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**An Object-Based Truthmaker Semantics for Modals**

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**Introduction**

Possible worlds semantics is an extremely well-established approach to the semantics of modals , but it faces a range of difficulties for at least certain types of modals, especially deontic modals with their distinction between heavy and light permissions and obligations. This paper outlines a new semantics of modals that aims to overcome some of those difficulties. This semantics is based on an a novel ontology of modal objects, entities like obligations, permissions, needs, as well as epistemic states, abilities, and essences. Moreover, it is based on truthmaking, more precisely the notion of exact truthmaking, in the sense of Fine’s (2014, 2017, to appear a, b) recent truthmaker semantics. Unlike in Fine’s truthmaker semantics, the notion of exact truthmaking (or satisfaction) is taken to apply not only to sentences, but also to modal objects. Thus, situations or actions may be (exact) truthmakers (or satisfiers) not only of sentences, but also of entities like obligations, permissions, and essences. I will call this *object-based truthmaker semantics*. Object-based truthmaker semantics applies particularly well to deontic modals, which this paper will focus on. But it is meant to apply to all modals, and it will be indicated how it can generalize. The paper will in particular suggest an application of object-based truthmaker semantics to metaphysical modality based on essences as modal objects.

 Object-based truthmaker semantics is based on a range of intuitions that are particularly well-reflected in natural language. First, modal objects as such are, at least to an extent, well-reflected in nominalizations of modal predicates such as *need, permission, obligation*. The semantic behavior of such nominalizations reflects the properties that characterize modal objects as a type of entity of its own distinct from more familiar types of entities such as propositions and states, most importantly having satisfaction conditions, having a part structure strictly based on partial content, and entering similarity relations based on shared content only. Second, the involvement of modal objects and the distinction between heavy and light permissions is reflected in the presence of complex modal predicates in natural language, such as *have the need, have the permission, have the obligation*.

 Modal objects come with a set of actions or situations that are their satisfiers and some (modal objects of necessity) also come with violators. Object-based truthmaker semantics treats modality locally, tying the truth of a modal statements just to a particular modal object with its satisfiers and perhaps violators. Some modal objects, though, may be modal states displaying a greater range of satisfiers and being constituted in relation to other modal states that act as their duals.

 The object-based truthmaker semantics outlined in this paper aims to account for inferences recognized as valid in standard deontic modal logic as well as inferences that are intuitively valid or invalid, but do not come out as such in standard deontic logic. There are a range of similarities with Fine’s (to appear b) sentence-based truth maker semantics of deontic modals, and a comparison of the two approaches will be given at the end.

**1. Outline of the new semantics of modals based on modal objects**

I will start with a few remarks regarding the syntax of modals. In logic, modals are generally treated as operators, applying to sentences. The standard possible-worlds account treats modals as operators with an interpretation as quantifying over possible worlds that act as parameters of evaluation for the scope of the modal:

(1) a. John needs to leave.

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

(2) a. John is allowed to leave.

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

Different modals involve different sets of worlds, depending for the most part on the context of use. The contextually given function *f* maps the world *w* in which the entire sentence is evaluated to the relevant set of worlds, the modal base.

 Modals in natural language, by contrast, come in different syntactic categories. They may take the form of modal auxiliaries (*may, must, could, should*), as modal full verbs (*need, is obliged to, is permitted/ allowed to*), as modal adjectives (*possible, necessary, obligatory, optional*), as adverbs (*possibly, necessarily, perhaps, certainly*), and as nouns (*need, possibility, necessity, permission, obligation*). In addition, there are agentive verb that may have a modal component (*allow, forbid, promise, order*). Modals in natural language thus do not obviously classify as operators. Setting a linguistic discussion of different semantic roles of modals aside, I will treat modals rather differently than as operators, namely as predicates of modal objects, entities like obligations, permissions, needs, epistemic states, abilities, and essences. Modal predicates of the various sorts then take modal objects as implicit arguments, just like action verbs take events as implicit arguments on the Davidsonian view (Davidson 1967). Moreover, the interpretation of modal predicates in a sentence will go along with existential quantification over modal objects, just like the interpretation of action verbs goes along with existential quantification over events on the Davidsonian view. What modal object a modal describes depends on the use of the modal and thus the choice of a modal object roughly matches the choice of a modal base on the standard account of modals.

 Whereas on the standard view, modals come with a sentential scope, modals as predicates of modal objects come with what I will call a *clausal predicate*. The clausal predicate of a modal is a sentential unit that is associated with the modal and acts semantically as a predicate of the modal object argument of the modal. A clausal predicate may take the form of a sentential subject (for modal predicates like *is necessary*), a clausal complement (for modal predicates like *is* *allowed to* or *need*), or a prejacent (for modal auxiliaries). The clausal predicate will generally serve to specify the satisfaction conditions of the modal object.

 Crucially, modals of necessity and of possibility lead to the very same logical form, with the modal and the sentential predicate both predicated of a modal object. Thus, (3a) and (4a) will have the logical forms in (3b) and (4b) respectively:

(3) a. John is obliged to leave.

 b. ∃d(is obliged to(d) & [John to leave](d))

(4) a. John is permitted to leave.

 b. ∃d(is permitted(d) & [John to leave](d))

The clausal predicate *John to leave* acts as a predicate of a modal object that is a need in (3a) and of a modal object that is a permission in (4a), giving satisfaction conditions of the need and the permission respectively. The differences between the two modal forces will now entirely reside in the ontology of modal objects, more precisely in their satisfaction and violation conditions, which will later be spelled out in terms of truthmaker theory.

 There is substantial linguistic support for the analysis of modals in (3, 4) and that is that that modal predicates often come with complex- predicate constructions containing a nominal that makes explicit referenve to a modal object:

(5) a. need – have a / the need

 b. be able to -- have the ability to

 c. be permitted to - - have the permission to

Sometimes only the complex predicate is available, for example in French (*avoir besoin*) or Italian (*avere bisogno*).[[1]](#footnote-1) In addition, the new logical form of modal sentences has a range of philosophical and logical motivations and applications, as this paper tries to show.

**2. Heavy and light permissions**

One central feature of the present approach is that modality is tied to particular modal objects: In the deontic case, this means that the truth of statements of obligations and permissions are based just on the satisfaction conditions of particular obligations or permissions.

