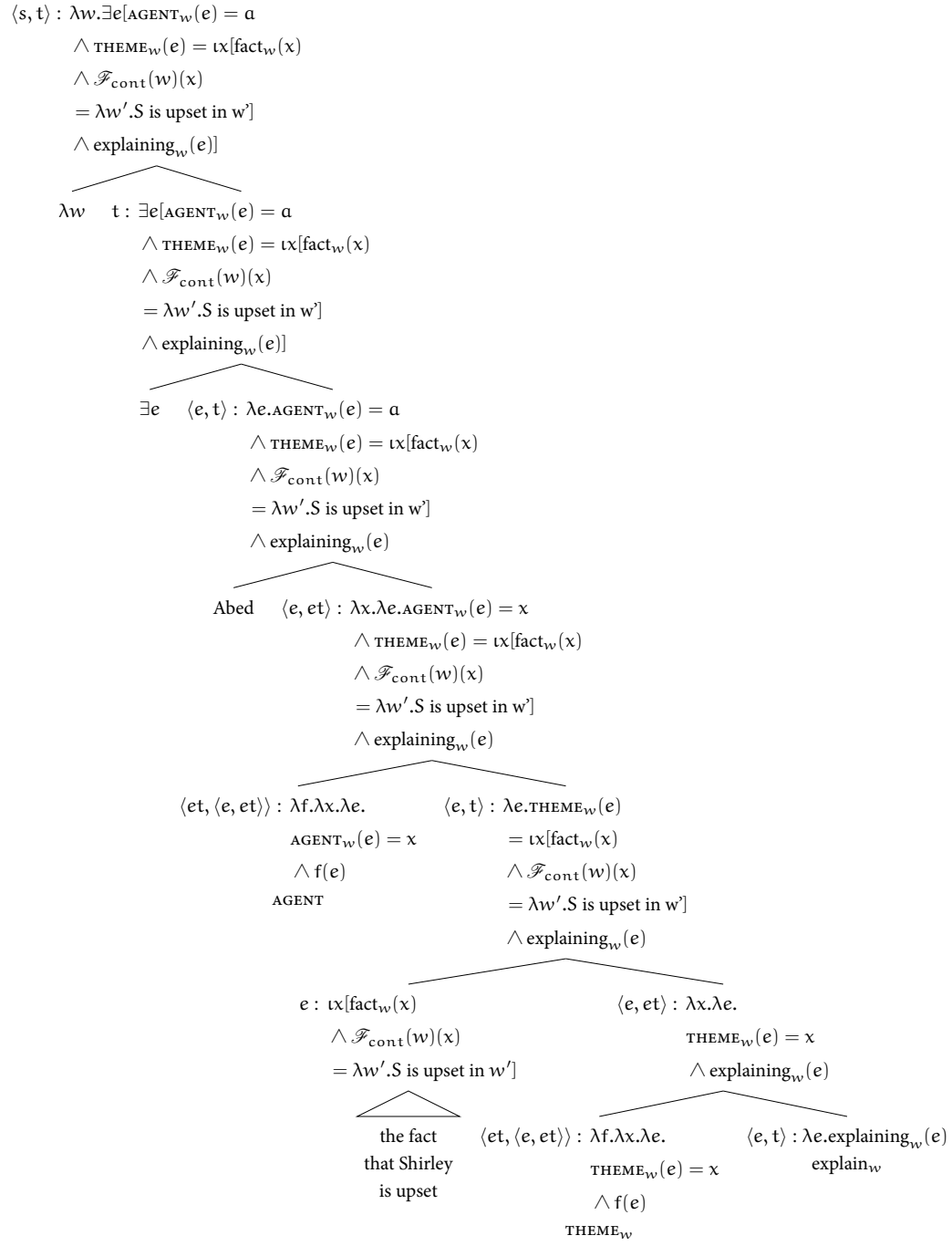
- With the following components in place, we are in a position to provide a neo-Davidsonian analysis of clausal embedding, which will provide a solution to the puzzle of embedding under *explain*.
  - The property theory of *that*-clauses.
  - A neo-Davidsonian event semantics.
  - No type distinction between events and individuals.
- What do these (independently motivated) components buy us? A framework where attitude verbs and *that*-clauses both denote *properties*, and therefore may combine via PM, much like nouns and *that*-clauses.
- *Explanans* LF:

(24) Abed explained that Shirley is upset.



