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**A Truthmaker Semantics for Attitude Reports and Modal Sentences**

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**1. The standard view and the new view of attitude reports and modal sentences**

**1.1. The Relational Analysis of attitude reports**

(1) a. John thinks that Mary is happy.

 b. think(John, [*that Mary is happy*])

The roles of propositions:

- primary bearers of truth values

- the meanings of sentences / embedded sentences

- the contents or ‘objects’ of propositional attitudes

Properties of propositions

- have truth conditions essentially

- are mind- and language-independent abstract objects

Problems for propositions

- How can abstract propositions act as the content of mental attitudes?

- How can abstract propositions bear truth values and, as structured propositions, have the particular truth conditions they are supposed to have (the problem of the unity of the proposition)?

Linguistic problems for the Relational Analysis

The Substitution Problem (Moltmann 2003a)

(2) John fears / thought that S.

 John fears / thought the proposition that S.

The interpretation of nominal constructions

(3) a. John’s thought that S / the thought that S

 b. John’s thought was that S.

*that* S a complement, an apposition?

**1.2. The Quantificational Analysis of modals**

Modals represent quantifiers ranging over (accessible) possible worlds (whose range and ordering may be contextually given)

(4) a. John may leave.

 a’. ∃w (w ∈ f(wo) & [*John leave*]w = true)

 b. John must leave.

 b. ∀w(w ∈ f(wo) → [*John leave*]w = true)

**1.3. The new logical form of attitude reports and modal sentences**

(5) a. John thinks that Mary is happy.

 b. John has the thought that Mary is happy.

 c. ∃e(think(e, John) & [*that* *Mary is happy*](product(e)))]

(6) a. John needs to leave.

 b. John has the need to leave.

 c. ∃d(need(d) & [*John to leave*](d))

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**2. Attitudinal objects and cognitive products**

**2.1. Aims**

[1] Avoid the conceptual problems for abstract propositions by making use of attitudinal objects (roughly playing the role of propositions).

[2] Make use of the ontology overtly reflected in particular types of terms and constructions in natural language for the semantic analysis of attitude reports and modal sentences.

General observation (due to Bolzano)

Natural languages hardly display terms for propositions, but rather a wealth of terms for cognitive products and more generally attitudinal and modal objects.

**2.2. Attitudinal objects**

Attitudinal objects include cognitive products, illocutionary products and mental states.

Attitudinal objects are described by non-gerundive nominalizations of attitude verbs.

Cognitive products

*thought, judgment, realization, decision, conclusion*

Illocutionary products

*claim, promise, request, command, answer, question*

‘Mental states’

*intention, desire, belief, fear, hope*

**2.2. The action-product distinction (Twardowski 1911)**

thinking – thought, judging – judgment, deciding – decision, concluding - conclusion

claiming – claim, promising, promise, requesting – request, answering – answer

Products but not actions carry truth or satisfaction conditions and enter similarity relations based on a shared content.

Products, roughly, play the role of propositions but as cognitive particulars.

Products are best understood as the abstract (nonenduring) artifacts (Thomasson 1999) produced by the action (Moltmann 2014, to appear).

By contrast: recent approach to propositions as types of acts (Soames 2010, Hanks 2015).

**2.3. Mental states**

John’s belief that S, John’s intention to do V share the relevant characteristics of cognitive and illocutionary products, but should better not be viewed as products of actions.

Searle (1983)

Intentional states are prior to (intentional) actions

Intentional states come with intrinsic satisfaction conditions and a force (mind-world or world-mind direction of fit)

**2.4. Properties of attitudinal objects (Moltmann 2013, 2014, to appear)**

[1] Having truth or satisfaction conditions

(7) a. John’s belief / claim that that S is true / false.

 b. John’s desire was satisfied.

 c. John’s request was fulfilled.

 d. John’s decision was implemented.

 e. John’s command was executed.

 (8) a. John followed Mary’s advice.

 b. John complied with the instruction.

(9) a. John ignored the command.

 b. John broke his promise.

 c. John took up the offer.

General observation:

Predicates of satisfaction can be predicated neither of propositions nor of actions or events (Ulrich 1979,Twardowski 1911).