What is important, however, is that there are different sorts of modal objects. Obligations and permissions may just be the products of particular norm-giving acts, but there are also deontic states, which may guide a greater range of actions. Modal objects as such are independent of each other, though particular conditions may obtain that regarding their relations to each other. Thus in the case of deontic modals, unlike in standard logic deontic logic, modality is tied to permissions or obligations resulting from particular acts. This means that permissions on the one hand and obligations on the other hand are independent of each other. Moreover, obligations may be independent of each other, as may be permissions. Yet there are normative conditions that may drive the productions of permissions and obligations as well as the relation among deontic states. In any case, the present approach provides a great amount of flexibility, depending on the context and the nature of the modality involved

 Being based on different sorts of modal objects has a range of philosophical applications and advantages, in particular regarding the possibility of contradictory obligations, the difference between weak and strong permissions and obligations, and the difference between must and ought. The involvement of different modal objects, though, has also a particularly good reflection in natural language, and not just in the possibility of complex modal predicates involving explicit reference to modal objects.

 One particularly good linguistic reflection concerns the distinction between heavy and light (or explicit and implicit) permissions (von Wright 1963). Thus, simple predicates as in (6a) display the light reading (as well as a heavy one), whereas complex predicates as in (6b) and (6c) (light verb *have/give* + nominal) display only the heavy reading:

(6) a. Mary *is permitted to* take a walk.

 b. Mary *has the permission* to take a walk.

 c. John *gave the permission* for Mary to take a walk.

The complex predicates in (6a, b) involve explicit reference to a modal object described as a ‘permission’, the (non-enduring) product of an act of permission, a notion I will discuss shortly. By contrast, (6a) involves a stative predicate *is permitted to,* describing a deontic state, rather than the product of an act. The clausal predicate in both cases gives the satisfaction conditions of the modal object.

 There is a notorious problem for possible-world semantics to account for heavy permissions, as opposed to light permissions. The possible-worlds-based account would give the same semantics to the two sorts of permission sentences: a permission sentence such as (5a) or (5c) is true just in case the clausal predicate is true in *some* world compatible with the agent’s obligations. But having a permission means more than that: it means that there was an act whose content is, at least in part, given by the complement clause and whose product, the permission, can be taken up by performing the act described by the complement clause. Moreover, giving or receiving a permission does involve a change, but not in the set of worlds compatible what the agent is obliged to do. Rather it involves a change in a set of options to act that are at the agent’s disposal.[[2]](#footnote-2)

 Deontic states are not just produced by a single illocutionary act, but may have various sources for their obtaining. They generally come with a greater range of satisfiers and violators than permissions or obligations as products of acts. Moreover, states of obligations systematically relate to states of light permission, unlike heavy permissions and obligations. Light permissions display a duality with light obligations (PS ↔ ¬ 0 ¬S). But the duality does not obtain for heavy permission. Not being obliged to do X, does not mean having the permission to do X. Similarly, being obliged to do X, does not entail having the permission not to do X.

 Heavy permissions and obligations may moreover easily be inconsistent, whereas consistency is a norm for deontic states. While this will be elaborated in greater detail later, for the moment, we can state the following generalization: the heavy reading goes along with the compositional semantics of complex predicates as in (10a, b), involving reference to an entity of the sort of a ‘permission’, whereas the light or heavy reading goes along with simple stative predicates.

 Similar semantic differences as with simple and complex predicates for permissions appear to arise with other modals as well. Thus a similar difference shows up with circumstantial modals below:

(7) a. It is *possible* to open to open the bottle.

 b. *There is a possibility* of opening the bottle.

In (7b), *possibility* makes reference to particular ways, particular types of actions that leads to the satisfaction of the goal, and (7b) suggests that the speaker know about one such way. By contrast, no reference to a particular action is made in (7b), and the implication does not hold.

 Providing a way of dealing with heavy permissions is important for an adequate account of modality, in particular for the sorts of modalities reflected in natural language. Note that verbs such as *offer* and *invite* can only serve to describe explicit forms of permission.

 While heavy permissions do not display the duality with obligations, they do engage in certain types of inferences, as will be discussed in Section 7.1.

**3. The ontology of modal objects**

**3.1. Intuitions and linguistic reflection of modal objects**

Modal objects play a central role on the object-based truthmaker semantics for modals, and this section will elaborate further on linguistic reflections and language- independent intuitions for them, as well as on their ontology.

 In natural language, modal objects are often, but not always, referents of nominalizations of modal predicates (*possibility, obligation, permission, ability, need*), though not all modal predicates come with nominalizations; in particular modal auxiliaries *may* and *must* do not. The existence and semantic involvement of modal objects does not depend on the existence of a corresponding nominalization. Modal objects (even though they are perhaps not part of our reflective ontology) are not language-dependent or language-created objects. There is in fact one sort of modal object about which we have very clear language-independent intuitions, namely laws. Laws are generally *abstract artifacts* in the sense of Thomasson (1999), that is, artifacts that may lack a physical realization. They are artifacts produced by acts of declaring or passing a law. Modal objects that are produced by acts, as laws may be, are *modal products*. Thus permissions are modal products produced by acts of permitting; obligations may be produced by acts of demanding. Permissions and obligations would not exist without the act that produces them and they may have a limited lifespan. Moreover, they need not have a physical realization and in that sense are abstract.

 Not all modal objects are modal products in that sense. Moral obligations need not have been produced by particular acts. Other modal objects that are not modal products include abilities (physical modality) and essences (metaphysical modality).

 Illocutionary acts that produce modal objects (acts or permitting, demanding, promising) may at the same time produce other products, *illocutionary products*. An act of permitting may produce a permission, an act of demanding a demand, and an act of promising a promise. Unlike a modal product, an illocutionary product does not generally endure beyond the act that produces it. The distinction between an illocutionary act and its product as a philosophically important ontological distinction has been made first by Twardowski (1911), who, however, did not recognize modal objects (Moltmann 2014, 2015, 2017a).

 Modal products share with illocutionary product their content-related properties and properties of concreteness, but unlike the latter, they may endure past the time of the act that established them. An act of commanding may produce a command, and, under the right circumstances, an obligation on the part of the addressee, and the latter may last longer than the command. An act of promising produces both an illocutionary product that is a promise, as well as a commitment on the part of the speaker (Searle 1975). 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.)

 The lifespan of modal products is reflected in the applicability of particular existence predicates that go along with them. In English, such existence predicates are, besides *exist,* *obtain, hold, prevail,* 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’ for a time past the act of giving it.

**3.2. Characteristic properties of modal objects**

Modal objects (illocutionary products) have characteristic properties that distinguish them from related types of objects, such as events, acts, and propositions. Most important are their three content-related properties:

[1] Modal objects have satisfaction conditions.