Explanandum LF:

(25) Abed explained the fact that Shirley is upset.



- Note that this immediately accounts for why, when a *that*-clause composes with *explain* the result is the *explanans* reading.
- The expectation, which is born out in the vast majority of cases[15], is that when a verb composes with a *that*-clause, the *that*-clause should provide the propositional content of the eventually expressed by the verb.
- ContDPs denote/quantify over members of D_e. They cannot compose directly with a verb without leading to a type-mismatch further down the

[15] The *prove*-class verbs are a notable exception to this generalization. See Stowell 1981 and and subsequent responses for discussion. I don't have much to add to this here.

line.

- Instead, ContDPs must enter the derivation in the specifier of a thematic function.
- This is consistent with the generalization that ContDP complements can, but need not be interpreted as the CONTENT of the eventuality expressed by the verb, since they are interpreted as genuine thematic arguments.
- I do not propose a concrete theory of idiosyncratic interpretations of thematic arguments here, but everyone needs such a theory anyway.
- The interpretation of a ContDP complement relative to a verb is far more idiosyncratic than the interpretation of an embedded clause relative to it. On this account, this is because embedded clauses are (always) *modifiers*, whereas contDPs are genuine thematic arguments.

4.2 Propositional DPs

- Propositional DPs have a type-flexible core.[16]

[16] See Elliott, Nicolae & Uli Sauerland 2016 for an application of this idea to simplex *wh*-expressions.

(26) For any type σ
$[\![\text{thing}]\!] = \lambda a \in D_\sigma . C(a)$

- Quantificational determiners are necessarily also type-flexible:[17]

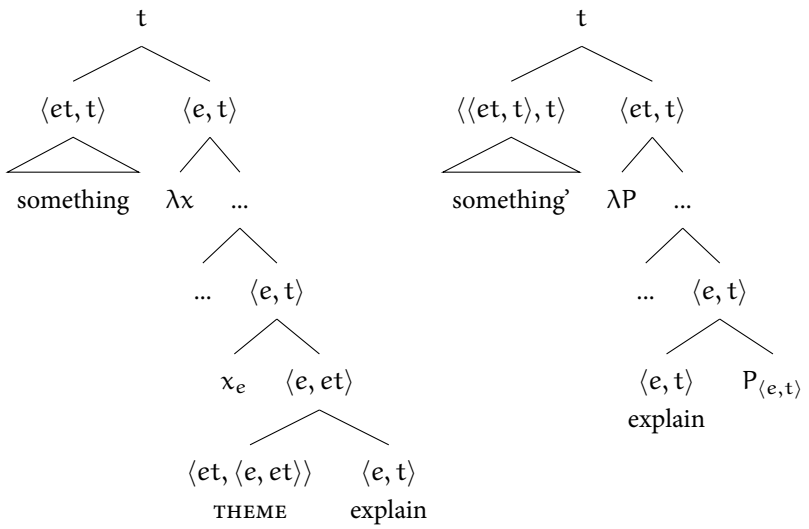
[17] This will not give rise to higher-order meanings for other quantificational DPs, in the absence of additional type-shifters, on the assumption that lexical nouns such as *dog, boy*, etc. are not type-flexible.

(27) For any type σ
$[\![\text{every}]\!] = \lambda P_{\sigma t} . \lambda Q_{\sigma t} . \forall a [P(a) \rightarrow Q(a)]$

- Consequence: propositional DPs can have higher order meanings, e.g., generalized quantifiers over properties of type $\langle\langle et, t\rangle, t\rangle$, QR-ing to leave behind a type $\langle e, t\rangle$ trace.[18]

[18] This is no doubt a huge oversimplification. See Asher 1993 for foundational work on the semantics of what I refer to as propDPs.

