

# Syntactic, semantic and methodological aspects of an expanded ontology in the modal and attitudinal domain<sup>1</sup>

## 1. Introduction

In the target paper, Moltmann has a twofold goal. She argues for the replacement of possible world semantics by object-based truthmaker semantics in the modelling of attitudinal and modal natural language expressions, and for the introduction of two novel ontological classes for this purpose: modal and attitudinal objects. After outlining the standard view and the main components of the proposed alternative, the paper examines different concrete types of attitudinal and modal expressions which have presented problems for the standard theory, presenting their analysis in the proposed approach, and pointing out the advantages of the latter.

Overall, Moltmann's approach gives a much tighter semantics of modal and attitudinal meanings. Her general preference is for simplex items over complex representations: truthmakers over clauses specifying truth conditions, attitudinal and modal objects over possible-world predicates, attitudinal-and-modal-object predicates over orderings and divisions among possible worlds as attitudinal and modal bases. In all these cases, it is the expansion of ontology that is chosen over deriving the observed phenomena from a minimal ontology. Most prominently, she adds the ontological classes of attitudinal and modal objects, which get further divided into subclasses too, when it turns out that different attitudes or modalities trigger different linguistic effects. This enables her to model attitudinal and modal nuances (beliefs, doubts, claims, suggestions, i.e. permissions, obligations, possibilities, necessities) by assigning each of them a corresponding predicate. Instead of e.g. an existential quantification over Mary-leaving situations within the domain of situations that comply with deontic requirements – in order to capture the semantic nuance of permission, she directly predicates of a modal object that it is a weak or strong permission, and that its truthmaking is determined by the clause *Mary is leaving*.

This high degree of precision comes at the price of ontological complexity. Pros and contras of this move, in syntax and semantics, are the main topic of this commentary paper –with the addition of a brief comment on one of the arguments for truthmaker semantics. Section 2 puts the proposal of two novel ontological classes in the context of a particular syntactic analysis of complement clauses which is compatible with it, and concludes that it both provides the syntactic approach with a simpler semantics and makes it more regular in terms of basic cartographic assumptions. The rest of the paper discusses a selection of the semantic phenomena discussed in the target paper. Section 3 tackles the danger of obscuring underlying dependencies between semantic components by the expansion of ontology, exemplified on the account for a distinction in strength between two types of permissions pointed out and analyzed in the target paper. Section 4 observes some empirical regularities which may pose challenges for the analysis proposed in the target paper and section 5 problematizes the assumption that the capacity of causation diagnoses concreteness. Section 6 points out a possible overgeneration of the account proposed for disjunctions with respect to Hurford's constraint.

## 2. Syntactic aspects of the introduction of modal and attitudinal objects

The lexical category of nouns is special with regards to ontological classes. While verbs are restricted to eventualities and adjectives to degrees and properties, nouns are unrestricted.

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They can refer to entities of any ontological class: to concrete and abstract objects, to kinds and instantiations, to individuals, situations (including states and events), properties. Nevertheless, there is an intuition that nouns denote objects, and that even when they denote kinds, or properties or events, they do so as if they were referring to objects. Nouns 'objectify' other ontological classes by virtue of referring within them. Consider the illustration in (1).

- (1) a. free people : people's liberty  
b. John runs : John's running

There appears to be a correlation between being nominal and being conceptualized as an object, i.e. disregarding any narrower ontological class that the referent belongs to. This is an intuition that Moltmann's treatment of nominalizations of modal and attitudinal predicates as objects closely fits. Crucially, complement clauses are predicates on this account, ranging over attitudinal and modal objects. Hence, it is not complement clauses that display a noun-like behavior, but the silent or incorporated nominal expressions denoting modal and attitudinal objects that they describe.

That complement clauses are predicates ranging over attitudinal (i.e. evidential) and modal meanings has also been argued on syntactic grounds. Arguably the closest syntactic analysis to Moltmann's semantic views is my analysis in Arsenijević (2009), where complement clauses are modelled as relatives whose relativization site is a modal or evidential projection in the left periphery of the clause.<sup>2</sup>

Moltmann's approach in the target paper, taking complement clauses of modal and attitude verbs to stand for predicates over modal and attitudinal objects contrasts with the traditional view on which they denote characteristic predicates of sets of possible worlds (Hintikka 1969). On Hintikka's classical view, all attitude verbs share the nature of a universal quantifier over possible worlds, and differ in the lexically specified accessibility relation (which can be bouletic, doxastic, directive). The argument determining the set of worlds is the complement clause, and the one determining the division of worlds is the subject, i.e. the bearer of the attitude.

