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Nominalizations: The Case of Nominalizations of Modal Predicates

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Abstract

Nominalizations describing events and tropes have received considerable interest in the semantic (and philosophical) literature. By contrast, nominalizations of modal predicates and the modal objects they describe have received little, if any, attention in the literature so far. This paper is a case study of nominalizations of the sort *need* and *possibility* as well as *permission*, *obligation*, *invitation*, *offer*, and *ability*. The paper will argue that nominalizations of modal predicates require recognizing a novel ontological category of modal objects, entities that arguably play a role also in the semantics of modal sentences in general. The paper will give a general characterization of modal objects and address the question how two familiar semantic nominalization strategies fare in regard to how the semantics of the nominalization may be obtained from the underlying modal predicate. Those strategies are the Davidsonian account of nominalizations, which takes nominalizations to pick up an implicit argument of the underlying predicate, and the Kimian (pleonastic) account, which takes nominalizations to introduce 'new' objects into the semantic structure of a sentence that would not have been present otherwise. The paper will argue that both the Davidsonian account and the Kimian account may be needed for the full range of nominalizations of modal predicates. The paper will furthermore outline a new semantics of modals based on modal objects.

Introduction

The semantics of nominalizations has always been a challenge, not only for semantic theory, but also ontology. While there is a significant amount of work on the semantics of event nominalizations derived from verbs as well as, to some extent, fact nominalizations, and trope nominalizations derived from adjectives, nominalization of modal predicates have hardly received any attention by semanticists (or philosophers). This article will focus on nominalizations of modal predicates against the background of the semantics of the more familiar sorts of nominalizations. It argues that nominalizations of modal predicates such as *obligation*, *permission*, and *need* require recognizing an ontological category of modal objects

distinct from events, states, and tropes. Such modal objects arguably play an important role not only for nominalizations of modal predicates, but for the semantics of modals themselves.

Nominalizations are nouns that are derived from an expression (the base expression) of a possibly different category, such as a verb or an adjective. Thus the nominalization *laughter* is derived from the verb *laugh* and can serve to form the referential term *John's laughter*, referring to an event. The nominalization *happiness* is derived from the adjective *happy*, and can serve to form the referential term *John's happiness*, referring to a trope or particularized property, that is, the manifestation of happiness in John. In a derivative sense, also nominal constructions obtained from sentences are called nominalizations, such as *the fact that John is happy*, which is in a way derived from the sentence *John is happy*.

Nominalizations obviously have a semantics that is related to that of the base expressions and so should have a meaning that is obtainable from -- or at least systematically related to -- that of the base expression. For some nominalizations this is straightforward; for example agent nominalizations such as *driver* stand for entities that are arguments of the base expression. But for nominalizations that are event and tropes nominalizations the relation is to the meaning of the base expression is less obvious. Such nominalizations appear to introduce 'new' entities into the semantic structure of sentences, entities that would not be part of the semantic structure of sentences without the nominalization and whose ontological status may appear problematic. This holds even more so for the nominalizations this paper focuses on, nominalizations of the sort of *permission*, *obligation*, *need*, and *possibility*. Entities of the sort of permissions and needs may seem even harder to accept ontologically than event or tropes.

There are different accounts as to how to derive the meaning of a nominalization from that of the base expression. For event nominalizations derived from verbs such as *laughter*, *walk*, or *scream* as well as adjective nominalizations such as *wisdom* or *happiness* there are two strategies in particular that could achieve that. On one account, the nominalization picks up an implicit argument of the base expression. In the case of event nominalizations, this would be the implicit Davidsonian event argument of the verb, and; similarly, in the case of adjective nominalizations, this would be an implicit trope argument of the adjective (a manifestation of wisdom in the case of the nominalization *wisdom*). On another account, the nominalization introduces a new entity on the basis of the meaning of the base expression, in addition to perhaps further expressions or entities. The first account of nominalizations may be called the 'Davidsonian account', since the Davidsonian semantics of events, with events acting as implicit arguments of verbs, goes naturally along with it. The second may be called the

‘Kimian account’ of nominalizations, since it goes along naturally with the way Kim (1976) conceived of events, as entities obtained from a property, an object, and a time.

In what follows, I will first discuss event, trope and fact nominalizations in light of these two approaches. I then introduce another type of nominalization, which cognitive and illocutionary act verbs display, namely ‘product’ nominalizations of the sort *judgment*, *claim*, *decision*, *request*, and *promise*. Such nominalizations do not stand for events or acts, but rather their (nonenduring) products. The notion of a product of a cognitive or illocutionary act is closely related to that of a modal object and helps illuminate the latter notion. I will argue that both types of objects need to be recognized for the semantics of the full range nominalizations of verbs and adjectives. In addition, modal objects provide the basis for a novel semantics of modals, which I will sketch at the end.

1. Nominalizations of verbs and adjectives: the Davidsonian account

The Davidsonian account of event nominalizations is due to Higginbotham’s (1985, 2000) development of Davidson’s (1967) semantics of adverbials.¹ According to Davidsonian event semantics, events act as implicit arguments of verbs and adverbials are predicates of the implicit event argument of the verb. A sentence like (1a) on that account has the logical form in (1b), with existential quantification over events that are to occupy an additional, ‘implicit’ argument position of the verb:

- (1) a. John walked slowly.
 b. $\exists e(\text{slowly}(e) \ \& \ \text{walk}(e, \text{John}))$

The main argument Davidson gives for events acting as implicit arguments of verbs and adverbials as predicates of such events is the possibility of adverb-dropping, that is, the validity of an inference from (1a) to (1c):

- (1) c. John walked.

The semantic status of events as implicit arguments of verbs goes along with a particular view about the ontology of events, on which events are primitive entities not to be defined in

¹ For further developments of the Davidsonian event semantics, see also Parsons, (1990) and Landmann (2000).

terms of objects, properties and times (cf. Davidson 1968). This means that different properties can be used to describe one and the same event and thus won't be event-constitutive. On the Davidsonian account, events could not be conceived as entities strictly dependent on the content of a (canonical) description, say composed of the meaning of the verb and its arguments.