(28)



5 *Extension to questions*

(29) Mary considered the question (of) who John invited.

- We can account for the composition of content nouns such as *question* with interrogatives by assuming that *question*, much like *fact* and *proposition*, ranges over contentful entities.[19]
- I assume that the content of an entity that is a *question* is an answer-set (Hamblin 1973, Karttunen 1977)[20]. Consequently, I extend the definition of $\mathscr{F}_{\mathrm{cont}}$ as a metalanguage function from an entity x and a world w to x's unique content in $\mathrm{D}_{\langle s,t\rangle} \bigcup \mathrm{D}_{\langle st,t\rangle}$.

(30) a. $[\![\text{who John invited}]\!] = \lambda x.\mathscr{F}_{\mathrm{cont}}(w)(x)$
$= \lambda p.\exists x'[p = \lambda w'.\mathrm{J}\ \text{invited}_{w'}\ x']$

b. $[\![\text{question}_w]\!] = \lambda x.\text{question}_w(x)$

c. PM(30a)(30b)$= \lambda x.\text{question}_w(x) \wedge \mathscr{F}_{\mathrm{cont}}(w)(x)$
$= \lambda p.\exists x'[p = \lambda w'.\mathrm{J}\ \text{invited}_{w'}\ x']$

- A similar argument for this semantics can be given on the basis of a definiteness effect with content nouns which compose with questions.

(31) {*a | the} question (of) who left early.

- I assume furthermore that the content of a *wondering* eventuality is an answer set. The same approach can be extended to rogative (Lahiri 2002) predicates more generally.

(32) a. $[\![\text{wonder}_w]\!] = \lambda e.\text{wondering}_w(e)$

b. In every world w, if $\text{wondering}_w(e) = 1$
then $\mathscr{F}_{\mathrm{cont}}(w)(e) \in \mathrm{D}_{\langle st,t\rangle}$.

- Rogative predicates like *wonder* may now compose with questions via Predicate Modification.

(33) $[\![\text{wonder who John invited}]\!]$
$= \lambda e.\text{wondering}_w(e) \wedge \mathscr{F}_{\mathrm{cont}}(w)(e) = \lambda p.\exists x'[p = \lambda w'.\mathrm{J}\ \text{invited}_{w'}\ x']$

- The selectional restrictions of rogative predicates follow from the content of a rogative eventuality is an answer-set, rather than from the type-calculus directly.
- Note that the analysis already proposed for propDPs is flexible enough to account for the fact that rogative predicates can embed propDPs (see Nathan 2006):

(34) Abed wondered why Jeff was still there, and Troy wondered [$_{\mathrm{DP}}$ the same thing].

[19] Uegaki (p.c.) independently developed a proposal very similar to the one outlined here.

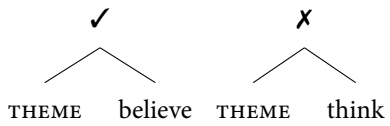
[20] As far as I can tell, nothing much rides on the choice of how to represent the content of a noun such as *question*. Other possibilities include partitions (J. a. G. Groenendijk & Stokhof 1984), and the Inquisitive Semantics notion of a proposition (Ciardelli, J. Groenendijk & Roelofsen 2015). Thanks to Clemens Mayr (p.c.) for discussion of this point.

6 *Deriving the selectional restrictions of 'think' vs. 'believe'*

- *think* and *believe* differ in terms of *transitivity*: *believe* is (optionally) transitive, whereas *think* is intransitive (see also Moulton 2010).[21]

[21] It's not obvious how to impose this restriction in a neo-Davidsonian framework with full thematic seperation, but this is seemingly orthogonal to the main point, since argument structure restrictions undoubtedly exist (pacé Borer 2005a,b).

(35)



- The same account can be extended to the difference between *wonder* and *ask*: *ask* is (optionally) transitive, whereas *wonder* is intransitive.

(36) a. Jeff { *wondered | asked } the question.

b. Jeff { wondered | asked } who left early.

c. Jeff { wondered | asked } something.

