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Nominal *that*-complementisers: Eventualities, Situations and Polysemy

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Informational Nouns

Informational Nouns

- nouns with at least one sense that denotes a piece, pieces, a body or bodies of information
 - which could be modelled as e.g., a proposition, some collection of propositions, Record Types...

Examples of informational nouns in English are given in (1)

- (1) *allegation, belief, book, fact, information, knowledge, newspaper, report, statement*

Noun-related propositional complementiser clauses (NCCs)

The neutral term *noun-related complementiser clause* NCC is from Müller 2023

Not all nouns can be used with NCCs

(2) Examples:

- a. the allegation/belief/evidence/fact/information/report/
statement that Bilbo found the ring
- b. #the house that Bilbo met Gandalf
- c. #the event/celebration that Gandalf set off fireworks
- d. #the book/brochure/document/newspaper that Bilbo
found the ring

Some evidence of cross-linguistic robustness:

- Finnish, German, Italian, Spanish

Question: What is the right restriction for licensing NCCs?

NCCs clearly relate to propositions/informational entities etc.

- Naive hypothesis: Informational Nouns can be felicitously used with NCCs in the COMPenvironment
 - Correctly predicts *#the house/event/celebration that...*
 - Does not predict *#the book/brochure/document/newspaper that...*

Plan:

- Summarize one of the main analyses of these data, and discuss some challenges
- Motivate our own alternative analysis:

A situation-theoretic approach:

NCCs select for informational nouns that also denote eventualities
OR situations

Background: The “contentful entities” approach

e.g. Kratzer 2006; Elliott 2020

- Both NCCs and common nouns express properties. These properties compose via predicate modification
- NCCs encode *cont*, a function from worlds and ‘content bearing entities’ to propositions.
- Ns such as *fact* and eventuality denoting Ns (*allegation*, *belief*) denote content bearing entities (a sort of type e , e_c)
- Nouns such as *book* do not (e.g., Elliott 2020)

$$(3) \quad \begin{aligned} \text{a. } \llbracket \text{allegation} \rrbracket &= \lambda w [\lambda x [\text{allegation} : \langle s, \langle e_c, t \rangle \rangle \rangle (w)(x)] \\ \text{b. } \llbracket \text{fact} \rrbracket &= \lambda w. [\lambda x [\text{fact} : \langle s, \langle e_c, t \rangle \rangle \rangle (w)(x)]] \end{aligned}$$

$$(4) \quad \begin{aligned} \llbracket \text{that Alex ran} \rrbracket \\ = \lambda w [\lambda x [\text{cont} : \langle s, \langle e_c, \langle s, t \rangle \rangle \rangle \rangle (w)(x) = \lambda w' [\text{run}(w')(a)]]] \end{aligned}$$

$$(5) \quad \begin{aligned} \llbracket \text{fact that Alex ran} \rrbracket \\ = \lambda w [\lambda x [\text{fact}(w)(x) \wedge \text{cont}(w)(x) = \lambda w' [\text{run}(w')(a)]]] \end{aligned}$$

Objection 1: Ignoring polysemy

Informational nouns that can be composed with NCCs:

1. also have an eventuality-denoting sense: *allegation*, *belief*, *statement*
2. plus *fact* (more on which shortly)

Informational nouns that cannot be composed with NCCs:

3. also have a physical-entity-denoting sense: *book*, *document*, *newspaper*

Conclusion: Polysemy plays a role in licensing NCCs (Sutton, in prep)

- The “contentful entities” approach simply demarcates contentful entities of type *e* from non-contentful ones
 - “The natural conclusion to draw from such contrasts is that the linguistic notion of a contentful entity is distinct from the intuitive notion.” (Elliott 2020, p.63)
- We think that a more explanatory and predictive analysis can be given

Objection 2: facts are not content-bearing entities

Trying to make sense of content-bearing entities

- One a very broad understanding of *entities*:
 - Mental states such as beliefs are entities that in some sense bear content
 - Communicative events such as statements are entities that in some sense bear content
 - Artefacts such as books are entities, but perhaps they 'contain' rather than bear content
- But facts are not entities that bear content
 - If anything, they are content (that in some sense corresponds with how the world is)

It is therefore opaque what entities of sort e_c are denoted by *fact*

Background: Austin vs. Strawson on *facts*

Strawson 1949; Austin 1949

Austin on truth and facts

- facts are parts of the world (situations)
- *Alex's statement corresponds with the facts* expresses that 'Alex's statement is true'
- Facts/situations are truth makers for statements

Strawson on truth and facts

- Facts are really no more than true propositions (they are what true statements state)
- *Alex's statement corresponds with the facts* is just a way of saying 'Alex's statement is true'

Background: Austin's response

Austin 1970/1954

Different uses of *fact* behave in different ways

- (6) a. The (mangy) condition of the cat is a fact
b.??The (mangy) condition of the cat is a/the fact that ...