[2] Involving a force and a form (mode of (physical) manifestation)

(10) a. ??? John’s hope was his decision (namely to leave the country).

 b. ??? John’s thought was his remark (namely that it will rain).

 c. ??? John’s claim was his suggestion (namely that it might rain).

[3] Having truthmakers or satisfiers

The *by*-locution:

(11) John followed Mary’s advice by taking the class.

Different types of attitudinal objects may have different types of satisfiers (Searle 1983):

Truth-directed attitudinal objects, desires, hopes, fears

situations and actions

Intentions, decisions, plans, directive illocutionary products (requests, demands)

actions ‘by way of fulfilling the intention, decision, request…’ (Searle 1983)

Questions

answers as illocutionary products (questions as speech acts) or cognitive products (questions as products of inquiry)

Attitudinal objects without satisfaction conditions / satisfiers

- imaginations, entertainings, assumptions

- factive emotive states and illocutionary acts: regrets, delights apologies

[4] Agent-dependence, concreteness

(12) a. ??? John’s thought was Mary’s thought.

 b. ??? John’s remark was Mary’s remark.

(13) a. John overheard Mary’s remark.

 b. John’s thought (which he had yesterday) was / ??? is that Mary should be invited.

[5] Similarity relations based on sharing content

*Is the same as*: exact similarity

 (14) a. John’s thought is the same as Mary’s thought.

 b. ? John’s thinking is the same Mary’s thinking.

(15) a.. John’s request is the same as Mary’s request.

 b. ? John’s speech act is the same as Mary’s speech act.

[6] Part structure based on partial content

(16) a. part of John’s decision – part of John’s deciding

 b. part of John’s claim – part of John’s claiming

Parts of attitudinal objects are partial contents, not the temporal parts of actions (or states in a certain sense of state)

[7] Properties of understanding and evaluation based on content

(17) a. John’s answer is incomprehensible.

 b. John’s answering is incomprehensible.

**2.4. Kinds of attitudinal objects**

Terms for kinds of attitudinal objects: *the belief that* S*, the claim that* S*…*

(18) a. The belief that S is widespread.

 b. John and Mary share the belief that S.

Kinds inherit relevant properties from instances, e.g. truth conditions.

**2.5. The logical form of attitude reports based on the notion of an attitudinal object**

Attitude verbs express relations between (Davidsonian) events and agents.

Clausal complements are predicates of the product of the (Davidsonian) event argument.

(19) a. John thought that S

 b. ∃e(think(e, John) & [*that* S](product(e)))

 c. syntactic relation: event-product-pred(*that* S, *thought*)

*believe* etc: event argument is the mental state, product-function maps mental state onto itself

Nominal constructions

(20) a. John’s thought that S

 b. ιd[thought(d, John) & [*that* S](d)]

 c. the thought that S

 d. ιd[thought(d) & [*that* S](d)]

 e. syntactic relation: mod(*that* S, *thought*)

Alternation with complex predicate constructions light verb – product nominalization

(21) *have the thought – think, make a request – request, give avice - advise*

Complex predicates only

(22) *have the impression that*, German *die Absicht haben* ‘have the intention’, French *avoir peur* ‘fear’, *avoir besoin* ‘need’

The semantics of ‘special’ or ‘nominalizing’ quantifiers (Moltmann 2003a,b, 2013)

(23) a. John thought something nice.

 b. ∃e∃d(think(e, John) & nice(d) & d = product(e))

(24) a. John thought what Mary thought.

 b. ∃e∃d∃e’(think(e, John) & d = product-kind(e) & think(e’, Mary) & d = product-

 kind(e’))

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**3. The semantics of attitude reports**

Satisfaction-based sentence meanings

assign truthmakers/satisfiers to attitudinal objects

Derivative sentence meanings as properties of locutionary products

specify products of locutionary acts in terms of smaller, referential and predicational, products

Locutionary products: *that-*clauses specify structure

 (25) a. John thought /said that Mary was happy.

 b. loc-prod(*that Mary is happy*) = λd[d consists of a referential product involving the

 use of ‘Mary’ and a predicational product involving the use of the concept ‘happy’]

 c. ∃e(say(e, John) & loc-prod(*that* *Mary is happy*)(product(e)))