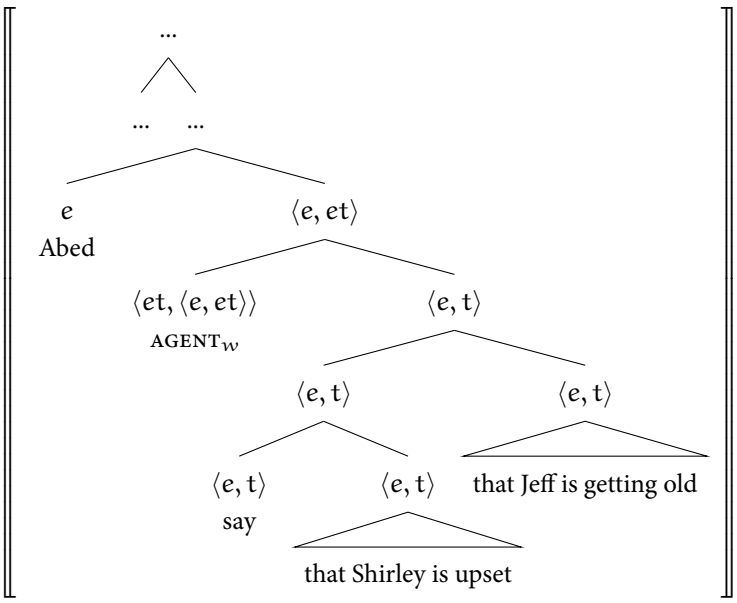
- This account of selectional restrictions is empirically superior to accounts stated in terms of c-selection/case (see Grimshaw 1979, Pesetsky 1982) due to the behaviour of propDPs, which pattern with *that*-clauses.

7 *Ruling out stacking*

- The most obvious objection to the contention that embedded clauses are modifiers is their unstackability. Moulton (2009) shows that the kind of semantics for *that*-clauses outlined here rules this out independently as a contradiction, due to the functionhood of $\mathscr{F}_{\mathrm{cont}}$.[22]

[22] As Moulton points out, the (false) expectation is that stacked CPs should be allowed if they either both express tautologies or contradictions. I assume that this is independently ruled out for pragmatic reasons.

(37) *Abed said [$_{\mathrm{CP}}$ that Shirley is upset] [$_{\mathrm{CP}}$ that Jeff is getting old].



$$= \begin{array}{c} \lambda w.\exists e[\textsc{agent}_w(e) = \mathfrak{a} \wedge \\ \mathscr{F}_{\mathrm{cont}}(w)(e) = \lambda w'.\mathrm{s\ is\ upset\ in\ } w' \wedge \\ \mathscr{F}_{\mathrm{cont}}(w)(e) = \lambda w''.\mathrm{j\ is\ getting\ old\ in\ } w''] \end{array}$$

7.1 *Conjoined that-clauses*

(38) Abed said [$_{CP}$ that Shirley is upset] and [$_{CP}$ that Jeff is getting old].

- Conjunction must take place at the propositional level.[23]

(39) Abed said
- [F_{PROP} that Shirley is upset] and [F_{PROP} that Jeff is getting old] ✗
- [F_{PROP} [that Shirley is upset and that Jeff is getting old]] ✓

[23] (38) shows us that it is not desirable to draw too tight a connection between F_{PROP} and the overt complementizer *that*. F_{PROP} must be a distinct functional head located above the COMP domain.

7.2 *Why '=' and not '⊆'?*

(40) $[\![F_{PROP,w}]\!] = \begin{cases} \lambda p.\lambda x.\mathscr{F}_{cont}(w)(x) = p \\ \lambda p.\lambda x.p \subseteq \mathscr{F}_{cont}(w)(x) \, ? \end{cases}$

- Disadvantage of ⊆: account of unstackability is lost.
- Advantage of ⊆: account of entailment relations from, e.g. *Abed believes that Jeff is in Paris* to *Abed believes that Jeff is in France*.

