


Embedded declaratives as modifiers¹

Patrick D. Elliott²

September 4th, 2016

Sinn und Bedeutung 21, University of Edinburgh

: <https://patrl.github.io/assets/SuB2016.pdf>

1 Introduction

- Clauses vs. DPs embedded under attitude verbs give rise to meaning alternations.
- Existing 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 Shirley is upset]. *explanans*
b. Abed explained [_{DP} the fact that Shirley is upset]. *explanandum*





- In (1a) the complement expresses the *explanans* (the explanation of a given phenomenon), whereas in (1b) the complement expresses the *explanandum* (the phenomenon to be explained).
- Pietroski’s analysis – a syntactically nominal complement to explain is assigned a distinct θ -role (THEME) to a syntactically clausal complement (CONTENT).³

[(1a)] = $\exists e[\text{AGENT}(e) = \text{Abed} \wedge \text{CONTENT}(e) = \text{that Shirley is upset}]$

[(1b)] = $\exists e[\text{AGENT}(e) = \text{Abed} \wedge \text{THEME}(e) = \text{the fact that Shirley is upset}]$

- 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 $\sqrt{\text{explain}}$.⁵
- I argue that this can’t be correct – the phenomenon is too general.

¹ I’d especially like to thank the following individuals for trying, sometimes unsuccessfully, to steer me in the right direction: Klaus Abels, Itamar Kastner, Nathan Klinedinst, Keir Moulton, Andrew Nevins, Todd Snider, Yasu Sudo, Tim Stowell, Wataru Uegaki, and Coppe van Urk. I’d also like to thank audiences at the 52nd meeting of the Chicago Linguistics Society, UCLA Roundtable, London Semantics Day 2016, and the 2016 NASSLLI student session.

² : University College London
: <https://patrl.github.io>
: p.elliott@ucl.ac.uk
: @patrickdelliott

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.

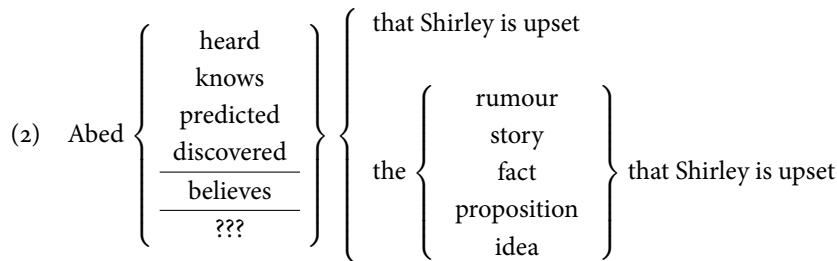
³ Pietroski cashes out his analysis in terms of neo-Davidsonian event semantics (see, e.g., Parsons 1990, Lasnik 1995).

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.

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”



- 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* proceed.

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

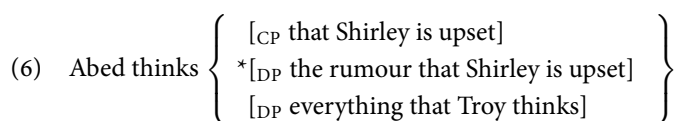
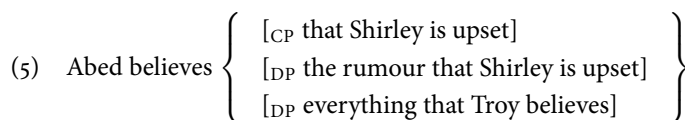
- Pietroski (2000) (see also King 2002, Kastner 2015) locates the source of the meaning alternation in the syntactic category of the complement.⁷
- (4) Propositional DPs (PropDPs)⁸
 - a. DPs headed by the nouns *thing* or *stuff* (possibly more)
 - b. The simplex *wh*-expression “what”
 - c. Some propositional anaphora, e.g. *that* and *it* (but not *so*)
 - d. Null operators in comparatives (Kennedy & Merchant 2000)

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:

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

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.