Uses of *fact* such as (6-a) do not align with an analysis in terms of true propositions

We see some appeal in both Strawson's and Austin's views: Their views can be reconciled if we analyse *fact* as polysemous:

- i. what makes e.g., statements or beliefs etc. true (i.e. situations)
 - denoted by *a fact* in (6-a)
- ii. (true) propositions (situation types that are witnessed by some situation)
 - denoted by *the fact* in e.g., *Alex expressed the fact that the cat has mange*

From simple to rich type theory

Background

- Seminal work by Ranta (1994)
- Implementing a NL semantics based on Martin-Löf 1984

Move 1: Let types feature as part of the object language

- Simply Typed Semantics: Construct arbitrarily complex expressions of some type which are then interpreted (e.g. in a model)
- Richly typed semantics: Construct types themselves of arbitrary complexity
 - Types have witnesses (things of that type)
 - But are individuated also in terms of their structure (fine-grained intensionality)

From simple to rich type theory

Move 1: Let types feature as part of the object language

Move 2: Treat propositions as types

- Curry-Howard Correspondence (Curry and Feys, 1958; Howard, 1980)

Simple Type Theory (STT)	Rich Type Theory (RTT)
Sets of worlds	Types
Flat	Structured
Individuated by set membership	Individuated by witness set <i>and</i> structure

Hyperintensionality:

- The types $2 + 2 = 4$ and $5 - 3 = 2$ have the same witnesses (situations, worlds etc.)
- But can be individuated in terms of structure (and the manner of construction)

Very short introduction to TTR

Cooper 2023, 2012, a.m.o

Record Types

$$(7) \quad \left[\begin{array}{lcl} x & : & Ind \\ c_1 & : & cat(x) \end{array} \right] \quad \begin{array}{l} \bullet \text{ There is a cat} \\ \bullet \text{ Cf. predicate logic: } \lambda w. \exists x. cat_w(x) \end{array}$$

- Propositions in TTR are types (e.g. situation/record types)
- Witnesses of record types are records (situations)
- Labels x, c_1 are like discourse referents
- Ind is a basic type
- cat is a type constructor: constructs a type given a value for the label x

Records/Situations

$$(8) \quad \left[\begin{array}{lcl} x & = & f \\ c_1 & = & s_1 \end{array} \right] \quad \begin{array}{l} \bullet (8) : (7) \text{ iff} \\ \bullet f : Ind \\ \bullet s_1 : cat(f) \end{array}$$

Non-Polysemous Common Nouns in TTR

CNs denote Properties of situations

- Not functions from worlds to sets of entities
- Functions from situations to situations types

$$(9) \quad cat \mapsto \lambda r : [x : Ind] . [c_{cat} : cat(r.x)]$$

- Functions from records of some type: $\lambda r : [x : Ind]. \dots$
 - I.e., situations that contain some individual
- to a proposition
 - I.e., the type of situations in which the entity labelled x is a cat

Simplified example

$$(9) \quad \textit{cat} \mapsto \lambda r : [x : \textit{Ind}] . [c_{\textit{cat}} : \textit{cat}(r.x)] : \textit{Ppty}$$

- Proper names as GQs: functions from a property to the proposition that some individual has that property (classic Montague treatment)

$$(10) \quad \textit{Felix} \mapsto \lambda P : \textit{Ppty} . P([x = \textit{f}])$$

$$(11) \quad \textit{Felix is a cat} \mapsto [c_{\textit{cat}} : \textit{cat}(\textit{f})]$$

Important theoretical point, situation theoretic approaches to semantics:

- CNs do not (directly) denote individuals
- CNs denote properties of situations that contain individuals

Multi-participant situations (Sutton, 2022)

Polysemous nouns denote situations that contain multiple participants

- polysemous Ns constrain situations to witness at least two entities
- e.g., *lunch*: to witness at least some event and some physical entity
- the resulting record type constrains the event to be a lunch eating event and the individual to be the food
- Additionally neo-Davidsonian inspired thematic role relations

(12) *lunch* \mapsto

$$\lambda r : \left[\begin{array}{lcl} x & : & Phys \\ e & : & Ev \end{array} \right] \cdot \left[\begin{array}{lcl} c_{\text{food}} & : & food(r.x) \\ c_{\text{eat}} & : & eat_lunch(r.e) \\ c_{\text{pat}} & : & patient(r.x, r.e) \end{array} \right]$$

Proposal Outline

- NCCs select for polysemous nouns that denote either eventualities or situations, as well as propositions
 - So *allegation* and *fact* can be used with NCCs
 - But *book* and *newspaper* cannot
- but crucially, the relationship between the proposition and the eventuality or situation is determined by the lexical semantics of the noun
 - E.g., for *allegation that*, it is not the NCC that encodes e.g., 'contains' as a relation between contents and an eventuality, but the noun
 - And so we do not predict that *fact* denotes content bearing entities