Given Davidsonian event semantics, NPs with a deverbal nominalization as head such as *John's walk* can be given a straightforward semantics: such NPs simply pick up the implicit event argument of the verb as the referent (cf. Higginbotham 1985, 2000):

(2) [*John's walk*] = $\iota e[\text{walk}(e, \text{John})]$

The implicit event argument of the verb will be the very same event as is described by the event nominalization. Nominalizing verbs as event nominalizations, however, goes along with a shift in argument structure: the Davidsonian event argument of the verb will become the external argument position of the nominalization, that is, the argument position that will provide a referent for the entire NP of which the nominalization is the head.

Given, the Davidsonian account, it is clear why the same expressions that act as adverbials generally are able to act predicates or adjectival modifiers of the event nominalization of the verb. This is illustrated with *slow(ly)* below:

- (3) a. John walked slowly.
 b. John's walk was slow.
 c. John's slow walk.

Slow(ly) in all three syntactic roles will be predicated of the very same events.

The Davidsonian account of event nominalizations allows a rather straightforward extension to the semantics of nominalizations of adjectives. This, though, requires an enrichment of the ontology associated with natural language. For adjective nominalizations, the ontology should include tropes besides events (Moltmann 2007, 2009, 2013b). Tropes are 'particularized properties'; that is, concrete manifestations of properties in objects. They are not properties as universals, but rather properties as particulars, dependent on particular objects as their bearers.

Adjectives, to an extent, exhibit the very same alternation of expressions acting both as modifiers of the adjective and as predicates (or adjectival modifiers) of the adjective

nominalization. Thus the modifiers of *happy* in (4a) and *pale* in (4b) act as predicates of what the nominalizations *happiness* in (5a) and *paleness* in (5b) stand for:

- (4) a. Mary is visibly / profoundly happy.
 b. Mary is extremely / frighteningly / shockingly pale.
- (5) a. Mary's happiness is visible / profound.
 b. Mary's paleness is extreme / frightening / shocking.

In the case of adjectives, the implicit arguments should be tropes rather than events or states and nominalizations of the sort of *Mary's happiness* and *Mary's paleness* will stand for tropes, not events or states (Moltmann 2009, 2013b).² That is, *Mary's happiness* stands for the particular way happiness manifest itself in Mary and *Mary's paleness* for the particular manifestation of paleness in Mary. This is in fact the standard view about adjective nominalizations found throughout the literature on tropes, for example in Williams (1953), Campbell (1990), and Lowe (2006). It is a view in fact that goes back to Aristotle and was common throughout the Aristotelian tradition in medieval and early modern philosophy (Ockham, Aquinas, Locke, to name just a few).

Why should the implicit argument of an adjective be a trope, rather than an event, or perhaps more specifically a state? This raises the question, what are states, in the context of natural language ontology? That is, how are our intuitions about states reflected in natural language? States are certainly the sorts of things we refer to with terms like *the state of Mary's being happy* as well as simply the gerund *Mary's being happy*. States in that sense have different properties from the entities that terms with adjective nominalizations stand for, such as *Mary's happiness*. For example, 'Mary's being happy' cannot be profound and 'Mary's being pale' cannot be extreme (Moltmann 2009, 2013a, 2015). By contrast, these are among the properties that 'Mary's happiness' and 'Mary's paleness' can have. Tropes involve a particular manifestation of the property in question whereas states just consist in an individual having that property.³ For reasons such as these, nominalizations of adjectives cannot stand for states, but rather stand for tropes.

² For the notion of a trope in contemporary metaphysics see, for example, Williams (1953), Campbell (1990), and Lowe (2006).

³ States are then in a sense abstract. See Maienborn (2007) and Moltmann (2013a, 2015) for a discussion of the relevant notion of a state.

Formally (6a) will then have the logical form in (6b), with existential quantification over tropes filling in the ‘Davidsonian’ argument position of *happy*:

- (6) a. Mary is visibly happy.
 b. $\exists e(\text{happy}(e, \text{Mary}), \& \text{visibly}(e))$

(7a) will have the logical form in (7b):

- (7) a. Mary’s happiness is visible.
 b. $\text{visible}(\text{max } e[\text{happiness}(e, \text{Mary})])$

Here *max* is a suitable maximality operator. Since there may be various tropes of happiness of Mary at different times, the definite term *Mary’s happiness* is taken to stand for the maximal trope of happiness of Mary.

Davidsonian event semantics has been enormously influential in linguistic semantics, and, going along with it, the Davidsonian account of event nominalizations. However, there is an alternative approach to the semantics of event nominalizations, based on Kim’s (1976) conception of events. What has sometimes been objected to the Davidsonian semantics of events is that it fails to account for the intuition that only a sentence with an explicit event-referring term such as (3b) is about an event; a sentence containing just a verb describing an event such as (3a) is only about an agent, John, and not *about* an event. The Kimian account of event nominalizations appears to be able to capture this intuition.

2. The Kimian account of event nominalizations

The Kimian semantic account of event nominalizations matches the view that events are introduced into the semantic structure of a sentence generally only by means of nominalizations (though underived event noun such as *fire*, *war*, or *noise* would be exceptions). According to Kim’s (1976) ontological account of events, events are entities that strictly depend on an individual, a property, and a time. Kim’s account of events consists in the following statement of existence and identity conditions for an event dependent on an object, property, and time:

- (8) For individuals d, d' , properties P, P' , and times t, t' ,

[1] $f(d, P, t)$ exists iff P holds of d at t .

[2] $f(d, P, t) = f(d', P', t')$ iff $d = d', P = P', t = t'$.

Here $f(d, P, t)$ is the event dependent on an object d , a property P , and a time t .

This account in fact introduces events simply by way of specifying their properties. In (8), these are the conditions under which events exist (in time) and when events are identical to other entities obtained in the same way (Moltmann 2013a, b). Kim's (1976) original account, which targets events of a rather simple sort, has subsequently been adopted and further developed by Bennett (1988), Lombard (1986), and others.⁴

Kim's account of events does not explicitly define events in terms of a property, an object, and a time. In particular, events are not taken to be composed in some way of properties, objects, and times. Rather the account consists in an implicit definition of events, stating their existence and identity conditions in terms of an object, a property, and a time. Kim's account in fact introduces events by a form of Fregean abstraction (Frege 1884, Dummett 1973, Hale 1987, Wright 1983). Frege's abstraction principle, given below, just gives identity conditions for objects obtained by the abstraction function g from entities o and o' that stand in some equivalence relation R :

(9) For an equivalence relation R , $g(o) = g(o') \leftrightarrow R(o, o')$.