[2] Modal objects enter similarity relations based on shared content only.

[3] Modal objects have a part structure based on partial content.

Like modal objects themselves, those properties are well-reflected in natural language. In addition, we have stable language-independent intuitions about them as well.

 Modal objects of the sort of obligations allow for satisfaction or violation, expressed by various sorts of predicates in natural language, as below:[[3]](#footnote-3)

(8) 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.

 Modal objects of the sort of permissions, invitations, and offers go along with different predicates of satisfaction, *take up* and *accept*, for example:

(9) 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.

 The property of modal objects entering similarity relations just on the basis of a shared content manifests itself in the application condition on *is the same as*:

(10) a. John’s and Mary’s needs / demands are the same – they both need /demand a good

 computer.

 b. John’s offer is the same as Mary’s, they both offered Sue a thousand dollar for the

 painting.

*Is the same as* expresses (exact) similarity rather than identity, and it applies to modal objects just in case they share their content (or satisfaction conditions).

 The third characteristic of modal objects is that they have a part structure based on partial content. This is linguistically reflected in that the *part of-*construction picks out partial content only when applied to modal objects:

(11) 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 (11a, 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 as in the examples below:

(12) a. Part of John’s need was satisfied.

 b. John’s need was partly satisfied.

(13) a. Part of the offer was taken up.

 b. The offer was partly taken up.

It is important to emphasize that all modal objects, not only the deontic ones are characterized by the content-related properties [1]-[3].

 Besides the content-related properties [1]-[3], modal objects may also exhibit properties of concreteness. Thus, some modal objects, it seems, 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. In addition, modal objects may be dependent on particular agents (John’s need as opposed to Mary’s).

 To summarize, enduring modal objects, which include laws and rules, are part of our (at least implicitly) accepted ontology, 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 characteristic properties distinguishing them from other objects, in particular their three content-related properties [1]-[3], as well as, at least sometimes, properties of concreteness.

**4. Outline of Fine’s truthmaker semantics**

In what follows, I will give a brief outline of Fine’s (2014, 2017, to appear a, b) truthmaker semantics, which will be the basis for the object-based truthmaker semantics of modal sentences that this paper will develop.

 Truthmaker semantics involves a domain D of situations or actions containing actual, possible, as well as impossible situations and actions.[[4]](#footnote-4) D is a partial order under the relation ‘part of’ and is closed under fusion. D includes a null action or situation (fusion of the empty set) and the complete action or situation, an impossible action or situation that is the fusion of the set of all actions or situations.

 A situation or action *s* stands in the relation ╟ of exact truthmaking (or exact satisfaction) to a sentence *S* just in case *s* is a truthmaker of *S* and *s* is wholly relevant for the truth of *S*. ╟ applies to both declarative and imperative sentences: declarative sentences generally are made true by situations that are their exact truthmakers, imperatives generally are complied with by actions that are their exact satisfiers.

 The following, fairly standard conditions on the truthmaking of complex sentences then hold:[[5]](#footnote-5)

 (14) a. s ╟ S *and* S’ iff for some s’ and s’’, s = sum(s’, s’’) and s’ ╟ S and s’’ ╟ S’.

 b. s ╟ S *or* S’ iff s ╟ S or s ╟ S’.

 c. For a one-place predicate *P*, s ╟ ∃x S iff s ╟ S[x/d] for some individual *d*.

 d. For a one-place predicate *P*, s ╟ ∀x S iff s = sum({s’| ╟ S[x/d] for some individual

 *d*})

Truthmaker semantics assigns sentences not only truthmakers or verifiers, but also falsifiers, situations or actions that are falsemakers of a sentence and wholly relevant for the sentence being false. This allows a straightforward formulation of the truthmaking conditions of negated sentences: a truthmaker for ¬ *S* is a falsifier for *S*. With ╢ as the relation of (exact) falsification (or contravention), the condition on the truthmaking of a negated sentence is given below:

 (14) e. s ╟ *not* S iff s ╢ S

Also complex sentences are assigned both truthmaking and falsemaking conditions. For conjunctions and disjunctions the false-making conditions are those below:

(15) a. s ╢ S *and* S’ iff s ╢ S or s ╢ S’

 b. s ╢ S *or* S’ iff for some *s’* and *s’’*, s = sum(s’, s’’) and s’ ╢ S and s’’ ╢ S’

On Fine’s view, a sentence S has as its meaning a pair <pos(s), *neg(S)*> consisting of a *positive denotation*, the set *pos(S)* of verifiers of *S*, and a *negative denotation*, the set *neg(S)* of falsifiers of *S*.

 One significant advantage of truthmaker semantics is that it straightforwardly provides a notion of partial content, as defined below (Fine 2017):

(16) For sets of situations or actions A and B, B is a *partial content* of A iff every satisfier of

 A contains a satisfier of B and every satisfier of B is contained in a satisfier of A.

Partial content provides the basis for a relation of analytic entailment, as distinct from classical entailment. A sentence S *analytically entails* a sentence S’ iff the content of S’ is a partial content of the content of S. By contrast, of course, S *classically entails* S’ iff S’ is true in any model in which S is true.

 Imperatives for Fine have the same sort of semantic values as declarative sentences, a pair consisting of a set of satisfiers and a set of violators, the only difference being that the satisfiers and violators of imperatives are actions, whereas the satisfiers and violators of declaratives are situations. Imperatives provide an important application of the notion of partial content, namely to Ross’ paradox (with imperative sentences), the intuitive invalidity of the inference below, which is valid given standard deontic logic:

(17) Post the letter!

 Post the letter or burn the house!

Fine explains the invalidity of (17) by taking inferences among imperatives to be based on analytic entailment rather than classical entailment. That is, imperative S2 follows from imperative S1 just in case the content of S2 is a partial content of the content of S1. (17) then is not valid because there are satisfiers of the conclusion, actions of burning the house that are not part of a satisfier of the premise, an action of taking an apple. In contrast to imperatives, entailments among declaratives, for Fine, are not based on analytic entailment, but on classical entailment.

 Imperatives can be used not only for commands, but also for permissions (*Take an apple!)*.[[6]](#footnote-6)No distinction is made on Fine’s account between imperatives used to convey permissions and imperatives used to convey orders.

 Partial content will also be important for ruling out invalid inferences (Ross’ paradox) with the corresponding modal sentences within object-based truthmaker semantics, as we will see. The role of partial content, though, will be different than on Fine’s account of the invalidity of (17).