An Eventuality-Informational Polysemous Noun: *allegation*

A function from a record, r

- a pairing of a record type p , and event, x

to a a record type, the proposition that:

- r is an allegation-situation — $\text{allegation}(r)$
- and that p is the contents of x — $\text{cont}(r.x, r.p)$

(13) $\text{allegation} \mapsto$

$$\lambda r : \left[\begin{array}{l} p : \text{RecType} \\ x : \text{Ev} \end{array} \right] \cdot \left[\begin{array}{ll} c_{\text{alleg}} & : \text{allegation}(r) \\ c_{\text{alleg_cont}} & : \text{cont}(r.x, r.p) \end{array} \right]$$

- allegation is $\text{RecType}/\text{Ev}$ polysemous

Our take on *fact*

fact denotes pairings of a proposition and a situation that witnesses the proposition cf. *Austinian proposition* (Barwise, 1989; Ginzburg, 2012)

A function from a record, r

- a pairing of a record type p , and record x

to a a record type, the proposition that:

- r is an fact-situation ($fact(r)$)
- and that x is a witness (a truth maker) for p i.e., $(r.x : r.p)$
 - Where $f = r.x : r.p$ is a *manifest field* (Coquand et al., 2004; Cooper, 2023)
 - Alternatively represented $[f : p_{r.x}]$

which holds iff $f : p$ and $f = r.x$

$$(14) \quad fact \mapsto \lambda r : \left[\begin{array}{l} p : RecType \\ x : Rec \end{array} \right] \cdot \left[\begin{array}{l} c_{fact} : fact(r) \\ f = r.x : r.p \end{array} \right]$$

- *fact* is *RecType/Rec* polysemous
- *facts* can be characterised as *true Austinian propositions*

Analysis of NCCs

A function from a record, r

- a pairing of a record type p , and something, x , that is either a record or an eventuality

to a record type, the proposition that:

- the value of $r.p$ is the proposition *Alex runs*
- plus introduction of a label, q that allows anaphoric reference to the proposition *Alex runs*

(15) *that Alex runs*

$$\mapsto \lambda r : \left[\begin{array}{l} p:RecType \\ x:Ev \vee Rec \end{array} \right] . [q=r.p, [c_{ar} : run(a)] : RecType]$$

- Where $q=r.p, [c_{ar} : run(a)] : RecType$ iff

$$q : RecType,$$

$$q = r.p = [c_{ar} : run(a)]$$

Analysis of NCCs cont.

(15) *that Alex runs*

$$\mapsto \lambda r : \left[\begin{array}{c} p:RecType \\ x:Ev \vee Rec \end{array} \right] . [q = r.p, [c_{ar} : run(a)] : RecType]$$

Two effects of this analysis

1. A selectional restriction to exclude e.g., *book* (no eventuality- or situation-denoting sense)
2. Underspecification wrt how any bound x is related to p (must come from the semantics of the NP)

Composing Informational Nouns with NCCs

Composition via property modification:

$$(14) \text{ fact} \mapsto \lambda r : \left[\begin{array}{l} p : RecType \\ x : Rec \end{array} \right] \cdot \left[\begin{array}{l} c_{\text{fact}} : \text{fact}(r) \\ f = r.x : r.p \end{array} \right]$$

$$(15) \text{ that Alex runs} \\ \mapsto \lambda r : \left[\begin{array}{l} p:RecType \\ x:Ev \vee Rec \end{array} \right] \cdot [q = r.p, [c_{\text{ar}} : \text{run}(\mathbf{a})] : RecType]$$

$$(16) \text{ fact that Alex runs} \\ \mapsto \lambda r : \left[\begin{array}{l} p:RecType \\ x:Rec \end{array} \right] \cdot \left[\begin{array}{l} c_{\text{fact}} : \text{fact}(r) \\ q = r.p, [c_{\text{ar}} : \text{run}(\mathbf{a})] : RecType \\ f = r.x : r.p \end{array} \right]$$

A property of pairs, r of:

- proposition (rec. type), p
- a situation, x

Such that:

- r is a fact
- the proposition is *Alex runs*
- x makes p true

Comparing Analyses

	Contentful entity approach	Our approach
Relation with proposition	Encoded by <i>that</i>	Encoded by the noun
Facts are entities	Yes	No
Principled explanation for restrictions on NCCs?	No	Yes
Polysemy plays a role	No	Yes

Open question: Situations vs. Eventualities

In Cooper 2023:

- Situations and eventualities are not fundamentally distinct
 - E.g., situation/event e can be a witness for the type $run(alex)$

Here, we assume a more neo-Davidsonian approach:

- Situations and eventualities are distinct
 - E.g., event e can be a witness for the type *allegation*
 - Situations are witnesses for propositions (Record types) (such that these situations may contain events)

So on a broad understanding of *situation* that included neo-Davidsonian eventualities and the truth-makers for propositions:

- NCCs select for nouns that are information-situation polysemous

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