In Arsenijević (2009), I argued that complement clauses are headed relative clauses, derived in terms of Kayne's (1994) raising analysis. Their peculiarity is that the raising constituent is a functional head from the periphery of the complement clause. Like in Kayne, this item raises into a noun, which then possibly incorporates into a verb.

The analysis builds on the observation that meanings expressed by verbs taking complement clauses typically also can be expressed by sentential adverbials.

- (2) a. Reportedly, there'll be a recession in the coming years.  
b. John said that there'll be a recession in the coming years.  
c. Possibly, there'll be a recession in the coming years.  
d. There can be a recession in the coming years.

When modal and evidential adverbials are embedded under attitude verbs, they often behave as modals of concord, failing to contribute any semantics beyond that contributed by the higher item. Alternatively, they may trigger a direct speech interpretation or have a meta-interpretation where the modal or attitudinal verb targets the particular formulation, not the

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<sup>2</sup> There are also analyses of complement clauses as free relatives, see Manzini and Savoia (2003). These approaches are more in line with attributing the nominal behavior to the complement clause itself, since free relatives have traditionally been analyzed as definite descriptions just like definite nominal expressions (Jacobson 1995) – and therefore less relevant for the target paper. For more details on the situation-relative analysis of embedded clauses, see Arsenijević (2020).

actual semantic content of the complement clause. If none of these options are available, the sentence is semantically ill-formed.

- (3) a. They claimed that Mary allegedly committed fraud.
- b. How can John possibly wear pink clothes and that blond hair?
- c. #Mary believes that John is evidently ill.
- d. #John doubts that Mary clearly isn't home.

This supports the view that attitude verbs belong to the same semantic class with evidential and modal adverbials.

The following is a summary of my (2009) analysis of the traditional attitude and modal verbs taking clausal complements, with a small modification: rather than the head of the respective functional projection as in the original analysis, it will be its specifier that raises into a noun. The reason for the modification has to do with the compatibility with the target paper, and will become clear towards the end of the section.

As already pointed out, both matrix and complement clauses may involve an attitudinal or modal semantic component. Adverbials expressing such a component have been analyzed in the cartographic tradition to surface in the modal and evidential functional projections corresponding to their interpretation (Cinque 1999). Cartographic syntax takes these projections to be headed by class-predicates – in this case these are predicates specifying the type of evidentiality or modality. The predicate takes two arguments, in its complement and in its specifier. In the case of modal and attitudinal heads in the clausal structure, these are always a clause (as the complement) and a subspecification of the head (as the specifier, for instance REPORT subspecifies a hearsay evidential predicate, which in turn takes a clause in its complement).

- |     |                  |             |                            |            |
|-----|------------------|-------------|----------------------------|------------|
| (4) | <i>Specifier</i> | <i>Head</i> | <i>Complement</i>          |            |
|     | [Evid/hearsayP   | [REPORT]    | [EVID <sub>hearsay</sub> ] | [IP ... ]] |
|     | reportedly       |             | the virus has slowed down  |            |

Attitude verbs are analyzed to derive from the structure in (4), and to crucially incorporate the specifier of the respective projection. The specifier raises across the clause edge into a lexical noun, in full parallel to Kayne's (1994) analysis of relative clauses. This noun can project a DP, thus resulting in a nominal expression, but it also can be verbalized by a light verb, i.e. by an aspectual specification, as in the illustrations in (5)-(7), in which case the derived verb then projects its verbal extended projection.

- (5) [<sub>VP</sub> [<sub>DP</sub> the announcer] [<sub>VP</sub> ACT [<sub>ResP</sub> BE [<sub>NP</sub> [REPORT]<sub>i</sub>] [<sub>EvidP</sub> [~~REPORT~~]<sub>i</sub>] [EVID<sub>hearsay</sub>] [<sub>CP</sub> that John is ill]]]]]]]]  
 (the vP of the sentence *The announcer reported that John is ill.*)  
 ACT + REPORT = report<sub>v</sub>

- (6) [<sub>VP</sub> [<sub>DP</sub> the announcer] [<sub>VP</sub> HAS [<sub>NP</sub> BELIEF<sub>i</sub> [<sub>AttitP</sub> [BELIEF]<sub>i</sub>] [EVID<sub>attit</sub>] [<sub>CP</sub> that John is ill]]]]]]]]  
 (the vP of the sentence *The announcer believed that John is ill.*)  
 HAS + BELIEF = believe<sub>v</sub>