- (7) Abed complained $\left\{ \begin{array}{l} [_{CP} \text{ that Shirley is upset}] \\ *[_{DP} \text{ the rumour that Shirley is upset}] \\ *[_{DP} \text{ everything that Troy complained}] \end{array} \right\}$

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

- (8) a. Abed is a very thoughtful guy;
he's thinking $[_{DP} \text{ some stuff}]$ right now.
- b. Annie hopes Troy will leave soon; and honestly,
I hope $[_{DP} \text{ the same thing}]$.
- c. Abed: Annie says that she's not coming.
Troy: $[_{DP} \text{ What}]$ 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 $[_{CP} \text{ that Shirley is upset}]$.
- b. *It is widely believed $[_{DP} \text{ the rumour that Shirley is upset}]$.
- c. *It is widely believed $[_{DP} \text{ everything that Troy believes}]$.

- (10) a. It seems $[_{CP} \text{ that Shirley is upset}]$.
- b. *It seems $[_{DP} \text{ the rumour that Shirley is upset}]$.
- c. *It seems $[_{DP} \text{ everything that Troy believes}]$.

- *Evidence from prepositional complements*

- (11) a. *Annie heard about $[_{CP} \text{ that Jeff is getting married}]$.
- b. Annie heard about $[_{DP} \text{ the rumour that Jeff is getting married}]$.
- c. Annie heard about $[_{DP} \text{ something}]$ – namely, that Jeff is getting married.

2.4 PropDPs and “explain”

- (12) Abed explained $[_{DP} \text{ something}]$ – namely, that Shirley is upset.
✓ *explanans*
- (13) Abed explained $[_{DP} \text{ something}]$ – 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, Moulton 2009, 2015, and others.

$$(14) \quad \llbracket \text{that Shirley is upset} \rrbracket = \begin{cases} \lambda w'.s \text{ is upset in } w' & \text{standard } \textit{that}\text{-clause denotation} \\ \lambda x.\mathcal{F}_{\text{cont}}(w)(x) = \lambda w'.s \text{ is upset in } w' & \text{Revised } \textit{that}\text{-clause denotation} \end{cases}$$

- $\mathcal{F}_{\text{cont}}$ 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 , realized here as a set of worlds $p \in D_{\langle s, t \rangle}$.

- Composing content nouns with *that*-clauses:⁹

$$(14) \quad \begin{array}{c} e : \iota x[\text{rumour}_w(x) \wedge \\ \mathcal{F}_{\text{cont}}(w)(x) = \lambda w'.s \text{ is upset in } w'] \\ \swarrow \quad \searrow \\ \langle e, t \rangle : \lambda P.\iota x[P(x)] \quad \langle e, t \rangle : \lambda x.\text{rumour}_w(x) \wedge \\ \text{the} \quad \mathcal{F}_{\text{cont}}(w)(x) = \lambda w'.s \text{ is upset in } w' \\ \swarrow \quad \searrow \\ \langle e, t \rangle : \lambda x.\text{rumour}_w(x) \quad \langle e, t \rangle : \lambda x.\mathcal{F}_{\text{cont}}(w)(x) = \lambda w'.s \text{ is upset in } w' \\ \text{rumour}_w \quad \text{that Shirley is upset} \end{array}$$

⇐ Predicate Modification (PM) (Heim & Kratzer 1998)

⁹ I assume the approach to intensionality discussed in Heim & von Stechow 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 $\langle s, e, t \rangle$.

3.2 Neo-Davidsonian event semantics

- Central idea: *all* arguments are severed from the verb.

$$(15) \quad \llbracket \text{hug} \rrbracket = \begin{cases} \lambda x.\lambda y.\text{hug}(y, x) & \text{standard denotation} \\ \lambda e.\lambda x.\lambda y.\text{hug}(e, y, x) & \text{Davidsonian denotation} \\ \lambda e.\lambda x.\text{hug}(e, x) & \text{Kratzerian denotation} \\ \lambda e.\text{hug}(e) & \checkmark \text{neo-Davidsonian denotation} \end{cases}$$