**5. Modal objects and their truthmakers**

Sentence-based truthmaker semantics as outlined in the last section far applies only to independent sentences and not to sentences (or sentential units) embedded under modals or attitude verbs. Object-based truthmaker semantics addresses specifically the semantics of sentences that are embedded under modal (and attitudinal) predicates. It does so by focusing on the sorts of objects that embedded sentences, acting as clausal predicates, serve to characterize: modal (and attitudinal) objects. Sentences then do not to just stand for sets of truthmakers or rather pairs consisting of a set of truthmakers and a set of falsemakers. Sentences rather have a more derivative meaning, which allows them to semantically act as predicates of modal (and attitudinal) objects. I will take [*S*] to be the meaning sentence *S* has when acting as a clausal predicate, that is, [S] is a property of content-bearing objects. As such, to recall, [S] plays a role in the logic form of a sentence such as (18a) as in (18b):

(18) a. John needs to leave.

 b. ∃e(need(e, John) & [John to leave](e))

When predicated of a modal (or attitudinal) object, a sentence specifies the object’s satisfaction conditions, in a way to be spelled out shortly.

 Object-based truthmaker semantics applies to attitude reports in a similar manner, by treating sentences embedded under attitude verbs as predicates of the attitudinal object associated with the verb, an illocutionary product (promise, claim, demand), cognitive product (judgment, thought), or mental state (belief, hope, desire). Thus, *that* S below acts as a predicate of the assumption that is the product of the act *e* of assuming (Moltmann 2014, 2017a):

(19) a. John assumed that it was raining.

 b. ∃e(assume(e, John) [that it was raining](product(e)))

When applied to an attitudinal object, a *that-*clause again specifies the satisfaction condition of the attitudinal object (Moltmann 2017a).

 Not only can the meaning of embedded sentences be conceived as a property of modal (or attitudinal) objects. Also the meaning and semantic function of independent sentences can be conceived as that of a sentential predicate standing for a property of modal (or attitudinal) objects. Independent sentences then act as predicates of the illocutionary product meant to be produced by the utterance of the sentence. Declarative sentences as sentential predicates will apply to illocutionary products of the sort of assertions; imperative sentences to illocutionary products of the sort of requests or demand.

 This view also can also be applied to independent sentences that involve performative uses of verbs, and performative uses of modals in particular. Deontic modals when used performatively make the same contribution as imperatives used under certain circumstances, setting up an obligation or permission (Lemmon 1962a, Portner 2007, Kaufman 2012):

(20) a. You must leave the room!

 b. You may take an apple!

Whereas imperatives will express properties to be predicated of the illocutionary product produced by the sentence, the prejacent of performative modals will express a property to be predicated of the deontic modal product (obligation or permission) meant to be produced by the utterance of the sentence.

 In object-based truthmaker semantics, the logic of modal sentences centers on modal objects. Object-based truthmaker semantics is based on the view that both modal objects and sentences have truthmakers or satisfiers. That is, not only sentences are associated with a content consisting of a set of truthmakers or satisfiers, but also modal objects. The satisfiers of modal objects may be of different sorts, depending on the modal object itself. Modal objects that are obligations or permissions have actions as satisfiers, and modal objects of epistemic, circumstantial, or metaphysical sorts have situations as truthmakers.

 For the relation of exact truthmaking or satisfaction between situations or actions and modal objects I will use the same symbol ╟ as for the relation between situations or actions and (imperative or declarative) sentences. ╟ then comprises different sorts of satisfaction relations reflected in the use of different satisfaction predicates in natural language applicable to modal objects. They include the truthmaking, satisfaction, fulfillment, acceptance, and compliance relation. For the relation of exact falsemaking or violation between situations or actions and modal objects, I will again use the same relation ╢ as for the relation between actions or situations and (imperative or declarative) sentences.

 Fine takes situations to be truthmakers of declarative sentences, and actions to be satisfiers of imperative sentences. As such, situations and actions satisfy the very same truthmaking or satisfaction conditions of complex sentences and play the very same roles within truthmaker semantics. The present approach differs in what determines the types of satisfiers or violators involved in the semantics of a sentence. On object-based truthmaker-semantics, deontic modal objects take actions as satisfiers, whereas modal objects of, for example, epistemic and metaphysical sorts take situations as satisfiers. Sentences (and sentential units) regardless of what they may be embedded under have satisfaction conditions that can be fulfilled by both actions and situations. Sentences of different types may impose certain conditions on their satisfiers (the distinction between imperatives and declaratives). But it is the modal object that determines what exactly its satisfiers are; the clausal predicate will give only a partial characterization of them. [[7]](#footnote-7)

 An important question for object-based truthmaker semantics is: what distinguishes modal objects of possibility and modal objects of necessity? The difference between the two modal forces on the present approach is not a matter of logical form, or even of sentence meaning. Also it is not the kinds of satisfiers that distinguish modal objects of possibility and modal objects of necessity. For example, the permission for Mary to enter the house has the same satisfiers as the obligation for Mary to enter the house. What distinguishes a permission from an obligation,rather, is that a permission only allows for actions (those it permits), whereas an obligations not only allows for actions (those that comply with it), but also excludes actions, those that violate it. The permission for Mary to enter the house allows for actions of Mary entering the house, but does not exclude other actions. By contrast, the obligation for Mary to enter the house allows for actions of Mary entering the house and excludes actions of Mary’s not doing so. This means that permissions have only satisfiers, whereas obligations have both satisfiers and violators.[[8]](#footnote-8) A modal object *d* thus is associated with a set of satisfiers *sat(d)* and an (empty or nonempty) set of violators *neg(d),* just like (declarative and imperative) sentences on sentence-based truthmaker semantics.

 Whether a modal object has violators or not is reflected in the sorts of satisfaction predicates applicable to the modal object. For example, the predicates *satisfy, fulfil* and *comply with* are applicable only to modal objects that have satisfiers as well as violators. By contrast, *take up* and *accept* as satisfaction predicates are applicable only to modal objects that fail to have violators. The choice of satisfaction predicates thus is another reflection of object-based truthmaker semantics in natural language.