- (7) [<sub>VP</sub> [<sub>DP</sub> John]<sub>k</sub> [<sub>VP</sub> IS [<sub>NP</sub> POSSIBLE<sub>i</sub> [<sub>Mod\_epistP</sub> [POSSIBLE]<sub>i</sub>] [MOD<sub>epist</sub>] [<sub>XP</sub> [~~DP~~ John]<sub>k</sub> be ill]]]]]]]]  
 (the vP of the sentence *John can be ill.*)  
 IS + POSSIBLE = can<sub>v</sub>

This syntactic operation results in a nominalization, and further optional verbalization, of the respective evidentially or modally modified clause. Illustrating this on the example in (5), its

VP stands for an event of acting which results in the existence of the report that John is ill. The report in this sentence is the nominalization of the evidentially modified clause *reportedly, John is ill*. The VP in (6) denotes an eventuality in which the belief is maintained that John is ill, and the respective incorporated NP is the nominalization of the evidentially modified clause *John is ill, she believes*. The VP in (7) stands for an eventuality of there being a possibility that John be ill, where the NP incorporated into the verb denotes the modally modified clause *John is possibly ill*. This closely matches the semantically motivated proposal in the target paper. Let us take a more detailed look into the semantics associated with this syntactic operation and with its outcome. For evidential and attitude predicates, a straightforward solution is to treat the respective heads ( $EVID_{\text{hearsay}}$ ,  $EVID_{\text{attit}}$ ,  $MOD_{\text{epist}}$ ) as type  $\langle\langle st \rangle \langle st \rangle t \rangle$  expressions (situational quantificational determiners). The clause in the complement of this head is a predicate over situations, in line with the standard view of clauses and propositional meanings. The subspecification *REPORT*, considering the example in (5) is too, as it denotes the set of situations which are compatible with what is reported, and similarly the specification *BELIEF* in (6) denotes the set of situations compatible with what is believed (possibly further restricted by specifying the holder of the relevant beliefs). The head takes the set of situations denoted by the clause in its complement and returns a quantifier: a function from sets of situations to truth values. It returns *true* if the intersection between the two predicates over situations, that denoted by the specifier (*is compatible with what is reported/believed*) and that denoted by the clause, is non-empty, and otherwise *false*. In a way, thus, the head is an attitudinally flavored existential quantifier over situations.

Attitudinal (i.e. evidential) heads denote universal quantifiers in the form:  $\lambda P_{\text{Acc}} \lambda P_s [\forall s. P_{\text{Acc}}(s) \Rightarrow P_s(s)]$ . They specify for a predicate over situations and a kind of accessibility, that the former is a subset of the latter (i.e. that a proposition is a subset of the set of worlds accessible by a particular accessibility relation). Modal heads may as well have an existential force.

The raising of the accessibility relation predicate across the clause boundary and into the noun semantically corresponds to lambda abstraction (Heim and Kratzer 1998). The denotation of the complement clause occurring in (5) and in (6), after the raising, is as in (8). Note that this implies that a complement clause may correspond to a range of different structures and meanings, depending on the projection whose specifier raises.

$$(8) \lambda P_s [\forall s. P_s(s) \Rightarrow \text{Ill}(\text{John})(s)] \\ \text{that John is ill}$$

The denotation of the noun into which the respective predicate raises in (5) is as in (9) (and mutatis mutandis for the one in (6), except that the predicate would be *belief*, possibly with an additional argument).

$$(9) \lambda s [\text{report}(s)] \quad (\text{where } \text{report} = \text{compatible with what is reported}) \\ \text{report}$$

After composition and reduction, the NP is of the type  $\langle t \rangle$ , i.e. it denotes a proposition, as shown in (10).

$$(10) \lambda P_s [\forall s. P_s(s) \Rightarrow \text{Ill}(\text{John})(s)] (\lambda s [\text{report}(s)]) \\ \forall s. \text{report}(s) \Rightarrow \text{Ill}(\text{John})(s) \\ \text{report that John is ill}$$

Its intension is a function from situations to truth values  $\langle s, t \rangle$ : the expression stands for the set of situations in which the content of the embedded clause is compatible with what is

reported. Notice that neither interpretation captures the objectifying effect of nominal reference that the section departs from.