Satisfaction-based sentence meanings:

(26) a. John (implicitly) believes that Mary is happy.

 b. Satisfaction-based sentence meaning (first version)

 [*that* S] = λd[∀i(I ╟ d 🡪 i ╠ S)]

 ╟ : exact truthmaking or satisfaction, ╠ : inexact truthmaking

 c. ∃e(believe(e, John) & [*that* *Mary is happy*](product(e)))

Underspecification of attitudes by clausal complements

(27) Fiona wants to PRO catch a fish. (Fara Graff 2013)

Products are causally relevant and carry full satisfaction / truth conditions.

Clausal complements may underspecify products with respect to their content.

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**4. Modals**

**4.1. Modal predicates**

*Must, may, should, ought to, need to, is obliged to, is necessary, is possible*

The approach

Clausal complement, clausal subject subject or prejacant have the same function in modal sentences as in attitude reports: they are predicates of the modal objects and characterize the modal object in terms of its satisfiers/truthmakers (and perhaps violators/falsifiers)

Deontic modals: take modal products as implicit argument whose satisfiers are actions

Epistemic modals: take modal products as implicit arguments whose satisfiers are situations

**4.2. Modal objects**

Modal products

artifacts produced by illocutionary acts of request, permission, invitation, offer

Modal objects that are not modal products: abilities, logical necessities and possibilities

Modal products described by nominalizations of modal predicates

*The need for John to improve, John obligation to help, the permission to leave, the offer to stay, the invitation to come to the party*

Modal products not described by nominalizations: laws, rules, duties

Properties of modal products

- have satisfaction conditions

(28) a. John fulfilled the need to improve by taking classes

 b. Mary took up the offer to take a vacation by hiking in the montains for a week

- have a temporary existence

Modal products are established and go out of existence at some point in time, but unlike cognitive and illocutionary products they may endure past the act that establishes them.

Evidence 1:

predicates specifying the endurance of a modal product

(29) a. John’s promised yesterday to help. Today, John’s obligation still holds.

 b. Yesterday, John invited Mary to stay. Today,John’s offer is still valid.

Evidence 2:

Choice of tense in specificational sentences:

(30) a. John’s promise (yesterday) was that he would help.

 b. ?? John’s promise is that he would help.

 c. John’s obligation is that he will help.

(31) a. John’s request (yesterday) was that Mary leave the country.

 b. ?? John’s request is that Mary leave the country.

 c. Mary’s obligation is to leave the country.

Modal products are on a par with laws (as products of acts of passing / declaring them):

laws may generally endure past the act of establishing them.

**4.3. Modals of necessity and of possibility**

(32) a. John must help.

 b. John may help.

Difference between deontic *may* and *must*

*must*: modal product (obligation) has both satisfiers and ‘violators’

satisfiers: actions of John’s helping by way of fulfilling the obligation

violators: actions incompatible with John’s helping

*may*: modal product has only ‘satisfiers’

Other cases

promises: have satisfiers and violators,

offers: have only satisfiers,

requests: have satisfiers and violators,

invitations: have only satisfiers

Epistemic modals (roughly)

Epistemic *must*: verifiers: situations verifying the evidence, falsifiers: situations incompatible with the evidence

Epistemic *might*: verifiers: situations compatible with the evidence

**4.4. The logical form of modal sentences and sentences involving modal products**

(33) Satisfaction-based Sentence Meanings (second version)

 [S] = λd[∀s(s ╟ d → s ╠ S ) & ∀s(s ╢ d → s ╣ S)]

╢: exact violation, ╣: inexact falsemaking

(34) a. John must help.

 b. ∃e(must(e) & [*John help*](e))

(35) a. John may leave.

 b. ∃e(may(e) & [*John leave*](e))

(36) a. John asked Mary to come.

 b. John invited Mary to come.

(37) a. ∃e(ask(e, John, Mary) & [*Mary come*](product(e)))

 b. ∃e(invite(e, John, Mary) & [*Mary come*](product(e)))

 c. [*Mary come*] = λd[∀s(s ╟ d → s╠ *Mary come* & ∀s(s ╢ d → s ╣ *Mary come*))]

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