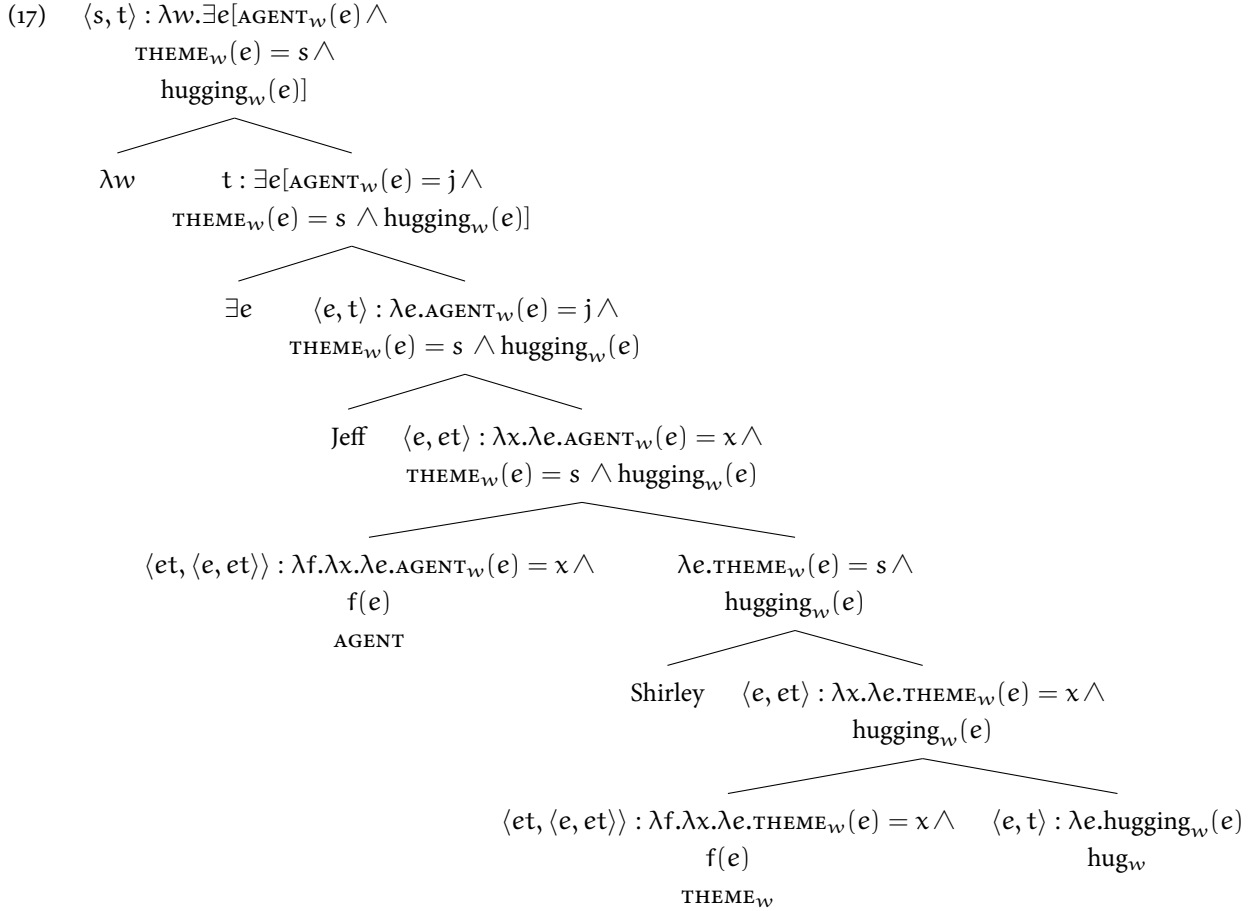
- neo-Davidsonian logical form of a simple transitive sentence:¹⁰

¹⁰ 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 $\langle s, e, t \rangle$.

This has the (perhaps counterintuitive) 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 (16):

(16) *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.