The analysis analogously applies to modals. Modal items, adverbials like *possibly*, *necessarily*, *obligatorily* (and consequently also items deriving from them: their nominalizations and verbs like *can*, *must*, *may*) involve a head specifying the modal force (possibility or necessity) and restricting the type of modal base, and a specifier subspecifying the modal base (epistemic, deontic, bouletic, circumstantial etc. and their finer classes). The meaning of the head is analogously to attitude heads:  $\lambda P_{\text{Mod\_base}} \lambda P_s [\forall s. P_{\text{Acc}}(s) \Rightarrow P_s(s)]$ , or alternatively  $\lambda P_{\text{Mod\_base}} \lambda P_s [\exists s. P_{\text{Acc}}(s) \wedge P_s(s)]$ . The specifier provides the modal base predicate and the complement the proposition. Spec-head agreement obtains (it also does in attitudinal, i.e. evidential phrases, but there it is vacuous due to the invariant specification of the head), in result of which the specifier (i.e. the adverbial which sits there, and consequently also the noun or verb derived via raising) realize not only the modal base, but also the modal force. Analogously to (10), this yields the semantics in (11) for the modal variant (assuming *epistemic* stands for *compatible with what is known*).

- (11)  $\lambda P_s [\exists s. P_s(s) \wedge \text{ill}(\text{John})(s)] (\lambda s [\text{epistemic}(s)])$   
 $\exists s. \text{epistemic}(s) \wedge \text{ill}(\text{John})(s)$   
 possibility that John is ill (on the epistemic interpretation)

The semantics of the sentences in (5)-(7), in informal terms, comes out as in (12)-(14), respectively.

(12) the announcer acted and in result that John is ill is compatible with what is reported

(13) in the announcer's model, that John is ill is compatible with what is believed

(14) that John is ill is compatible with what is known

The core question in light of the target paper is what the nominalizations refer to (considering that once the nominalization is explained, the meaning of the verb compositionally derives from it). On the present account, as pointed out, the nominalization stands for a proposition (see (11)).<sup>3</sup> On Moltmann's, it refers to a modal or attitudinal object. Some of her central arguments can be extended to the present discussion triggered by syntactic considerations. It is, for instance, somewhat counterintuitive to consider that propositions about other propositions can be results of episodic events (cf. the meaning of (5) as specified in (12)). Similarly, that a proposition about a proposition, as a set of situations whose participants are sets of situations, can be situated at a location as in (13) is not entirely straightforward (although not exactly unimaginable). These two properties, being a result of an episodic event and having a location, are of the same type as those that Moltmann considers to be typical properties of concrete objects.

On her view, thus, as well as in line with general observations about the semantic ontology of nouns, the nominalization of a clause not only changes the syntactic category of the expression, but also its ontological class. It shifts a proposition (an expression of the type  $\langle t, \rangle$ , or  $\langle s, t \rangle$ ) into an attitudinal or modal object (an expression of the type  $o_{\text{att}} / o_{\text{mod}}$ ). While pros and contras of this step are a much broader issue, some aspects of which are discussed in the

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<sup>3</sup> Nouns derived by a nominalization of evidential and attitude predicates are often homonymous with deverbal nouns derived by conversion from the corresponding evidential and attitude verbs. The noun *report* therefore may refer to propositions, but it may also refer to speech act events. As this interpretation corresponds to a derived structure, I only invoke it when it interferes with the arguments under discussion and otherwise ignore it.

rest of this paper, Moltmann’s view evidently finds a matching operation within a syntactic analysis of complement clauses based on the raising of the specifier from an evidential or modal projection in its structure – namely the assignment of the nominal category to the extracted predicate. Empirical support for the view that nominalization has the semantic effect of type-shifting comes from the fact that on no available interpretation, the two expressions in (15) are equivalent.

- (15) a. that reportedly John is ill  
 b. a report that John is ill

Intuitively, the difference is that (15a) has the capacity to update the discourse by the content of the proposition it denotes, while (15b) does not. Between accounting for the asymmetry in terms of syntactic categories (clauses may combine with speech acts, nouns at least in English and similar languages not) and assigning the syntactic asymmetry a semantic ontological counterpart – Moltmann chooses the latter. When the present syntactic analysis is combined with her views, (15a) gets to denote a proposition and (15b), due to its nominal category, an attitudinal object.

Moltmann’s view allows for a simplification of the syntactic analysis. If the noun emerging through raising refers in the domain of special types of objects, then already the item in the specifier of the respective functional projection, the one that derives a complement clause by moving out of it, may be of this type: a predicate over attitudinal or modal objects. A consequence is that evidential and modal adverbs on such a view denote functions from predicates over situations to (predicates over) modal objects, specifying that the former present the characteristic content of the latter. The type of the head would be  $\langle\langle st \rangle\langle o_{att} \rangle\rangle$  for attitudinal adverbs, i.e.,  $\langle\langle st \rangle\langle o_{mod} \rangle\rangle$  for modals. This head remains silent, but gets phonological realization via agreement with the adverb sitting in the specifier.