**6. Heavy permissions and obligations**

Unlike the possible-worlds-based account of modals, object-based truthmaker semantics applies to heavy permissions and obligations. If the object *d* to which a clause *S* applies is a permission, then *S* will specify which sorts of actions will be exact satisfiers of *d*; *S* will not just say what is true in some world in which *d* is satisfied. If *d* is an obligation, then a clause *S* applying to it will specify what sorts of actions fulfill *d* and what sorts of actions violate it; *S* will not just say what is true in all worlds in which *d* is fulfilled (which may not content-wise relate to the fulfillment of *d*).

 As products of acts, heavy permissions and heavy obligations are entirely independent of each other, unlike in standard deontic logic. This, unlike in standard deontic logic, allows obligations to be incompatible with each other, as well as an obligation to be incompatible with a permission. Of course, there is a normative condition for obligations being compatible in a given legislative context, but this is a condition on the production of certain modal objects in a given context, not on the ontology and satisfiability of modal objects as such.

 Another condition that should be imposed on the production of modal objects in a given context is that no violators of an obligation should be a satisfier of a permission, or more generally, no violator of a modal object of necessity should be a truthmaker of a modal object of possibility:

(21) For a modal object of necessity d1 in a context C, for any s, such that s ╢ d1, there is no

 modal object of possibility in C such that s ╟ d.

(21) accounts for the validity of OS 🡪 ¬P ¬S, though the other direction does not obtain for heavy obligations and permissions (Section 7.1.), which means that heavy obligations and permissions are not duals.

**7. Conditions on modal objects**

There are a range of other conditions that should hold for modal objects in general. First, every modal object should have at least one satisfier. Second, a modal object of necessity such as a command should have at least one violator. Moreover, no satisfier of a modal object may also be a violator of that modal object. That is, the set of satisfiers and violators of a modal object may not overlap. Also convexity obtains, that is, if for actions or situations s1 and s2 that are satisfiers of a modal object d, and for an action or situation s, s1 < s < s2, then s is also a satisfier of d.[[9]](#footnote-9)A modal object may have only an impossible situation or action as satisfier, namely if it has a contradictory content. Also a modal object may have all possible situations or actions as satisfiers and thus lack a violator.

 The set of satisfiers of a modal object is not generally closed under fusion or ‘part of’. The fusion of a situation of John’s winning and a situation of Mary’s winning is no longer a satisfier of a modal object whose complete content is given by *John won* *or* *Mary won*, and the situation of lighting the gas is not a satisfier of the modal object whose complete content is given by *John lit the gas and turned on the stove*.

 Modal objects, being objects, cannot be negated; only their clausal predicates can. In object-based truthmaker semantics, a negated clausal predicate will give a partial characterization of the satisfiers of a modal object in terms of the falsifiers of the clause. Consider (22):

(22) You must not open the window.

According to the present account, the modal object described in (22) has as satisfiers actions *a* such that *a* contains an action that makes it false that the addressee opens the window, which means that a itself makes it false that the addressee opens the window. In addition, every action just consisting in a window-opening violation of the addressee would be part of a more specific action satisfying the particular obligation imposed by the utterance of (22). A violator of the obligation described by (22) will be an action that contains a violator the not-opening the window condition, thus an opening of the window. In (23), the negated clausal predicate specifies only the satisfiers of the permissions in the same way):

(23) You may not open the window.

 The notion of a partial content applies not only to sentences, but also to modal objects, as we have seen, reflected in the applicability of *part of* and *partially* to modal and attitudinal objects. The notion of partial content of a modal object can now be defined as below:

(24) Partial content of modal objects

 For a modal object d, a set C’ is a *partial content* of d if for the content C of d, C’ is a

 partial content of C.

The part-relation among modal objects, we have seen, is based on partial content. That is, a modal object d2 is a part of a modal object d1 only if d2’s content is a partial content of d1’s content:

(25) Condition on the part-relation among modal objects

 For modal objects d1 and d2, if d2 is *part of* d1, then d2’s content is a partial content of

 d1’s content.

The other direction does not hold, since modal objects are not just individuated by their content, but are subject to various conditions of concreteness.

 The notion of partial content is central for the relation between clausal predicates and the modal (or attitudinal) objects of which they may hold, as we will see in the next section.

 It is plausible that for any partial content of a modal object there is a part of that modal object with that partial content as its content. This is captured by the following condition on fission:

 (26) Fission of modal objects

 For a modal object d1 and a partial content C of d1, there is unique modal object d2 with

 C as its content so that d2 is part of d1.

 There are also conditions on the fusion of modal objects. The fusion of modal objects is not as intuitive as with objects that are not content-bearers, having to do with the fact that a description of such a fusion is not always straightforwardly available.

 The fusion of modal objects of the same kind with the same agent is unproblematic. The fusion of John’s obligation to work and his obligation to pay taxes, referring to the plurality of two modal objects, is John’s obligation to do work and pay taxes, a single modal object with a conjunctive clausal predicate. Let us then consider two modal objects that have different agents and involve the same sorts of actions on the part of the agents as satisfiers, for example John’s obligation to work in the evening and Mary’s obligation to work in the evening. The fusion of those two modal objects can be described as the obligation for John and Mary to work in the evening. The satisfiers of that fusion will be actions of John and Mary working in the evening distributively understood, that is, actions that would be sums of an action of John working in the evening and an action of Mary working in the evening.

(27) Fusion of modal objects

 For modal objects d1 and d2 of the same type and the same force,

 the fusion d1 and d2 , d1 ⊙ d2 = the smallest modal object d such that pos(d)

 = {s1˅ s2| s1∈ pos(d1) & s2 ∈ pos(d2)} and neg(d) = {s |s ╢ d1 v s ╢ d2}

Given (27), contradictory modal objects may have a fusion as well. Such modal objects will have only impossible actions as satisfiers, which is permitted (just as in sentence-based truthmaker semantics).

 Can modal objects of different forces have a fusion, say an obligation and a permission? I take the answer to be negative. Such a fusion should have as violators the violators of the obligation, but those violators would be incompatible with the permission part of the fusion.[[10]](#footnote-10)

 Fusions of modal objects will play a crucial role when recasting object-based truthmaker semantics within a dynamic semantic perspective. A discourse context for modals of a particular type can conceived as a modal object iytself. For example a to-do list in the sense of Portner (2007) would itself be a deontic modal object. Updating would then mean fusion of the described or produced modal object with the relevant background modal object.

**8. The relation of modal objects to their clausal predicates**

When sentences apply to modal objects, they will express a property regarding the satisfiers and violators of the modal objects. What exactly is the property of modal objects that sentences express? For formulating that property, let us note that sentences may underspecify the satisfaction conditions of a modal object. Consider:

(28) John needs to write a book (in order to get tenure).