- Attitude verbs

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

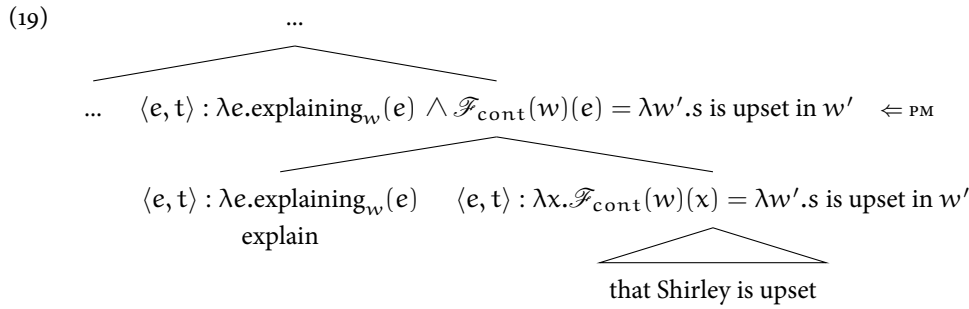
- This does *not* mean that we lose the advantages of a traditional Hintikkan analysis. Instead, we can think of the modal condition imposed by the Hintikkan denotation as a meaning postulate capturing what it means for s to be x 's belief state in w .
- *Events and individuals*
- We make no type-distinction between individuals and eventualities. Both are members of D_e .¹¹
- 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.

¹¹ See Lasnik 1995, and also Bach 1986 for additional discussion of related issues.

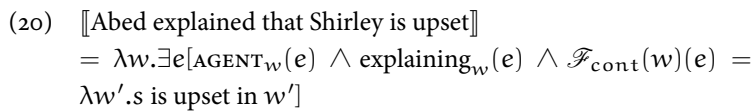
3.3 Clausal embedding

- 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.

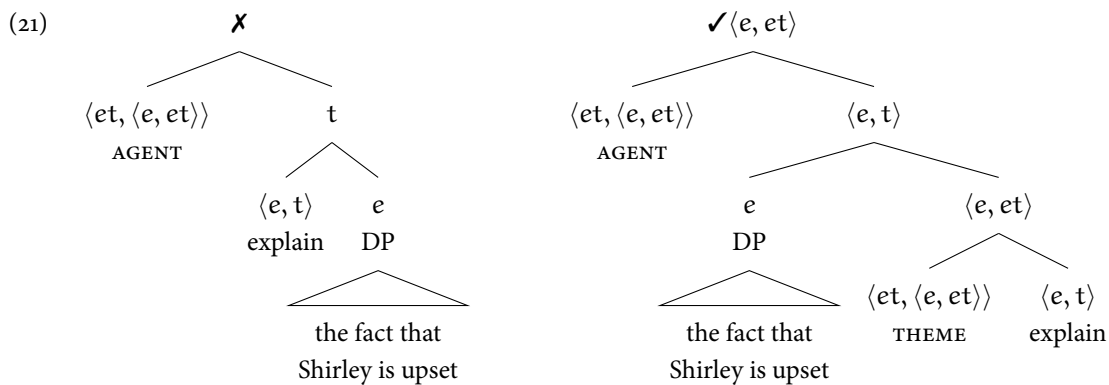


- Note that this immediately accounts for why, when a *that*-clause composes with *explain* the result is the *explanans* reading.



- The expectation, which is born out in the vast majority of cases¹², 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 line.
- Instead, ContDPs must enter the derivation in the specifier of a thematic function.

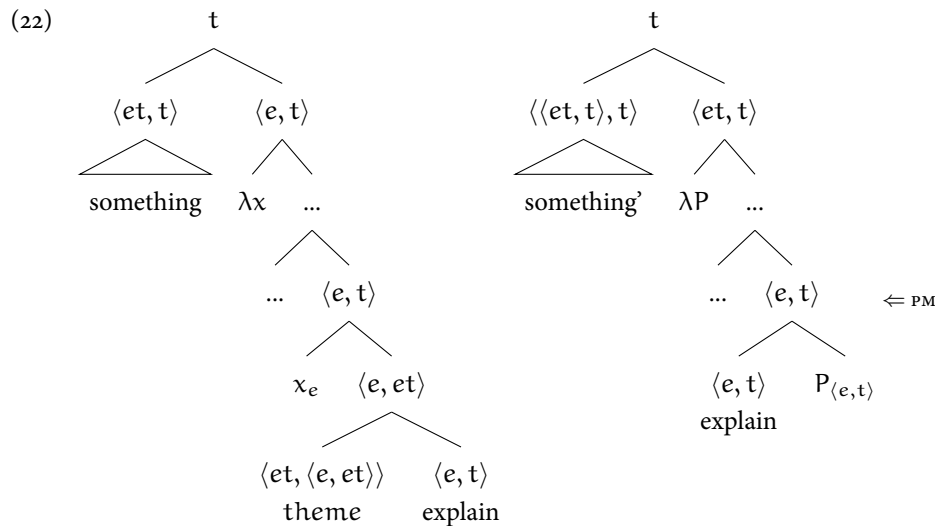
¹² The *prove*-class verbs are a notable exception to this generalization. See Stowell 1981 and and subsequent responses for discussion. I don't have much to add to this here.