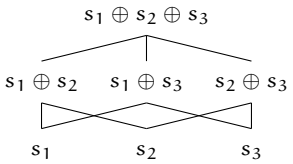
(41) a. $[\![\text{Abed believes that Jeff is in Paris}]\!] = \lambda w.\exists s[\text{HOLDER}_w(s) = a \wedge \{w' | j \text{ is in France in } w'\} \subseteq \mathscr{F}_{cont}(w)(s)]$

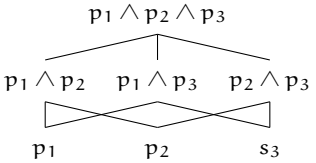
b. $[\![\text{Abed believes that Jeff is in France}]\!] = \lambda w.\exists s[\text{HOLDER}_w(s) = a \wedge \{w' | j \text{ is in Paris in } w'\} \subseteq \mathscr{F}_{cont}(w)(s)]$

- Response: entailments like in (41) shouldn't be dealt with in the Logical Form, since some embedding predicates are non-monotonic.

(42) Abed is surprised that Jeff is in Paris
⊭ Abed is surprised that Jeff is in France.

- I suggest that we instead deal with these facts as a reflex of the structure of the domain.
- The idea in brief: Abed's belief states in w form an algebra, as does the domain of propositions. States are ordered by the part-whole relation, and propositions by the entailment relation.
- A meaning postulate, specified for each root, places constraints on how $\mathscr{F}_{cont}(w)$ relates the domain of, e.g., *belief*-states to the domain of propositions. In the case of *belief*, it is clearly something like a homomorphism, i.e. if $\mathscr{F}_{cont}(w)(s_1) = p_1$ and $\mathscr{F}_{cont}(w)(s_2) = p_2$ then $\mathscr{F}_{cont}(w)(s_1 \oplus s_2) = p_1 \wedge p_2$. This correctly captures the entailment in (41). I leave a formal treatment of this approach to future work.