The need described by (28) is not simply satisfied if John writes some book or other. [[11]](#footnote-11) It is satisfied only when he writes a book in his field that gets published by a sufficiently good publisher. This means that in a need report, the clausal complement of *need* may give only necessary, not sufficient conditions on the satisfaction of the reported need. As a first proposal, one may then take a sentence *S* to have as its meaning the property of modal objects in (29) (as in Moltmann 2015, 2017a):

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

Here╟ is the relation of exact truthmaking now holding between situations or actions *s* and modal objects *d*. ╠ is the relation of inexact truthmaking, that is, the relation that holds between a situation *s* and a modal object d in case *s* has a part *s’* that is an exact truthmaker of *S*. A sentence *S* thus expresses the property that holds of a modal or attitudinal 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*. In the case of permissions, which lack violators, the second condition is of course vacuously fulfilled.

 However, (29) cannot be correct, as it would allow (30) to be true under the same circumstances:

(30) John needs to write a book or a letter.

This is of course the very same problem with entailments among imperatives, and the same notion can be used to avoid it, partial content. Unlike in the case of (28) the content of the complement clause of (30) is not a partial content of the complement clause in (30). Thus the meaning of a sentence as a property of modal objects should better be formulated in terms of partial content as below:

(32) [S] = λd[pos(S) is a partial content of pos(d) & neg(S) is a partial content of neg(d)

 in case neg(d) ≠∅]

The second conjunct in (32) is relevant, of course, only for modal objects of obligation. The property given in (32) applies to modal objects of necessity and of possibility, with the logical forms of the two sorts of modal sentences given again below:

(33) a. John needs to leave.

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

(34) a. John is permitted to leave.

 b. ∃d(is permitted(d) & [*John to leave*](d))

The next task then is to account for the inferences that deontic logic has traditionally dealt with.

**9. Inferences with deontic modal sentences**

**9.1. Inferences with heavy permissions and obligations**

There are a number of inference patterns that standard deontic modals validates, but that are not intuitively valid, and some that are intuitively valid, but not validated by standard deontic logic. Within object-based truthmaker semantics, the validity or invalidity of inferences is not just based on the truthconditions of sentences. Rather they can be traced to the following different factors:

[1] the truth-maker-based content of modal objects and their clausal predicates

[2] the nature of the satisfiers of modal objects

[3] the ontology of modal objects

[4] general conditions on generating modal objects, and in particular modal states.

 First, as already mentioned, there is no duality between heavy permissions and heavy obligations. While OS implies ¬P¬S (condition (21)), ¬P¬S does not imply OS. The reason is that the absence of a modal object does not entail the presence of any other modal object whatsoever.

 Just as Fine’s sentence-based semantics of imperatives provides a straightforward account of Ross’ paradox involving imperatives, object-based truthmaker semantics provides a straightforward, if somewhat different, account of Ross’ paradox with deontic modals as below:

(35) You may take an apple.

 You may take an apple or burn the house.

The invalidity of (35) (on the free-choice reading) follows from the partial-content relation between a clausal predicate and a modal object. The content of the permission described by the conclusion of (35) need not be a partial content of the modal object that is described by the premise.

 The corresponding inference with statements of obligation appears similarly invalid, though it is valid in standard logic (and Fine’s sentence-based truthmaker semantics, see Section 7.3.):

(36) You must post the letter.

 You must post the letter or burn it.

The explanation of the invalidity of (36) is the same. The very same partial-content relation obtains between a clausal predicate and a modal object of possibility and a clausal predicate and a modal object of necessity.

 The mereology of modal objects is the ground for the validity of the inference below:

(37) You must drink the tea and you must take the pill.

 You must drink the tea and take the pill.

The two modal objects d1 and d2 described by the premise (the implicit arguments of the two occurrences of *must*) are of the same kind, involving the same agent, and thus have a fusion d. d will have as its satisfiers sums of a satisfier of d1 and a satisfier of d2 (which as mentioned, can be impossible actions). The conclusion of (37) may involve d as the implicit argument of the one occurrence of *must*.

 Unlike in standard deontic logic, the corresponding inference for permissions also comes out valid, which seems intuitively correct:

(38) You may take an apple, and you may take a pear

 You may take an apple and take a pear.

Given standard deontic logic, there may not be a deontically possible world in which the two prejacents in the premise are both true, in which case the conclusion does not hold. But on the present view, there will be a modal object that is the fusion of the two permissions described in the premise and that thus can serve as the implicit argument of *may* in the conclusion. Of course, what is permitted in the two cases may be inconsistent (*You may stay and you may leave*). In that case, there will be a fusion of two permissions that has only impossible actions as satisfiers. Yet that fusion can serve as the modal object described by the conclusion (*You may stay and leave*).

 The partial-content relation between clausal predicate and modal object also accounts for the validity of the inference below:

(39) You must drink the tea and take the pill.

 You must drink the tea, and you must take the pill.

The conjuncts in the premise give each a partial content of the same modal object *d* (the implicit argument of *must* in the premise), and d is also a modal object that the two conjunct sentences in the conclusion may be taken to describe (so that *d* would be an implicit argument of both occurrences of *must* in the conclusion). Alternatively, the validity of the inference in (38) could be due to Fission. Fission means that for a modal object *d* with distinct conjunctive contents *C1* and *C2*, there will be two modal objects *d1* and *d2* whose content is partially given by *C1* and *C2* respectively.

 Deontic modals cannot be stacked or iterated, that is PP(S) and OO(S) are impossible, as is PO(d). Similarly as in Fine (to appear b), this follows from the requirement that the clausal predicate of a modal characterize actions. On the present view (on which P(S) is to be understood as ∃d(P(d) & S(d))), the modal object (introduced by PP(S)) would require actions as satisfiers. But the satisfiers of deontic modal sentences are themselves modal objects, not actions. This means that ∃d(P(d) & S(d)) could not serve to specify satisfiers of the modal object that would be introduced by PP(S).

 The nature of actions as truthmakers also explains the invalidity of the inference below (McNamara 2014):

(40) It ought to be the case that Jones helps Smith who has been robbed.
 It ought to be the case that Smith has been robbed.

The actions that are satisfiers of the obligations described by the premise of (40) need to be understood against the background of a man being injured. Actions, by nature, carry presuppositions. The modal object itself imposes them as preconditions on its satisfiers and violators.