The syntactic representation in (5) is replaced by that in (16), and the semantic representations in (8)-(10) by those in (17)-(19).

(16) [<sub>VP</sub> [<sub>DP</sub> the announcer] [<sub>VP</sub> ACT [<sub>ResP</sub> BE [<sub>NP</sub> [<sub>n</sub> REPORT<sub>i</sub>] [<sub>EvidP</sub> [<sub>n</sub> ~~REPORT<sub>i</sub>~~] EVID<sub>say</sub>] [<sub>CP</sub> that John is ill]]]]]]]]

(the vP of the sentence *The announcer reported that John is ill.*)

ACT + REPORT = report

(17)  $\lambda_{att} \lambda_s [\text{content}(\text{att}, \text{ill}(\text{John})(s))]$   
 that John is ill

(18)  $\lambda_{att} [\text{report}(\text{att})]$   
 report

(19)  $\lambda_{att} [\text{report}(\text{att})] (\lambda_{att} [\text{content}(\text{att}, \text{ill}(\text{John})(s))])$   
 $\lambda_{att} [\text{report}(\text{att}) \wedge \text{content}(\text{att}, \text{ill}(\text{John})(s))]$   
 report that John is ill

The resulting line of analysis at the syntax-semantics interface is certainly worthwhile further investigation and comparison with the alternatives. Two aspect in which it fares better is the objectified denotation of the noun compared with the clause which it nominalizes and the simpler type of the raising item. The latter component requires the implemented modification of Arsenijević (2009), where the specifier rather than the head of the relevant evidential or modal functional projection extracts to derive a complement clause – because a defining property of functional heads is that they cannot denote objects.

### 3. Ontology expansion and its consequences for the analytic potential

The introduction of two novel types of objects specific to the two families of expressions discussed, namely attitudinal and modal objects constitutes one of the two main proposals of the target paper. Further ontological branching is added to resolve more particular issues, such as the contrast between strong(er) and weak(er) (strong) permissions, as discussed below. The introduction of specialized ontological classes carries the danger of obscuring certain relations which exist between the objects under investigation, and thus closing the way for an empirically stronger account with a reductionist potential (in deriving some regularities from others). Let me discuss one illustrative example from the target paper.

One of Moltmann's arguments for the expansion of ontology by the attitudinal and modal objects, compared to the standard approach where the respective asymmetries are derived from a more conservative set of classes, comes from what she labels strong and weak permissions (see also Moltmann 2018).<sup>4</sup> These two types of permission are illustrated in (20) (Moltmann's (22)), where the permission expressed in (20a) is weaker than that in (20b).

- (20) a. Mary is permitted to take a walk.  
b. Mary has permission to take a walk.

Moltmann's solution is to treat these two types of expressions in terms of two different classes of objects: one as a state of what is permitted which is individuated in connection with what is obligatory, the other as an act that introduces permission. In this way she directly captures the difference in terms of ontological sub-classification, arguing that for traditional possible world semantics, these meanings are equivalent, and the difference cannot be expressed.

I argue for the contrary: that traditional possible worlds semantics offers well suited tools to capture the difference in (20) with high descriptive accuracy, and that the introduction of novel ontological classes as a solution hides some more general principles which relate the two types of permission.

Sentence (20a) has an interpretation approximately described as an adjectival passive (e.g. Kratzer 2000, Gehrke 2011) with the topic situation as its subject: there are situations which conform with deontic parameters and are accessible from the point of evaluation, and in which Mary takes a walk. Moreover, the underlying subject of the predicate *is permitted* is the infinitival clause *Mary to take a walk*. The reason why only the subject of this clause, *Mary*, rather than the entire clause, surfaces in the subject position is that the infinitive is unable to assign case.

In (20b), the infinitival clause has a PRO subject and is embedded within the nominal expression in the direct object position, headed by the noun *permission*. The situation-description *Mary to take a walk* does not figure at any point in the structure as its two components *Mary* and *to take a walk* are generated in disjoint constituents. In addition to that, the sentence (20b) involves a verbal predicate, which allows an event interpretation: it is a result of an event that Mary has permission. This is the interpretation for the verb *to have* that obtains in contexts such as (21).

- (21) As soon as Mary finds her glasses, I'll let you know. ... She has them!