Thus, Frege introduces directions as entities obtained by abstraction from parallel lines, and natural numbers as entities obtained by abstraction from concepts whose extensions stand in a one-to-one correspondence. (9) can naturally be generalized to n -place abstraction functions applying to n objects that stand in respective equivalence relations to each other. This means that Kim's account of events introduces events on the basis of a three-place abstraction function applying to objects, properties, and times on the basis of the equivalence relation of identity.⁵

Given Kim's ontological account of events, the semantics of event nominalizations appears straightforward. Such a semantics is given below, where the denotation of *walk*, [*walk*], is taken to be the one-place property of walking:

⁴ The view of events as derived objects has been more popular among philosophers than linguists, with the exception of Chierchia (1984). Linguists generally adhere to the Davidsonian view of events.

⁵ The notion of an entity introduced by abstraction is closely related to the notion of a pleonastic entity of Schiffer (1996, 2003), which is in fact also meant apply to events.

(10) [*John's walk*] = $\lambda e[e = [\text{John}, [\text{walk}], t]]$

There is one refinement of this semantics of event nominalizations that Kim himself introduces. Kim (1976) admits that events need not strictly be constituted by the entire content of the event description. He thus draws a distinction between *event-characterizing* and *event-constitutive* properties. Event-characterizing properties are merely properties holding of an event constituted on the basis of another, event-constitutive property. If *slow* is event-characterizing, (11a) has the analysis in (11b); but if *slow* is event-constitutive, (11a) has the analysis in (11c):

- (11) a. John's slow walk
 b. $\lambda e[e = f(\text{John}, [\text{walk}], t) \ \& \ \text{slow}(e)]$
 c. $f(\text{John}, [\text{slowly walk}], t)$

The availability of event-characterizing properties conveyed by an event description would distinguish descriptions of events from explicit fact descriptions of the sort *the fact that S*. Whereas adjective modifiers of event nominalizations may just be event-characterizing, all of the content of a sentence S in a fact description of the sort *the fact that S* must be fact-constitutive. This difference appears to manifest itself in the contrast between (12a), which can be true, and (12b), which can't:

- (12) a. John's slow walk was John's walk.
 b. The fact that John walked slowly is the fact that John walked.

Events are relatively independent of the description used to refer to them. Facts, by contrast, are entirely reflected in the meaning of explicit fact-referring terms of the sort *the fact that S*, or at least fact as 'non-worldly facts' in the sense of Strawson (1950).^{6,7}

Bennett (1988) in fact took the difference in description, that is, that facts but not events are tied to canonical descriptions, to be *the* feature distinguishing facts and events. The

⁶ Facts in the sense of non-worldly facts differ from the notion of a worldly fact defended by Austin (1979).

⁷ For further linguistic support for the view that facts are introduced by canonical fact descriptions and for a semantics for *the fact that S*, see Moltmann (2013b, Chap. 6).

difference in description, however, won't account for various differences in properties between events and facts that we will discuss now. The distinction between events and facts rather must be an ontological one, not one residing in their description.

An object introduced by Fregean abstraction has just those properties specified by the method of introduction. Thus, given (8), events have identity conditions and existence conditions relative to a time, but they won't have other intrinsic properties. They may, though, act as objects of mental attitudes. This means in particular that events won't have a part structure, won't have a spatial location, won't enter causal relations, won't act as objects of perception, and won't have properties of intensity or other measurable properties. This of course is highly counterintuitive. It is certainly part of our notion of an event for an event to have those properties. By contrast, though, it is part of our notion of a (non-worldly) fact to lack those properties.

These differences between events and facts are linguistically well-reflected, namely in the applicability of part-related constructions such as partitive *part of* as well as predicates of concreteness of various sorts, as seen below:⁸

- (13) a. Mary noticed part of the event.
 b. ??? Mary noticed part of the fact.
- (14) a. The meeting was in the room.
 b. ??? The fact that they met was in the room.
- (15) a. John's jump caused the table to break.
 b. ??? The fact that John jumped caused the table to break.
- (16) a. John saw Bill's jump.
 b. ??? John saw the fact that Bill jumped.
- (17) a. John's jump was high.
 b. ??? The fact that John jumped was high.
- (18) a. John's laughter was intense.
 b. ??? The fact that John laughed was intense.

Another difference between facts and events is that facts, unlike events, do not allow for predicates of description:

⁸ See also Vendler (1967), Peterson (1997), and Asher (1993).

(19) a. Mary described John laughter / John's jump.

b. ?? John described the fact that John laughed / the fact that John jumped.

Facts are tied to canonical fact-descriptions of the sort *the fact that S*, but events are not tied to canonical event descriptions. Canonical fact descriptions are of the form *the fact that S*, descriptions that fully display the nature of a fact and whose content is entirely fact-constitutive. Predicates of description appear to resist entities whose nature is fully displayed by the description used.

The main objection to Kim's account of events has been that it assimilates events to facts. Note that any property, however unspecific or logically complex, can, for Kim, be event-constitutive. Any predicate expressing a non-natural or indeterminate property, any explicitly or implicitly quantified predicate, and any negated or disjunctive predicate can, on Kim's account, individuate an event (together with an individual and a time). But this is characteristic of (non-worldly) facts, not events. Non-specific properties, negation, disjunction, and quantification can be fact-constitutive, but generally not event-constitutive. That is because events as concrete objects must be maximally specific or at least grounded in specific properties. It is the *groundedness* of events that distinguishes events from facts (Moltmann 2007, 2013a, b).⁹ This also means that events need to involve particular participants, rather than being constituted by existential quantification or a disjunction, unlike facts. This is clearly part of our notions of an event and of a (non-worldly) fact, and it is well-reflected in way fact nominalizations, as below, are understood:

(20) a. the fact that John met with a politician

b. the fact John met Sue or Mary.

Even if John met with several politician, there is a single fact described in (20a), constituted by existential quantification not a particular politician. Similarly, whether John met Sue, Mary or both, there will be a single fact described in (20b), constituted by the disjunction and not involving a particular person John met.