- 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.

3.4 Propositional DPs

- PropDPs must be systematically ambiguous – they make denote/quantify over members of D_e , or denote/quantify over members of $D_{\langle e,t \rangle}$.



- What is the denotation of *something*? The simplest possible analysis is existential quantification over properties + some contextual domain restriction, resulting in the following Logical Form:¹³

$$(23) \quad \llbracket \text{Abed explained something}' \rrbracket^g = \lambda w. \exists e, P[\text{AGENT}_w(e) = a \wedge \text{explaining}_w(e) \wedge P(e) \wedge g(Q)(P)]$$

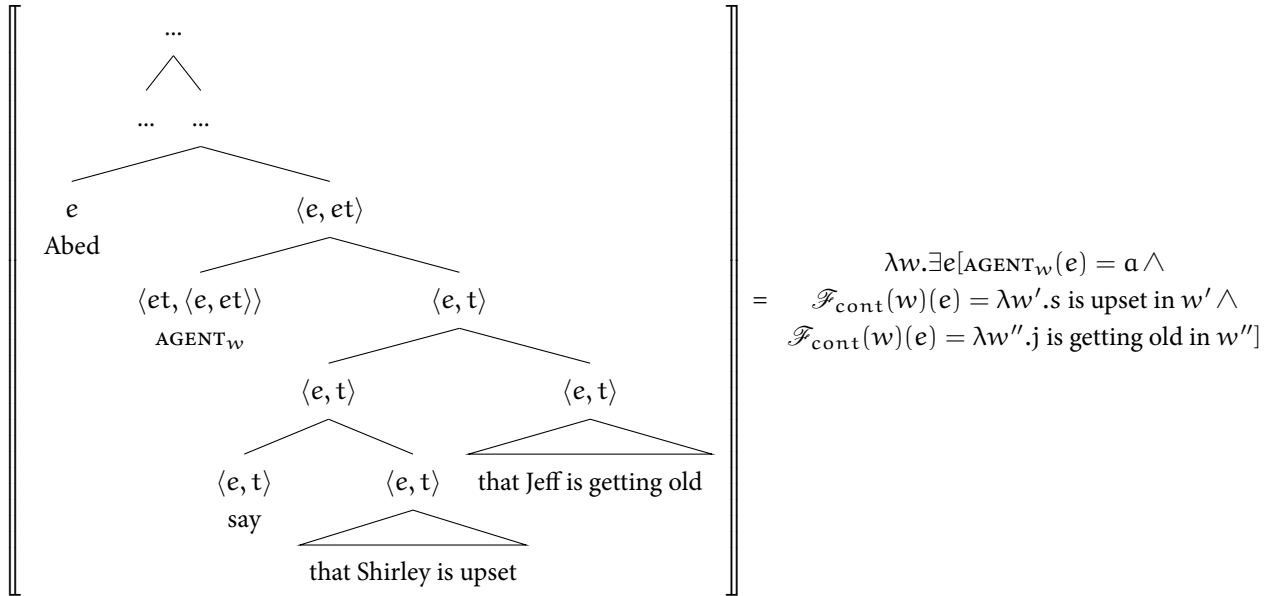
¹³ This is no doubt a huge oversimplification. See Asher 1993 for foundational work on the semantics of what I refer to as propDPs.

4 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 $\mathcal{F}_{\text{cont}}$.¹⁴

¹⁴ 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.

$$(24) \quad * \text{Abed said } [_{CP} \text{ that Shirley is upset}] [_{CP} \text{ that Jeff is getting old}].$$



4.1 Conjoined that-clauses

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

- Conjunction must take place at the propositional level.¹⁵

¹⁵ (25) 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.