On this interpretation, which I conditionally label 'verbal', an instantiation takes place of an event-kind, such that there are situations which include such an event, conform with deontic parameters, are accessible from the point of evaluation, and in which Mary takes a walk after

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<sup>4</sup> In my view, both flavors of permission discussed belong to the traditional strong permissions, rather than to the weak permission in the sense of the dual of obligation. One of the two is still stronger, and more explicit.

the relevant event. A cancellable implicature emerges that no accessible situations without such an event, or situations with such an event where Mary takes a walk before it, comply with the deontic parameters. This implicature strengthens the meaning of permission, i.e. yields an intuition that it is more explicit. The availability of sentences like (20a) triggers an antipresupposition (Heim 1991), thereby additionally strengthening the event interpretation against the stative one.

From a somewhat different perspective, on the broad focus reading, there are two sets of alternatives in the common ground that the sentences in (20) address. One is {Mary to take a walk is permitted, Mary to take a walk is not permitted}, and it is possibly addressed by both sentences. The other is {Mary has been given permission to take a walk, Mary has not been given permission to take a walk}, and it is only available to (20b). That in this sentence the infinitival clause is embedded in a nominal expression headed by the noun *permission* implies the existence of permissions to take a walk as a kind. The sentence thus presupposes that permissions to take a walk are an existing kind of objects which can be possessed, given or taken away and that an event of permission-giving is required for Mary to take a walk, which results in a stronger permission interpretation.

This approach makes a prediction that a minimal counterpart of (20a) different only in promoting the event interpretation would also have more readily available the higher explicit strength observed on (20b). This is confirmed in (22). Sentence (22b), being in the past tense, makes more prominent the verbal passive interpretation. On that reading, it establishes a similar contrast to (22a), repeated from (20a), as (20b) does.

- (22) a. Mary is permitted to take a walk.  
b. Mary was permitted to take a walk.

The contrast might not be as strong because in (22b), the infinitival clause is not embedded in the nominal argument referring to the permission (i.e. on one parse, *Mary to take a walk* is a constituent).

#### **4. Ontology expansion and the opposition between kinds and instantiations**

One of Moltmann's arguments for the introduction of attitudinal objects is that we find in language attitudinal objects such as claims or beliefs both as kinds and as instantiations. Consider the two sentences in (23). They describe the same state of affairs, but, on Moltmann's view, (23a) says that John and Mary share the kind of belief characterized by the expressed content, while (23b) says that they have belief-instantiations which are identical (with the essential property for comparison being their content).

- (23) a. John believes that disinfectants cure from viruses, and Mary does too. They've been sharing this belief ever since they heard it from an unquestionable authority.  
b. John believes that disinfectants cure from viruses, and Mary does too. They've had identical beliefs on this issue ever since they heard them from unquestionable authorities.

The kind-instantiation opposition is observed between two nominal expressions without clausal complements, even though their content is introduced in the previous discourse by a complement clause. Still, nouns of this type receive different semantics with and without a complement clause. In order to present an argument for the expressability of both kinds and instantiations of attitudinal and modal objects, the same needs to be exhibited by NPs which include clausal complements. However, such expressions turn out not to establish the relevant asymmetry, as shown in (24) – where (24a) aims at a kind interpretation, and (24b) at instantiations (only the reading in which there are two individual beliefs, both exhaustively



described by the complement clause *that disinfectants cure from viruses* is relevant, and on that reading the sentence is marked as semantically ill-formed).

(24) a. John and Mary have been sharing the belief that disinfectants cure from viruses ever since they heard it from an unquestionable authority.

b. #John and Mary have had identical beliefs that disinfectants cure from viruses ever since they heard them from unquestionable authorities.

On a deeper look, even (23b) does not involve two individual instantiations of beliefs, which are identical. Rather, it involves two pluralities of unindividuated beliefs concerning the same topic. Not John's belief regarding the issue and Mary's belief regarding the issue are identical, but John's beliefs regarding the issue and Mary's beliefs regarding the issue. Hence, (23) and (24) are not in contradiction with each other – they both indicate that instantiation interpretations cannot easily be forced on this type of expressions.

These data indicate that the complement clause effects maximization: there cannot be two beliefs that disinfectants cure from viruses, there cannot be two claims that the earth is concave – unless the noun is interpreted to refer to an event of claiming rather than to the content expressed by a clause, where only the latter is relevant for our discussion. John's belief that disinfectants cure from viruses and Mary's belief that disinfectants cure from viruses are one and the same belief, held by both John and Mary. The sentences in (25) are salient only if the contents of the two beliefs, i.e. the two claims are richer than the meaning of the complement clause and the sentence is interpreted as underspecified in this regard, or if the difference is not between the beliefs or claims, but between the circumstances or their implications.