Given the Kimian conception of events, one might try to account for the groundedness of events by imposing the restriction that events can be constituted only by fully determinate

⁹ The notion of a specific property that I am using is closely related to Armstrong's (1978) notion of a 'natural property' and Lewis (1983) notion of a 'non-redundant- property'.

properties. More accurately, given that events generally involve change, be conceived as transitions from an object having one determinate property at a time t to the object's having a contrary determinate property at a subsequent time t' (Lombard 1986). More complex events may then be built from such transitions, either as collections of transitions or as a transitions viewed with a particular, possibly complex property as its 'gloss'. However, if events are introduced by abstraction, even if based on such specific property changes, they will still lack the typical event properties. That is because the only properties they can have are those that come with the strategy of their introduction. Making events be dependent on specific properties will make no difference to the properties events can have if events are conceived as entities introduced by abstraction.

Moreover, such a more complex conception of events poses a problem for the Kimian account of event nominalizations. Most verbs in English do not describe the kinds of transitions that could constitute or ground events. In fact, it is hard to find any simple predicates at all that do. For example, even such predicates as *become soft* or *turn red*, which express a simple property change still involve a non-specific property.

If events are 'introduced' into the semantic structure of sentences only by nominalizations, then the descriptive content of a nominalization of any of the verbs just mentioned would not be event-constitutive. It would underspecify the event that is to be introduced. For example, *John's change* has a descriptive content that underspecifies the particular event of change that is being referred to. The same holds for *John's walk toward the house* (which leaves open what changes in spatial positions exactly took place), *John's disturbance of Mary* (which leaves open what exactly John did to cause Mary's state of irritation), and *John's hurry* (which leaves out what exactly John did that was done in a hurried way). Deverbal nominalizations cannot generally introduce an event by providing its constitutive properties. They can at best give a partial characterization of an event, leading to a description that would merely serve to pick out one event rather than another. This is why the Kimian conception of events cannot provide a semantics of event nominalizations.

However Kim's is suited as an account of fact nominalizations, that is, nominalizations of the sort *the fact that S*, for a true sentence S . These are nominalizations standing for facts as non-worldly facts, that is, facts that correspond to true propositions and are tied to the content of the fact description itself. More precisely, (8) gives a semantic account of a simple fact

description of the sort *the fact that Mary is happy today*, introducing a fact on the basis of an individual (Mary), a property (happiness) and a time (the time of today).¹⁰

3. Nominalizations for actions and for their ‘products’

The Davidsonian account of event nominalizations appears to apply well to verbs describing physical events. However, it does not apply well to nominalizations derived from verbs describing cognitive or illocutionary acts, such as *think*, *decide*, *claim*, and *request*. Such verbs display a distinction between two sorts of deverbal nominalizations that display sharp semantic differences: nominalizations of the sort *thought*, *decision*, *claim*, and *request* on the one hand and gerunds such as *thinking*, *deciding*, *claiming*, and *requesting* on the other hand, and not just in English.¹¹ This is a distinction that the Polish early analytic philosopher Twardowski (1911) introduced as the distinction between actions and what he called ‘products’. According to that distinction, nominalizations such as *thought*, *decision*, *claim*, and *request* describe non-enduring ‘products’ of actions of thinking, judging, claiming, and requesting, the actions described by the base verbs. By contrast, gerunds such as *thinking*, *judging*, *deciding*, *claiming*, *requesting*, and *promising* describe actions, the very same entities described by the base verbs. The non-enduring products of actions are as concrete and particular as the actions and in fact spatio-temporally coincident with them. The notion of a product is closely related to that of a modal object, and so it is appropriate to elaborate on the action-product distinction as introduced by Twardowski and further elaborated in Moltmann (2013b, Chap. 4, 2014, to appear a).

Actions and products differ fundamentally in their properties. Most importantly, as Twardowski emphasizes, only products may bear truth conditions or, more generally, satisfaction conditions, but not actions. This is reflected the applicability of the predicates *true* (or correct) and *false* (or wrong) to products of the sorts of judgments and claims and their inapplicability to the corresponding acts of judging and claiming actions:

- (21) a. John’s judgment that that S is true / false.
 b. ?? John’s judging / John’s claiming that S is true / false.

¹⁰ Kim’s account is also suited for the semantics of nominalizations that stand for abstract states rather than events. See Maienborn (2007) and Moltmann (2013a) for the distinction between Davidsonian or concrete states and Kimian or abstract states.

¹¹ For a crosslinguistic study of that distinction see Gerner (to appear).

- (22) a. ?? John's claim is correct.
 b. ?? John's (act of) claiming / John's speech act is true.

Moreover, it is reflected in the applicability of predicates of satisfaction to products of the sort of request, decisions, and promises and their inapplicability to acts of requesting, deciding, and promising:

- (23) a. John's request that people leave the building was fulfilled / satisfied
 b. ?? John's act of requesting / John's speech act was fulfilled / satisfied.
 (24) a. John's decision to postpone the meeting was implemented / executed.
 b. ?? John's action of deciding was implemented / executed.
 (25) a. John kept / broke his promise.
 b. ??? John kept / broke his act of promising / his speech act.

Note that the applicability of predicates of satisfaction makes clear that products cannot be identified with propositions, since propositions cannot be fulfilled, implemented, executed, kept, or broken. Rather products are entities *sui generis*, sharing some similarities with both propositions and with events, but are not to be identified with either of them (Ulrich 1979).

Products differ from actions furthermore in entering relations of exact similarity just on the basis of being the same in content, provided they involve the same force and possibly physical manifestation. This is reflected in the applicability of *is the same as*, a predicate in fact expressing exact similarity not numerical identity in English:

- (26) a. John's thought is the same as Mary's.
 b. John's thinking is the same as Mary's.
 (27) a. John's promise is the same as Mary's.
 b. John's speech act is the same as Mary's.

Whereas the truth of (26a) and (27a) just requires sharing of content, (26b) and (27b) appear to require more, say sharing of the particular way of performing the act.

Note that the *is* of identity expresses numerical identity not exact similarity, making (27c) false or true only under special circumstances (say a situation of coordinated acts of thinking or promising):

(26) c. John's thought is Mary's thought.

(27) c. ?? John's promise is Mary's promise.

While the ability of product to have truth or satisfaction conditions and to enter similarity relations based on a shared content can be attributed to Twardowski, there is another important difference between actions and products not noted by Twardowski and that concerns part-whole relations. The part structure of products is strictly based on partial content, not the temporal parts an act would have. A part of a thought, a belief, or a decision is a partial content. By contrast, the part structure of actions is that of events, consisting of temporal parts. Parts of products generally are distinct from the parts of the actions. Part of John's decision cannot be part of the action of deciding. Part of John's claim cannot be part of the speech act. Part of John's promise cannot be part of John's act of promising.