 As in standard logic, inferences from *John must pay taxes* or *John may pay taxes* to *John pays taxes* are not classically valid since *John pays taxes* may be false in a model in which John’s permission or John’s obligation to pay taxes exists, but in which there are no actual truthmakers for that permission or obligation. Such inferences moreover are not analytically valid. Given object-based truthmaker semantics, truthmakers of modal sentences are best taken to be modal objects themselves, or at least entities closely related to them, definable in terms of them (states of modal objects being valid, say). Clearly, then, the content of *John must pay taxes* or *John may pay taxes* does have *John pays taxes* as a partial content, since the latter consists in actions and the former in modal objects and actions cannot be part of modal objects (but only satisfiers of modal objects). That is, a truthmaker for the premises, a modal object, cannot have as part a truthmaker for the conclusion, a satisfier of the modal object.

**9.2. Light permissions and obligations**

Unlike in standard deontic logic, in object-based truthmaker semantics there are no inferential connections between strong permissions and strong obligations. A heavy permission simply is the product of an illocutionary act and its content need not relate to any obligation, and vice versa for a heavy obligation. But this is not so for light permissions and light obligations. Light permissions and obligations on the present approach are conceived as modal states that are not (just) the result of particular acts, but may be constituted in other ways and as such are subject to conditions relating states of permission and states of obligation to each other within a coherent moral system.

 How should such states be understood? Roughly, the maximal modal state of light permissions can be understood as consisting of the conjunction of everything that is permitted, in the sense of not being a violator of an obligation. When predicated of such a state, the clausal predicate need not list all that is permitted, but rather gives only a partial content of the content of the modal state. Fission, a general condition on modal objects, also holds for modal states. That is, for a modal state d1 and a partial content C off d1, there is a modal state d2 that is part of d1 and whose content is C. The maximal modal state of permission is satisfied only by action (perhaps only impossible ones) that up all that is permitted. Smaller actions may also count as taking up what is lightly permitted, in the sense of satisfying states that are parts of the maximal modal state of permission.

 Also the maximal modal state of obligation can be understood as consisting of the conjunctions of all that is obligatory. Again that state will have only actions as satisfiers that satisfy all that is obligatory. Again, fission obtains for modal states of obligation, just as it does for modal states of permission.

 Not violating a light obligation now is a condition constitutive of a modal state of light permission, defining its satisfiers, as below:

(41) Condition on light obligation

 In a given context C, for the maximal modal state d2 of light obligation in C and the

 maximal modal state d1 of light permission in C, if ¬ s ╢ d2, then s ╟ d1 .

Given the early condition (21), this establishes the duality between light permission and light obligation, and ensures that what is obligatory is also permitted.

 Speaking of a single maximal state of permission or obligation is in fact not entirely correct. There may be different maximal states may belonging to different modal systems or contexts. Moreover, for a given context, there may be different states of the same force at once, for example a ‘must-state’ and an ‘ought-state’, with only the former involving a duality to permissions (*John ought to do X* does not imply *John is not permitted to not do X* ).

**10. Comparison with Fine (to appear b)**

Fine (to appear b) gives an account of deontic modals within sentence-based truthmaker semantics. That account is not based on an ontology of modal objects with their truthmakers or satisfiers, yet it shares significant similarities with the present approach.

 For Fine the semantics of deontic modals is based on the notion of a *code of conduct*. Q code of conduct is a (contextually given) set of actions *a* with the following properties: a discharges all the obligation and *a* is permitted. Each action in the code of conduct is called an *ideal course of action*. The semantics of deontic modal statements involves the part-of relation among actions and is based on the following notions:

(42) For prescriptive contents (i.e. sets of actions) X and Y,

 a. X *subsumes* Y if every action in compliance with X contains an action in compliance

 with Y.

 b. Y *subserves* X if every action in compliance with Y is contained in an action in

 compliance with X.

Thus, X subsumes Y and Y subserves X just in case Y has a content that is a partial content of the content of X. The conditions for the truth of permission statements and obligation statements are then as follows:

(43) For a code of conduct C,

 a. O(X) is true iff *C* subsumes *X*, that is, if every ideal course of action in C contains an

 action in compliance with X.

 b. P(X) is true iff *X* subserves *C*, that is, if every course of action in compliance with X is

 contained in an ideal course of action in C.

That is, all the ideal courses of actions must contain some action satisfying a given obligation, and all satisfiers of a given permissions must be part of some ideal course of action.

 Fine’s notion of a code of conduct is closely related to the notion of the set of satisfiers of a modal object. In fact, a code of conduct would be the set of satisfiers of the fusion of a permission and an obligation. Such a fusion, though, plays no role on the present object-based truthmaker semantics. The reason is that a clausal predicate of a modal object that is a fusion of a permission and an obligation could not serve to convey the content of a permission. It could only give the content of an obligation, given that it conveys a partial content of the modal object. The satisfiers of a fusion of a permission and an obligation would consist of actions that take up the permission and satisfy the obligation. But for a permission statement P(S) be true, every satisfier of the permission content (clausal complement) S would have to be part of a satisfier of a, and every satisfier of *a* would have to contain a part that satisfies S. This, however, is not generally the case: a may have satisfiers that do not have parts that satisfy S. Take *d* to be the fusion of John is obligation to work all day and his permission to drink and to smoke. A satisfier of *d* would be the action s of John working and John smoking. But s would not contain a part that satisfies *John drinks*, and thus *John drinks* could not give a partial content of d. This is different if S is the content of an obligation, say the content of *John works*. Then every satisfier of *S* is part of a satisfier of *d*and also every satisfier of *d* has a part that satisfies *S*. Thus for obligations Fine’s account basically coincides with the present one, on which the clausal complement gives a partial content of the modal object / the code of conduct, but not so for permissions.

 I see two issues with Fine’s notion of a code of conduct. The first is a locality issue, the second is an identification issue. For Fine, modal statements are interpreted relative to a set of actions fulfilling what is obligatory and that are permitted. However, particular modal statements may just involve something that is permitted or something that is obligatory and that in a strictly local fashion. For example actions of making an offer or giving a permission may just license certain actions regardless of what else is permitted or obligatory. A promise may lead to an obligation whose fulfillment just depends on what has been promised and nothing else. Satisfying such modal products may go against given obligations. The satisfaction conditions of a modal product need not relate to anything beyond the modal product itself, and in particular it need not relate to given obligations or permissions. Of course the code of conduct may be conceived of a being strictly local itself and just identified with the set of satisfiers of the modal product, but this would require separating obligations and permission.