(25) a. There is a slight difference between John's belief that disinfectants cure from viruses and Mary's belief that disinfectants cure from viruses.

b. You cannot compare John's belief that disinfectants cure from viruses with Mary's belief that disinfectants cure from viruses.

c. There is a slight difference between John's claim that the earth is concave and Mary's claim that the earth is concave.

d. You cannot compare John's claim that the earth is concave with Mary's claim that the earth is concave.

Continuations like *John believes they do it if taken orally and Mary intravenously* or *John claimed that in front of a bunch of astronomers, and Mary while sleepwalking*, respectively, express possible ways to make the sentences pragmatically acceptable. On the narrow literal interpretation, the sentences are ill-formed.

In support of this view, consider the contrasts in (26). The numeral expressions without complement clauses may have the reading where each of the counted instantiations has different content, and in (26a) also the deverbal nominalization interpretation of three events of claiming, possibly with the same content. Those with a complement clause may only have the latter interpretation if it is made available by the underlying verb, as in (26a) – else they are semantically ill-formed.

(26) a. three claims vs. three claims that the earth is concave

b. seven beliefs vs. #seven beliefs that disinfectants cure from viruses

Final support comes from the fact that sentences as in (27) are semantically well-formed. Were a person's belief a token, it wouldn't have been possible to sensibly assert that it is widespread among a group of people.<sup>5</sup>

(27) I suspect his belief that the Democratic base consists of everyone who voted Democrat in November 2008 is widespread among all partisans, which is why this stomach-churning political pendulum continues.

Recall that among the two analyses discussed in section 2, on one an attitude or modal noun with a complement clause ranges over propositions, and on the other, as in the target paper, it ranges over attitudinal or modal objects.

The former analysis predicts exactly this type of effects. The NP stands for a proposition about the relation between two predicates: one specifying a domain (compatible with what is reported / believed / permitted / possible...) and another a set of situations, i.e. on the intensional interpretation for a predicate over situations. Neither meaning allows for a contrast between kinds and instantiations.

On the latter view, involving the classes of attitudinal and modal objects, it is indeed expected that kind and instantiation interpretations are available. The inability to establish clear instantiation readings requires further modelling complexity for the same empirical coverage, giving advantage to the approach without the expansion of ontology.

## 5. Causation

Moltmann argues that attitudinal objects are concrete. Her central argument is that they may trigger content-based causation, in examples such as (28a). She points out that it is not merely making a claim that caused excitement ((28b) and (28a) are not equivalent), but the claim including its content – which is exactly what she takes the attitudinal object to stand for. Note that, importantly, it is not the mere content of the claim that acts as the causer either: (28c) is not only not equivalent to (28a), but due to the stative nature of the content actually degraded (unless it is coerced into an event, e.g. of establishing a plan or learning about it).

- (28) a. Mary's claim (that heaven's got a plan for her) caused excitement.  
b. Mary's making a claim caused excitement.  
c. ?It caused a lot of excitement that heaven's got a plan for Mary.

I fail to see how the ability of causation testifies of concreteness, i.e. how concreteness is a necessary condition for causation. A more appropriate generalization seems to be that only events have the capacity of causation. Other causes are only apparent, i.e. indirect, via events in which they take part. But that implies that it is exactly the event-interpretation in (28) that can effect causation – and not the content-noun interpretation which is the only one relevant for the argument made.

Indeed, in (28a), it is precisely the event as described, in its totality, that causes excitement: the event of Mary making a claim that the heaven's got a plan for her.

A full parallel can be established with another type of nouns ambiguous between an event and an object interpretation – in this case the object being the result, as in (29a). Compare (29a, b, c) with (28a, b, c), respectively.

- (29) a. The Arabic invention (of the zero) caused progress in math.  
b. The Arabs' making an invention caused progress in math.  
c. The zero caused progress in math.

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<sup>5</sup> I am grateful to Magdalena Kaufmann (p.c.) for pointing out this argument to me.

“The Arabic invention of the zero” in (29a) is only salient on the event reading (even though the nominal expression is in principle ambiguous between the event and the result interpretation) – exactly like (28a), and (29c), just like (28c) must have its subject coerced into an event to be interpretable.

Why then are (28b) and (29b), which may only have an event interpretation, not equivalent, respectively, to (28a) and (29a), as Moltmann correctly points out? The reason is that these expressions are not the actual eventive counterparts of (28a) and (29a), respectively, since they differ in definiteness, as well as in whether or not the content is expressed.