There are further properties distinguishing actions and products. Thus only products not actions can enter causal relations on the basis of content, that is, only products can have causal effects in virtue of their content. Thus, only John's claim may cause astonishment or puzzlement in virtue of its content, but not so for John's act of claiming. John's remark may trigger a lot of comments in virtue of its content, but not so for John's making a remark. John's promise may have made Mary happy in virtue of its content, but not so for John's act of promising.

Actions and products also differ in properties relating to the understanding of their associated content. Understanding a claim or request means something quite different from understanding an act of claiming or requesting. Only the former relates to the content of the product, not the latter.

Related to properties of content-based causation and understanding are properties of content-based evaluation. Attitudinal objects are evaluated with respect to both their content and force, but not so for actions. A thought being interesting is something quite different from the act of thinking being interesting. It is also something different from an abstract proposition being interesting. Similarly, John's thought process may be unusual, without his thought or the corresponding abstract proposition being unusual.

It is clear then that an ontological distinction must be made between cognitive or illocutionary acts and their non-enduring products. For the semantics of nominalizations this means that non-gerundive nominalizations of psychological and illocutionary verbs do not just pick up the implicit event argument of the verb. Rather their semantics will be more complex involving a function mapping an implicit event argument onto its non-enduring

product. Thus, whereas gerunds have the simple semantics in (28a), product nominalizations will involve a more complex semantics, as in (28b), with *prod* being a function mapping an event onto its non-enduring product:

- (28) a. [*claiming*] = {⟨e, x⟩ | ⟨e, x⟩ ∈ [*claim*]}
- b. [*claim_N*] = {⟨e', x⟩ | ∃e (⟨e, x⟩ ∈ [*claim_V*] & e' = *prod*(e))}

The action-product distinction does not apply to stative attitude verbs such as *believe*, *intend*, *fear*, and *hope*. Mental states do not, at least not generally, come with products. Yet the entities that the nominalizations of stative attitude verbs describe, *belief*, *intention*, *fear*, *hope* etc., display the very same characteristic features as cognitive or illocutionary products. In particular, they have truth or satisfaction conditions:

- (29) a. John's belief is true.
 b. John's hope was fulfilled.
 c. John's realized his intention.

They enter similarity relations based on being the same in content:

- (30) a. John's belief is the same as Mary's -- they both belief that Sue is guilty;
 b. John's intention was the same as Mary's, to help Sue.

And they display a part structure based on partial content, rather than the temporal parts one would think states would have:

- (31) a. Part of John's belief is that he will get nominated.
 b. Part of John's intention is to help Sue.

It is therefore appropriate to posit a more generally category of what I call 'attitudinal objects' that includes both products and mental states (in the relevant sense) (Moltmann 2013b, to appear b). Attitudinal objects are concrete particulars that have content-related properties that include having satisfaction conditions, entering similarity relations based on sameness of content, and having a part structure based on partial content.

To summarize, nominalizations of verbs and adjectives in English consist in event nominalizations, trope nominalizations, as well as product nominalizations, for cognitive and illocutionary verbs. These nominalizations go along with an ontology of events, tropes, as well as cognitive and illocutionary products and mental states. In addition, de-sentential nominalizations such as *the fact that S* require an ontology of non-worldly facts, entities introduced by abstraction from the content of a sentence.

Verbs often alternate with complex-constructions containing a nominalization, of the sort light verb – nominalization, as below:

- (32) a. walk – take a walk
 b. rest - have a rest

But there are also complex predicates with a nominal that is not derived from a verb or where the verb may in fact be derived from the noun, of the sort *take a break / give someone a break* or *take a nap*. , adjectives alternate with complex predicates of the sort light verb-adjective nominalization:

- (33) a. be wise – have wisdom
 b. be intelligent -- have intelligence

Again, there are complex predicates with a nominal from which the adjective is derived, rather than the other way around:

- (34) a. have insight – insightful
 b. have talent -- talented

With attitude verbs, it is generally the product nominalization that occurs in the complex-predicate construction – the gerund in fact never figures in complex predicates:

- (35) a. think – have a thought / have the thought that S
 b. decide – make a decision / make the decision that S
 (36) a. claim – make a claim / make the claim that S
 b. advise – give advice / give the advice that S

There are also complex predicates with nominals not derived from verbs such *have the impression that S* or German *die Absicht haben, dass* ‘have the intention that’ or French *avoir peur que S* ‘have fear that’.

The alternation of the simple verb or adjective with the complex predicate construction bears on the question of ontological priority. Is the fact that simple verbs or adjectives may alternate with complex predicates formed with nominalizations indicative that nominalizations stand for ontologically derived entities? If so, this would go with the view that nominalizations introduce ‘new’ entities not as such involved in the simple predicates. Certainly, the answer to the question should be negative given the existence of underived nominals in complex predicates that stand for the very same sorts of entities as the relevant sorts of nominalizations. Those entities certainly could not generally be introduced on the basis of linguistic constructions, let’s say in the way facts are that introduced by a canonical fact description. Moreover, the existence of complex-predicate constructions that do not alternate with a simple verb might even give suggestive support for the view that the semantics of the simple predicate is in fact more complex, involving already implicit reference to the entities in question.

In Moltmann (2014, to appear a), the semantics of attitude reports with a simple attitude verb as in (37a) is in fact assimilated to that of the semantics of attitude reports with a complex predicate as in (37b), involving explicit reference to an attitudinal object (or kind of attitudinal object).

(37) a. John claimed that S.

b. John made the claim that S.

On that semantic analysis, the attitude verb is considered expressing a relation between acts or states and agents and the clausal complement acts semantically as a predicate of the attitudinal object, as in (37c):

(37) c. $\exists e(\text{claim}(\text{John}, e) \ \& \ [\text{S}](\text{prod}(e)))$

In (37c), *prod* is a (partial) function mapping an act onto its product (if it has one) or else a mental state onto itself.

Given this semantics of attitude reports, the complex-predicate construction simply makes explicit the ontology and semantic structure already involved in the simple construction. This sort of semantics, as we will see, carries over naturally to modal sentences.