(26) Abed said $\left\{ \begin{array}{l} [F_{PROP} \text{ that Shirley is upset}] \text{ and } [F_{PROP} \text{ that Jeff is getting old}] \quad \times \\ [F_{PROP} [\text{that Shirley is upset and that Jeff is getting old}]] \quad \checkmark \end{array} \right.$

4.2 Why '=' and not '⊆'?

(27) $\llbracket F_{PROP, w} \rrbracket = \left\{ \begin{array}{l} \lambda p. \lambda x. \mathcal{F}_{cont}(w)(x) = p \\ \lambda p. \lambda x. p \subseteq \mathcal{F}_{cont}(w)(x) ? \end{array} \right.$

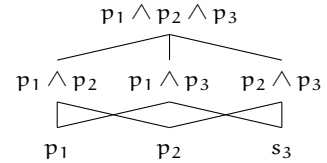
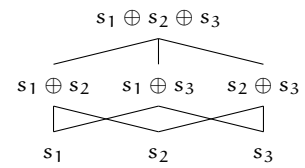
- Disadvantage of \subseteq : account of unstackability is lost.
- Advantage of \subseteq : account of entailment relations from, e.g. *Abed believes that Jeff is in Paris* to *Abed believes that Jeff is in France*.

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

- Response: entailments like in (28) shouldn't be dealt with in the Logical Form, since some embedding predicates are non-monotonic.

(29) Abed is surprised that Jeff is in Paris
 \neq 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 $\mathcal{F}_{\text{cont}}(w)$ 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 $\mathcal{F}_{\text{cont}}(w)(s_1) = p_1$ and $\mathcal{F}_{\text{cont}}(w)(s_2) = p_2$ then $\mathcal{F}_{\text{cont}}(w)(s_1 \oplus s_2) = p_1 \wedge p_2$. This correctly captures the entailment in (28). I leave a formal treatment of this approach to future work.



5 The DP/type *e* requirement

(30) **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).

- (31) a. * that Jeff will leave, Annie sincerely complained.
 b. ?* that Jeff will leave, Annie sincerely hopes.
 c. that Jeff will leave, Annie sincerely believes.

The fact that *hope* seems to pattern with *explain* is telling, since, as we have seen, *doesn't* disallow DP complements per se – it tolerates a propDP complement.

- Prediction: CP fronting with *explain* is only compatible with the *explanandum* reading.¹⁶

(32) That Shirley is upset, Abed explained as best he could.
~~X~~ *explanans*, ✓ *explanandum*

¹⁶ See Elliott 2016b,a. Keir Moulton p.c. pointed out to me that Angelika Kratzer independently made this claim in unpublished class notes, 2016.

- *Explanans* paraphrase: the content of Abed’s explanation, which he performed as best he could, is the proposition that Shirley is upset.
- (Putative) *explanandum* paraphrase: Abed gave an explanation, which he performed as best he could, for Shirley’s being upset.
- The type *e* requirement actually *falls out* as a straightforward consequence of the system outlined here, in tandem with an independently motivated proposal for interpreting A-bar movement – *chain reduction* (Sauerland 1998).
- Fox & Johnson’s (2016) multi-dominance account is the most full worked-out approach to chain-reduction (at least, that I’m aware of). I illustrate how CP fronting is interpreted using Fox & Johnson’s framework:

(36) Abed explained which girl won the race.

- Under the *explanans* reading, (36) is true, in a world where Lucy won the race, if Abed said by way of explanation in that world that Lucy won the race.¹⁸
- Under the *explanandum* reading, (36) is true, in a world where Lucy won the race, if Abed gave an explanation for the fact that Lucy won the race.¹⁹
- Possible consequence: interrogative complements may either denote *individuals with inquisitive content* (explanandum reading) or *properties of individuals with inquisitive content* (explanans reading). I leave an extension to interrogative complements to future work.

¹⁸ This is the most salient reading for the vast majority of speakers.

¹⁹ Some speakers claim to be unable to get this reading.

7 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).