Once this is corrected, the equivalence is established (leaving aside the information-structural and other differences stemming from the marked complex expression of the content). Examples in (30) are semantic equivalents of those in (28a) and (29a).

- (30) a. Mary’s making of the claim (that heaven’s got a plan for her) caused excitement.  
a’. Mary’s claiming that heaven’s got a plan for her caused excitement.  
b. The Arabs’ making of the invention (of the zero) caused progress in math.  
b’. The Arabs’ inventing the zero caused progress in math.

Recall that of the two interpretations available for expressions involving an attitude noun, the event interpretation and the content-noun interpretation, only the latter is relevant for the current discussion. The examples involving causation all relate to the event reading, and therefore do not provide any arguments for the concreteness of attitudinal objects.

## 6. Hurford’s constraint

Unlike the rest of the paper, this section does not target the expansion of ontology. Rather, it concerns the status of the truthmaking semantics. Hence, it is not directed at Moltmann’s account of attitudinal and modal predicates, but rather at the claimed advantage of truthmaker semantics over minimal situations.

As an argument in favor of exact truthmaking, instead of verification by minimal supporting situations (Kratzer 2002, 2014), Moltmann invokes Hurford’s disjunctions (Hurford 1974), i.e. disjunctions whose one member entails the other, like that in (31).

(31) It is windy, or it is windy and rainy.

The argument is that the entire sentence in (31) has only one minimal situation that verifies it, namely one in which it is only windy. This yields the unwanted result that the sentence in (31) is semantically equivalent to that in (32).

(32) It is windy.

On the exact truthmaking account, where the meaning of a sentence is the sum of all its exact truthmaker situations, the sentence in (31) has two different exact truthmakers: the windy situation, and the [windy and rainy] situation. Its overall meaning is the sum of these two situations. This matches the semantic intuition about the sentence.

The argument is based on a special kind of disjunctions, which are subject to a range of constraints. For instance, they require that the second disjunct entails the first, not vice versa, i.e. not without explicitly marked exhaustivity which removes the entailment relation.

(33) It is windy and rainy, or it is #(only) windy.

This is why it has been argued that in cases as in (31), the first disjunct receives an exhaustive interpretation (*only windy* in this case), such that it is no more entailed by the other disjunct

(Simons, 2001, Chierchia et al. 2009, 2012, among many others). This correctly makes (31) equivalent with (34).

(34) It is only windy, or it is (both) windy and rainy.

Considering that truthmaker semantics is a novel framework, which has not yet had a chance to develop elaborate accounts for a broad range of concrete relevant empirical phenomena, and that the property of exactness of its version implemented by Moltmann has non-trivial consequences for exhaustivity, it is not entirely clear how it would be used to model the exhaustivity component in Hurford's disjunctions. There are two general strategies that I can think of. One is that the exhaustivity of the first disjunct is captured by the exactness of truthmakers and falsemakers, because the exact truthmaker (and the exact falsemaker) of the exhaustive disjunct do not include any other content. This view is supported by the trivial nature of the account of exact truthmaker semantics for Hurford's disjunction. In this case, the account needs additional means to exclude the unacceptable pattern in the version of (33) without an explicit expression of exhaustivity, as well as those excluded by Hurford's constraint as in (35).

(35) #John ate beef or meat.  
#John ate meat or beef.

Considering that the pairs of disjuncts have different exact truthmakers, the sentences should be as good as (31). More generally, a framework that trivially accounts for exceptions from Hurford's constraint needs additional measures to account for the constraint itself. Otherwise, it overgenerates, while failing to capture the asymmetric requirement for an overt expression of exhaustivity.

The other option is that the exhaustivity of the first disjunct is not captured by the exactness of truthmakers and falsemakers. In this case, the exact truthmaking account needs additional means to account for the exhaustivity too. And especially since it is not a trivial task for exact truthmaking to account for exhaustivity, any comparison of the frameworks is premature before such an account has been provided.

The relevant question is hence how exact truthmaker semantics captures the differences in meaning between sentences with and without exhaustivity markers, as in the series in (36) (words in capitals are under narrow focus).

(36) a. John introduced Mary to Sue.  
b. Only JOHN introduced Mary to Sue.  
c. John only INTRODUCED Mary to Sue.  
d. John only introduced MARY to Sue.  
e. John only introduced Mary to SUE.

Considering that the exact truthmaker semantics models the meaning of a sentence in terms of the pair of its exact truthmaker and its exact falsemaker, and both these are situations – this is a non-trivial task.

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