The distinction between actions and products brings up other issues of ontological priority than that of whether an entity is introduced by means of linguistic construction. Clearly, the product depends for its existence on the act, and not vice versa, and so it depends on it ontologically. However, there is also a dependence of the act on the product: the identity of intentional acts arguably depends on the intended product. While the intentional act may be performed by performing physical acts, the identity of the intentional act clearly depends on what is intended, the product. The act in fact may also inherit certain properties from the product. This is reflected in part linguistically, in the applicability of certain adverbial modifiers. *John painted beautifully* means that John produces beautiful paintings, not that the activity of painting as such is beautiful. *John writes well* implies that the product, the written work, is good, not the act of writing as such. Thus, the act may depend for its identity on the product, though the product certainly depends for its existence on the act.

4. Nominalizations derived from modal predicates

We can now turn to the main topic of this article, the semantics of nominalizations of modal predicates. Nominalizations of modal predicates stand for what I call ‘modal objects’.

This requires a few linguistic remarks about nominalizations of modal predicates in general. First of all, modal predicates in English and related languages may come in the form of modal auxiliaries, such as *may must, can*, which generally lack nominalizations. Modal adjectives in English, however, do come with nominalizations: *possible – possibility, necessary – necessity, impossible – impossibility*. English also has modal adjectives describing physical possibility that come with nominalizations: *able – ability, capable – capability*. Furthermore, English has full verbs that are modal verbs, such as *need* and *have (to)*, one of which comes with the nominal *need* (as in *have a need*). Thus *John’s need, the permission for John to stay* and *the obligation for John to leave* stand for modal objects

As with nominalizations in general, nominalizations of modal predicates enter complex-predicate constructions that alternate with simple predicates formed with the base expressions:

- (38) a. need – have a / the need
 b. be able to / have the ability to

c. be capable to / have the capability to

In fact, the verb *need* in many European languages is expressed as ‘have (a) need’, with the light verb *have* and the product nominalization *need* (e.g. French *avoir besoin*, Italian *avere bisogno*). According to Harves / Kayne (2012), even the English verb *need* is itself derived syntactically from an underlying complex predicate *have need*

Modal predicates with subject clauses generally alternate with *there*-sentences involving quantification over modal objects:

- (39) a. It is possible that it will rain.
 b. There is a possibility that it will rain.

Modal objects, at least of the deontic sort, share important properties with attitudinal objects. Most importantly, deontic modal objects generally have satisfaction conditions, enter similarity relations based on shared content, and have a part structure based on partial content. Let us look at those properties more closely.

Modal objects of the sort of obligation allow for satisfaction or violation, expressed by various sorts of predicates, for example those in the sentences below:

- (40) a. John’s need was satisfied
 b. John fulfilled his obligation to help Bill.
 c. John ignored his obligation to help Bill.
 d. John kept his promise to help Bill.

Like the satisfaction of a cognitive or illocutionary product, the satisfaction of a modal object consists in performing a suitable action, which may be made explicit by a *by*-phrase:

- (40) e. John fulfilled his obligation to help Bill by offering him financial support.

Modal objects of the sort of permissions, invitations, and offers go along with different predicates of satisfaction, just like the corresponding illocutionary products:

- (41) a. John took up the permission to leave the room.
 b. John accepted the invitation / offer to use the house.

Modal objects of this sort do not come with violation condition: there is nothing incorrect about not taking up a permission or accepting an invitation or offer.

Modal objects share with cognitive and illocutionary product also the property of entering similarity relations just on the basis of a shared content, illustrated below:

- (42) a. John's and Mary's needs are the same – they both need a good computer.
 b. John's offer is the same as Mary's, they both offered Sue a thousand dollar for the painting.

By contrast (43a, b), with the *is* of identity, sound false or require very special circumstances, let's say in which the satisfaction of John's need goes along with that of Mary in (43a) or else in which they put in a joint offer in (43b):

- (43) a. ??? John's need is Mary's need.
 b. John's offer is Mary's offer.

The same as in natural language, as we have seen, expresses exact or close similarity, rather than identity. Note also that the plural *needs* is used in (42a), which means that reference is made to modal objects particular to John and to Mary, not a single modal object they share.

Furthermore, modal objects have a part structure based on partial content. Partial content is what the *part of*-construction picks out when applied to modal objects:

- (44) a. Part of John's need is for good computer.
 b. Part of the offer was that Sue could use the house.

Intuitions are very clear that *part of* in (44a, b) could not pick out a temporal part of a state, and so needs and offers could not be viewed as states with a temporal part structure.

The notion of a partial content of a modal object goes along with the notion of partial satisfaction:

- (45) a. Part of John's need was satisfied.
 b. John's need was partly satisfied.
 (46) a. Part of the offer was taken up.

b. The offer was partly taken up.

Modals objects also show properties of concreteness. In particular, they may enter causal relations. John's need may have pushed him to act in certain ways and his medical condition may have been the cause of his need for a certain medicine. Moreover, the evaluation of modal objects is generally content-based: John's offer can be strange only because *what* John offered, not because of the *way* the offering was done etc.

Modal objects thus share a range of properties with attitudinal objects, in particular their focus on content while being particular and concrete. Yet modal objects differ in one significant respect from attitudinal objects. Unlike the latter, they may endure past the time of the act that established them. Various sorts of illocutionary acts may produce not only illocutionary products, but also modal products that are able to endure for a longer time. An act of commanding may not just produce a command, but may, under the right circumstances, also produce a lasting obligation on the part of the addressee. An act of promising generally produces not only an illocutionary product that is a promise, but also an enduring commitment on the part of the speaker. Also an act of permitting may set up an enduring modal product, namely the permission that the addressee may have for a longer period of time. Similarly, an act of offering creates an enduring product, the offer that may obtain for a period of time beyond the duration of the act. Note that nominalizations such as *permission* and *offer* are polysemous, permitting reference to both an illocutionary product and a modal product. In general, the modal product produced by an illocutionary act *e* shares the very same satisfaction conditions with the illocutionary product produced by *e*. Thus, the command and the obligation that have been produced by the same speech act will be satisfied by the very same actions, and so for the promise and the commitment that has been produced along with it. But unlike illocutionary products, enduring modal products do not require subsequent sustaining actions ensuring their persistence, but only the initial act establishing them.