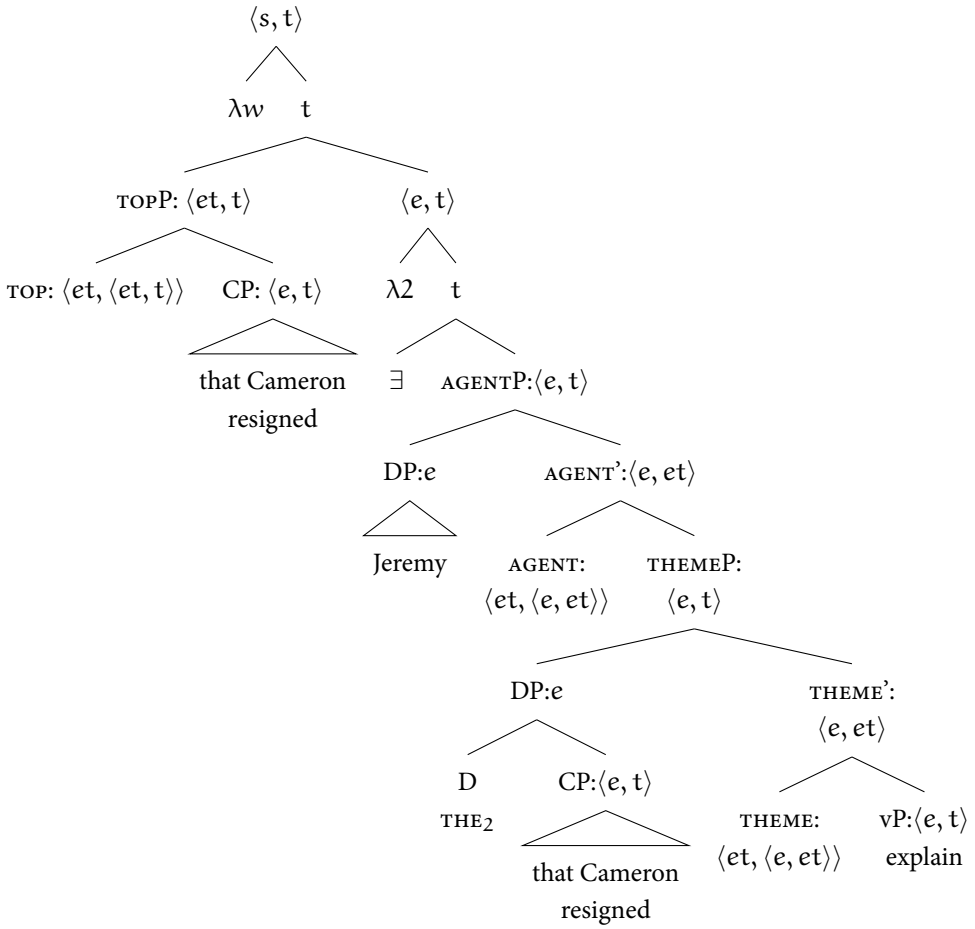




8 *Moving clauses*

- Here I make the following assumptions regarding A'-movement:
  - All A'-movement is mediated by quantificational particles (Horvath 2007, Cable 2010, Safir 2015).
  - Lower copies are subject to *Trace Conversion* (TC) (Ulrich Sauerland 1998, Fox 2002, Fox & Johnson 2016).
- In English, embedded *that*-clauses can undergo topicalization.
- According the assumptions outlined here, the LF resulting from topicalizing a *that*-clause is readily interpretable without positing ad-hoc mechanisms.

(43)



- I assume Fox's (2002) trace conversion algorithm here, resulting in the LF above.

(44) Trace Conversion (after Fox 2002)

a. Determiner replacement: $[_{QP}\ Q\ XP\ ]_n \rightsquigarrow [_{QP}\ \textsc{the}\ XP\ ]_n$

b. Variable insertion:
$[_{QP}\ \textsc{the}\ XP\ ]_n \rightsquigarrow [_{QP}\ \textsc{the}\ [\lambda x.[\![XP]\!](x) \wedge x = n]]$

(45) $[\![\text{top}]\!] = \lambda P_{et}.\lambda Q.\exists x[P(x) \wedge Q(x) \wedge \textsc{familiar}(x)]$

$$[\![(43)]\!] = \lambda w.\exists x, e[\textsc{familiar}(x) \wedge \mathscr{F}_{cont}(w)(x) = \lambda w'.\text{C resigned in } w' \wedge \textsc{agent}_w(e) = J \\ \textsc{theme}_w(e) = \iota x'[\mathscr{F}_{cont}(w)(x') = \lambda w'.\text{C resigned in } w' \wedge x' = x] \wedge \text{explaining}_w(e)]$$

- Prediction: the gap left behind by a topicalized *that*-clause should have the same distribution as a contentful expression of type *e*.
- It follows (correctly) that topicalizing a *that*-clause with the verb *explain* feeds the explanandum reading.

(46) That Cameron resigned, Jeremy explained. *explanandum*✓

- Furthermore, topicalizing a *that*-clause should be disallowed with verbs such as *think* and *hope*, which do not compose with contentful expressions fo type *e*.

(47) **The type *e* requirement (the DP req. revised):**
the gap of a fronted CP (sentential subject or topic) must be of DP/type e (cf. e.g., Moulton 2015).

(48) a. * that Jeff will leave, Annie sincerely complained.

b. ?* that Jeff will leave, Annie sincerely hopes.

c. that Jeff will leave, Annie sincerely believes.

9 *Conclusion*

- I develop a neo-Davidsonian analysis in which the difference between content DPs and *that*-clauses falls out as a matter of course: content DPs denote/quantify over individuals, and therefore must be integrated into the Logical Form as thematic arguments, whereas *that*-clauses are interpreted as *modifiers*.
- This has the advantage of providing a completely uniform account of (i) how *that*-clauses combine with nouns, and (ii) how *that*-clauses combine with verbs.
- To the extent that this account is successful, it can be considered an indirect argument for the position that ALL arguments, not just external arguments, are severed from the verb (see Lohndal 2014 for an overview).

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