References

- Asher, Nicholas. 1993. *Reference to abstract objects in discourse*. Red. by Genaro Chierchia, Pauline Jacobson & Francis J. Pelletier. Vol. 50 (Studies in Linguistics and Philosophy). Dordrecht: Springer Netherlands.
- Bach, Emmon. 1986. The algebra of events. *Linguistics and Philosophy* 9(1). 5–16.
- Beck, Sigrid & Armin von Stechow. 2015. Events, Times and Worlds – An LF Architecture. In Christian Fortmann, Anja Lübke & Irene Rapp (eds.), *Situationsargumente im nominalbereich*. Berlin, Boston: De Gruyter Mouton.
- Elliott, Patrick D. 2016a. *Propositional content of events and individuals*. Poster presented at NASSLLI, Rutgers.
- Elliott, Patrick D. 2016b. *That-clauses as event modifiers*. Slides from a talk presented at the 2016 UCL PhD Day, London.
- Fox, Danny & Kyle Johnson. 2016. QR is restrictor sharing. In *Proceedings of the 33rd West Coast Conference on Formal Linguistics*, 1–16. Somerville, MA: Cascadilla Proceedings Project.
- Grimshaw, Jane. 1979. Complement selection and the lexicon. *Linguistic Inquiry* 10(2). 279–326.

- Hacquard, Valentine. 2006. *Aspects of modality*. Massachusetts Institute of Technology dissertation.
- Heim, Irene & Kai von Stechow. 2011. Intensional semantics. Lecture notes.
- Heim, Irene & Angelika Kratzer. 1998. *Semantics in generative grammar*. Malden, MA: Blackwell.
- Kastner, Itamar. 2015. Factivity mirrors interpretation: the selectional requirements of presuppositional verbs. *Lingua* 164. 156–188.
- Kennedy, Christopher & Jason Merchant. 2000. *The Case of the ‘Missing CP’ and the Secret Case*. http://babel.ucsc.edu/Jorge/kennedy_merchant.html.
- King, Jeffrey C. 2002. Designating propositions. *Philosophical Review* 111(3). 341–371.
- Kratzer, Angelika. 2006. Decomposing attitude verbs. Handout from a talk in honor of Anita Mittwoch on her 80th birthday. The Hebrew University of Jerusalem.
- Lahiri, Utpal. 2002. *Questions and answers in embedded contexts* (Oxford studies in theoretical linguistics 2). Oxford ; New York: Oxford University Press. 308 pp.
- Lasnik, Howard. 1995. *Plurality, conjunction and events*. Dordrecht: Springer Netherlands.
- Lohndal, Terje. 2014. *Phrase structure and argument structure: a case study of the syntax-semantics interface*. OUP Oxford. 185 pp.
- Moltmann, Friederike. 2013. *Abstract objects and the semantics of natural language*. Oxford University Press.
- Moulton, Keir. 2009. *Natural selection and the syntax of clausal complementation*. University of Massachusetts - Amherst dissertation.
- Moulton, Keir. 2015. CPs: copies and compositionality. *Linguistic Inquiry* 46(2). 305–342.
- Nathan, Lance Edward. 2006. *On the interpretation of concealed questions*. Massachusetts Institute of Technology dissertation.
- Parsons, Terence. 1990. *Events in the semantics of English: a study in subatomic semantics*. The MIT Press.
- Pesetsky, David Michael. 1982. *Paths and categories*. Massachusetts Institute of Technology dissertation.
- Pietroski, Paul M. 2000. On explaining that. *Journal of Philosophy* 97(12). 655–662.
- Pryor, James. 2007. Reasons and that-clauses. *Philosophical Issues* 17(1). 217–244.
- Sauerland, Ulrich. 1998. *On the making and meaning of chains*. Massachusetts Institute of Technology dissertation.
- Stowell, Timothy. 1981. *Origins of phrase structure*. Massachusetts Institute of Technology dissertation.
- Uegaki, Wataru. 2015a. Content nouns and the semantics of question-embedding. *Journal of Semantics*. 1–38.
- Uegaki, Wataru. 2015b. *Interpreting questions under attitudes*. Massachusetts Institute of Technology dissertation.