Linguistically, the difference in endurance between illocutionary and modal products is reflected in the choice of tense in specificational sentences. The choice of tense in specificational sentences about illocutionary products must match the time of the illocutionary act. By contrast, the tense of a specificational sentence about a corresponding modal object should match the 'validity' or existence of the modal object, which may endure well beyond the illocutionary act that created it. Thus, a promise as an illocutionary products requires tense to match the time of the illocutionary act, whereas the ensuring obligation, the modal object,

allows tense to match the ‘validity’ of the obligation, which may go far beyond the time of the illocutionary act:

- (47) a. Yesterday, John promised to help (today).
 b. (Today) John’s obligation is to help.
 c. John’s promise was / ??? is to help.

Similarly, if John demanded yesterday that Bill leave the country next week, then past tense rather than present tense is required in (48a), but not in (48b):

- (48) a. John’s demand was / ??? is that Bill leave the country next week.
 b. Bill’s obligation is to leave the country next week.

The lifespan of modal products is also reflected in the applicability of particular existence predicates that go along with them. In English, such existence predicates are, besides *exist*, *obtain*, *hold* and *be valid*. An obligation that results from an act of demanding may ‘hold’ or ‘obtain’, that is, ‘exist’, for a period of time after the act. Similarly, an offer may ‘hold’ or ‘be valid’ for a time past the act of making it and a permission may hold ‘hold’ for a time past the act of giving it.

Not only modal products described by nominalizations such as obligations and permissions may be produced by illocutionary acts, also laws and regulations may be produced that way.¹² A law that is established by an act of declaring or passing it will generally endure beyond the act itself. A law exhibits the same characteristics of modal products. It has satisfaction and violation conditions, it enters similarity relations based on shared content, and it has a part structure based on partial content. It also has properties of concreteness, having a generally limited life span and being potentially causally efficacious. Finally, it shares the particular existence predicates specific to modal products. Like an obligation, a law may ‘hold’ or ‘be valid’ past the act of establishing it.

The fact that modal products share satisfaction conditions with the illocutionary products produced by the same illocutionary acts accounts for certain semantic connections between modal sentences and sentences describing illocutionary acts. In particular, deontic modals

¹² These entities, just like illocutionary and cognitive products, would classify as ‘abstract artifacts’ in the sense of Thomasson (1999), that is, as artifacts that lack a material realization.

may anaphorically relate to the illocutionary product introduced by an illocutionary or attitudinal verb as in the inferences from the a-sentences to the b-sentences below:

(49) a. John asked Bill to leave the room.

b. Bill must leave the room.

(50) a. John promised to come.

b. John must come.

(51) a. John allowed Bill to leave.

b. Bill may leave.

The inference from (49a) to (49b) of course is valid only provided John is in a suitable position of authority. (49a, 50a, 51a) involve illocutionary products, and (49b, 50b, 51b) the associated enduring modal products, the obligation or permission.

Deontic modals of course need not involve modal products produced by a particular directive act described in the context. They may also involve modal products of the sort of laws, rules, or conditions of various sorts whose origin may not be specified in the discourse.

Enduring normative products are clearly part of our social ontology in general, and they are well-reflected in natural language, in the semantic behavior of nominalizations of the sort *commitment*, *obligation*, *permission*, and *offer*. Modal products share relevant properties with cognitive and illocutionary products, most importantly satisfaction conditions, similarity based on shared content, and a part structure based on partial content, as well as particularity and concreteness (coming into existence and going out of existence at a particular time, causal efficaciousness), but they do not share the lifespan and the action-related aspects of the latter.

5. The role of modal objects in the semantics of modal sentences.

Nominalizations of eventive verbs bear on the semantics of verbs since their nominalizations make explicit the events that according to Davidson are implicit arguments of eventive verbs and are central for the semantics of adverbials. This raises the question whether the semantics of nominalizations of modal predicates is similarly revealing as to the semantics of modal predicates. That is, do modal objects also play a role for the semantics of modal predicates? I take the view that they do. First, they arguably are the implicit arguments of modal predicates. Second, they can be considered the central entities in a novel semantics of modals according to which modals do not represent quantifiers ranging over possible worlds but

rather predicates of modal objects. On that view, which I will merely sketch, the clausal complement, subject clause, or prejacet of the modal specifies the satisfaction conditions of the modal.

There is little in the semantic literature as to what the Davidsonian event argument of modals should be. Answering this question requires taking into consideration the various adverbials that can apply to modal predicates. They certainly include temporal adverbials as well as, for at least certain modal predicates, degree adverbials such as *quite* and *very (much)*. This may suffice as a motivation to take the modal objects themselves to be the Davidsonian implicit arguments of deontic modals. Let me call the prejacet, clausal complement or clausal subject associated with a modal predicate *the sentential unit* associated with the modal. Then, just like the clausal complement of attitude verbs, the sentential unit will act as a predicate of the modal object that is the implicit argument of the modal predicate. The logical form of (52a) will thus be as in (52b), where, setting syntactic details aside, the syntactic unit *Bill to leave* acts serves to specify the satisfaction conditions of the modal object of which it is predicated, a need:

(52) a. Bill needs to leave.

b. $\exists d(\text{need}(d, \text{Bill}) \ \& \ [\textit{Bill to leave}](d))$

(53a), with a deontic modal of permission, will have the very same logical form, as in (53b):

(53) a. Bill is allowed to leave.

b. $\exists d(\text{is allowed to}(d, \text{Bill}) \ \& \ [\textit{Bill to leave}](\text{prod}(d)))$

Again, the sentential unit *Bill to leave* here specifies the satisfaction conditions of the modal object, permission.

How does the sentential unit associated with the modal specify the satisfaction conditions of the modal object? It does so by characterizing its satisfiers and possibly violators. This can be spelled out by making use of Fine's (to appear) Truthmaker Semantics. Central in that semantics is the notion of exact truthmaking, as a relation that holds between a situation or action *s* and a sentence *S* just in case *s* is wholly relevant for the truth of *S*. Given the notion of a modal object and its satisfiers, the truth making relation, or more generally satisfaction relation, should now apply also to the relation between a situation or action and a modal

object. It thus holds between a situation or action s and a modal object d just in case s is entirely relevant for the satisfaction of d .

In fact, in the semantics given below, the exact satisfaction relation will only apply to modal objects, whereas an inexact truthmaking relation will apply to sentences. The latter is the relation that holds between a situation s and a sentence S just in case s supports of truth of S , which means s contains a part is an exact truthmaker of S .

The reason for that is the following. The modal object itself will impose the exact conditions on what its satisfiers are. By contrast, the sentential unit associated with the modal may contain only partial information about what the satisfiers of the modal object are. That is, the sentential unit may underspecify the satisfaction conditions of the modal object, for example the reported need in (54):

(54) John needs to buy bread.

Obviously, John's need, according to (54), is not satisfied if John buys any bread whatsoever; it must presumably be fresh bread and in sufficient quantity.¹³ That is, the sentential *unit John to buy bread* thus gives only partial information about what the exact satisfiers of the need are. This means that an exact satisfier of the modal object may just be an inexact truthmaker of the sentential unit associated with the modal.

The same holds for the violators of a modal object of the sort of a need or an obligation. The notion of exact violation as a relation between a situation or actions and a modal object is the correlate of the notion of exact falsmaking, as a relation between a situation or action and a sentence.

Fine uses the notion of exact falsmaking \Vdash for stating the the truthmaking conditions of a sentence with a negation, as below:

(55) $s \Vdash \textit{not } S$ iff $s \not\Vdash S$.

That is, a situation s is an exact truthmaker of a sentence *not S* just in case s is entirely relevant for the falsehood of S . As with the satisfiers of a modal object, an action or situation that is wholly relevant for the violation of the modal object need not be wholly relevant for the falsity of the sentence used to characterize it. It may just be an inexact falsmaker of it.

¹³ This sort of underspecification has been discussed for desire reports by Fara Graff (2014).

With the notions of exact satisfaction \models and exact violation \Vdash as relations between situations or actions and modal objects, the meaning of a sentence (or sentential unit) can now be formulated as below:

$$(56) [S] = \lambda d[\forall s(s \models d \rightarrow s \models S) \ \& \ \forall s(s \Vdash d \rightarrow s \Vdash S)]$$

Here \models is the relation of inexact truthmaking and \Vdash the relation of inexact falsmaking.

According to (56), a sentence or sentential unit S expresses the property that holds of a modal object d just in case every exact satisfier of d is a (possibly inexact) truthmaker of S and every exact violator of d is a (possibly inexact) falsifier of S .

Permissions allow certain actions, those they permit. Obligations not only allow for certain actions, those that comply with them; they also exclude certain actions, those violating them. The permission for Bill to leave allows for actions of Bill leaving, but does not exclude any other actions. By contrast, the obligation for Bill to leave allows for actions of Bill's leaving and excludes actions of Bill's staying. That is, permissions have only satisfiers, whereas obligations have both satisfiers and violators. This means that for permissions, the second conjunct in (56) is vacuously fulfilled. Thus, (56) is applicable to both modal objects of the sort of obligations and modal objects of the sort of permissions.

Also illocutionary products can be distinguished in terms of having or not having violators. An offer or an invitation has only satisfiers, but no violators; a request or an order has both satisfiers and violators. This means that (56) can also be applied to the semantics of illocutionary act reports, by treating the clausal complement of the illocutionary verb as a predicate of the product of the reported illocutionary act. Even more generally, (56) can be applied to the semantics of attitude reports in general, with the clausal complement of the attitude verbs specifying the satisfiers and perhaps violators of the attitudinal object. (56) thus represents a property of both modal objects and attitudinal objects.

Given the semantics of modals based on modal objects, modals of necessity and modals of possibility lead to exactly the same logical form, but they involve different sorts of modal objects with different satisfaction and violation conditions. This presents a very different approach to the semantics of modal sentences than the standard one based on quantification over possible worlds. Of course, the new approach needs to be further developed so as to deal with the various logical relations among modal sentences that standard modal logic has dealt with.

6. Modal objects other than deontic modal objects

Modal objects are particularly well-motivated as semantic values of nominalizations of deontic modals and in fact implicit arguments of deontic modal verbs. We have, it seems, robust intuitions about things like obligations and permissions, which are not only well reflected in the nominalizations we use to refer to them, but also in related abstract artifacts such as laws. There are other types of modal predicates for which a similar ontology of modal objects appears unproblematic.

One of them is ability modals such as *able* or *capable*. In English, ability modals come with the nominalizations *ability* or *capability*. Abilities share a range of properties with deontic modal objects. Abilities do not satisfaction conditions, but they have what one may call ‘manifestations conditions’, which play the same sort of role. Abilities then are on a par with modal objects of permission, having what corresponds to satisfiers, the manifestations of the ability, but no violators. Abilities appear to enter similarity relations based on the similarity of their manifestations and this shared content. Moreover, abilities have a part structure based on partial content rather than temporal parts: *part of John’s ability* cannot refer to a temporal part, but only to part of what the ability consists in or how it manifests itself. Abilities also display properties of concreteness, in that they come about and cease to exist at a certain time. Moreover, they can be compared in strength: John’s ability may be greater than Bill’s etc. But unlike modal products, abilities of course are not produced by an illocutionary act.

For other modals the semantic values of nominalizations are less straightforward, for example epistemic modals. Terms like *the possibility that John might return* should stand for epistemic modal objects. However, ‘possibilities’ do not seem to be on a par with obligations, permissions, and abilities. Unlike the latter, they do not come with predicates expressing satisfaction conditions, and they do not display a part structure based on partial content -- at least no clear intuitions are associated with what parts of possibilities or necessities should be:

(57) ??? Part of the possibility we are considering is that John might return today.

This suggests that possibilities, the semantic values of nominal constructions of the sort *the possibility that S*, are in fact on a par with non-worldly facts, as merely possible non-worldly facts.

It would of course be desirable if the semantics of epistemic modals could be similar to that of deontic modals (and ability modals). If it is, then this means that *possible* as an epistemic modal takes implicit arguments that are not made explicit by the corresponding nominalization. And for epistemic modal auxiliaries there would not be any terms either that explicitly refer to the entities acting as their implicit arguments. This of course is not an argument against a parallel semantics of epistemic modals, but it would give less support for it than there is in the case of deontic modals.

Conclusion

Nominalizations often pose a challenge for ontology and that is particularly so for nominalizations of modal predicates. While there are plausible strategies for introducing ‘light objects’ as semantic values of certain sorts of nominal constructions (*the fact that S* or *the possibility that S*), we have seen that nominalizations of deontic modals and ability modals involve a more substantive ontology of modal objects. Modal objects that are obligations and permissions could not be considered entities introduced by abstraction or ‘pleonastically’ on the basis of the nominalization itself. In fact, there are good grounds to posit such modal objects already as implicit arguments of modal predicates.

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