 Fine’s account also raises the problem of how to identify and convey a code of conduct. For a speaker knowing that John promised to support Bill is true she need not know what exactly has been promised as long as part of it amounts to John supporting Bill. For knowing the truth conditions of Bill is allowed to park it is not necessary to know about other actions Bill is obliged or permitted to undertake except parking the car, and even for that it is not necessary to know the details, for example for how long he may park it.

 The present approach does not raise the two issues because of its focus on modal objects. For the truth of a deontic statement it is entirely sufficient take into account the set of satisfiers (and perhaps violators) of the modal object in question. Modal objects of course may differ in ‘size, and modal states may be satisfied by a much greater range of actions than modal objects that are products of illocutionary acts Fine imposes separate conditions involving what is permitted and what is obligatory, unlike standard deontic logic, but still permissions and obligations act together to define single set that is the basis for the interpretation of both statements of permissions and statements of obligations. On the present approach, permissions are in principle entirely separate from obligation, though they may be jointly constitutive of certain modal states (Section 9.2. ).

 For understanding and knowing the truth conditions of a particular permission or obligation statement, the speaker need not know what exactly the satisfiers of the modal object in question are, but only that the clausal predicate gives a partial characterization of whatever the content of the modal object is.

 There are also specific differences between Fine’s account and the present one regarding the treatment of particular inferences. One of them concerns the paradox of permission (von Wright 1968, Kamp 1975). Fine’s sentence-based truthmaker semantics accounts for the failure of the inference below straightforwardly:

 (44) John may leave the room.

 John may leave the room or stay.

If the premise of (44) is true relative to a code of conduct C, then every action satisfying John leaves the room is part of an action in C; but not every action satisfying John leaves the room or stay may then be part of an action C, so the conclusion is not true relative to C.

 Fine’s semantics, however, does not apply to the failure of the same type of inference with modals of necessity (McNamara 2014):

(45) John must leave the room .

 John must leave the room or stay.

If the premise of (45) is true relative to a code of conduct C, then every action in C contains an action satisfying John leaves the room as part. But then also every action in C contains as part an action satisfying John leaves the rom or stays. Fine in fact considers the inference valid on one reading and distinguishes that reading (what he calls ‘bounded obligation’) from free-choice obligation Op, giving a distinct semantics for the latter as follows:

(46) OP(X) is true relative to a code of conduct C if *C* subsumes *X* and if *X* subserves *C*,

 that is, if every ideal course of action in C contains an action in compliance with X and

 every action in compliance with X is contained in an ideal course of action in C.

Fine here imposes the condition that X be a partial content of C, which is just what the present approach does with respect to the content of both modal objects of obligation and modal objects of permission.

 I disagree with Fine that modals of obligation may fail to display a free-choice reading. For me, the conclusion in (45) has just a single reading, on which John can discharge the obligation either by leaving or staying. There is no difference in intuition between (44) and (45). Object-based truthmaker semantics treats disjunctive permissions and obligations in the very same way: the inferences in (44) and (45) are exclude both because the clausal predicate in the conclusion does not give the partial content of the modal object that the premise is most likely about. Fine could not carry over such a simple partial-content condition to permission sentences, since codes of conducts are restricted to actions satisfying what is obligatory.

 Another difference to Fine’s account concerns conjunctive clausal predicates, that is, the inference in (47):

(47) You may take an apple and eat it*.*

 You may take an apple.

There is a sense in which the inference below is intuitively not really valid:

(48) You must turn on the gas and lit the stove.

 You must turn on the gas.

As with imperatives (as was mentioned), such inferences are not unproblematic. While for Fine the inference is simply valid, on the present approach there is a pragmatic explanation available while the inference in (48) is not that good. Given object-based truthmaker semantics, the conjunctive clausal predicate gives a more complete characterization of the modal object than the simple clausal predicate in the conclusion. It is a plausible pragmatic principle that a clausal predicate be used that gives a sufficiently full description of the modal object.

 There is one further respect in which the present approach and Fine’s are closely related, and that concerns the truthmakers of deontic modal statements. For Fine, the truthmakers of deontic modal statements are closely related to codes of conduct as follows: ‘Each code of conduct *C* is understood to be the state that consists in its members *c*1, *c*2, ... being all and onlythe ideal courses of action. We might say, in this case, the code *C prevails*; and so the code is, in effect, being identified with the state that it prevails. [..]’ (Fine, to appear b). The following conditions then are imposed on when an atomic deontic statement X is verified or falsified by a code of conduct *C*:

(49) a. *C* verifies O(X) iff *C* subsumes *X*.

 b. *C* falsifies O(X) iff *C* does not subsume *X*.

(50) a. *C* verifies P(X) iff *X* subserves *C*.

 b. *C* falsifies P(X) iff *X* does not subserve *C*.

In object-based truthmaker semantics, the truthmaker of a modal statement is considered the modal object itself (or an entity closely related to it), and the same conditions will obtain for verifying a modal statement of permission P(d) & S(d) involving a modal object *d* and a modal statement of obligation O(d) & S(d):

(51) a. d verifies P(d) & S(d) / O(d) & S(d) iff content(S) is a partial content of d.

 b. d falsifies P(d) & S(d) / O(d) & S(d) iff content(S) is not a partial content of d.

In object-based truthmaker semantics, the difference between obligations and permissions resides entirely in the satisfaction conditions of the corresponding modal objects, with modal objects of necessity having both satisfiers and violators and modal objects of possibility having only satisfiers.

**11. Other Modals**

Object-based truthmaker semantics is meant to apply to other modals than deontic modals as well. In fact, it should apply with the very same semantics to other sorts of modals, the only difference being the modal objects involved. Identifying the modal objects for different sorts of modals is not always straightforward, though. It is straightforward when modal predicates come with nominalizations, in which case the ontology of the modal objects can be read off the semantic behavior of the nominalizations. This is what we had with deontic modals. However, modal predicates need not come with nominalizations, in which case the modal object needs to be identified by semantic / ontological considerations only. In all cases, though, modal objects should have the characteristic properties of modal objects: having satisfaction conditions, having a part structure based on partial content, and entering similarity relations based on shared content (Moltmann 2017b). In what follows, I will not attempt an exhaustive overview of the various modal objects for the various sorts of modals and their uses, but rather restrict myself to pointing out some core features of different kinds of modal objects.

 Modals expressing physical possibility involve modal objects of the sort of abilities, modal objects for which there is a nominalization in English (*ability*). Abilities certainly are not modal products, yet they have the characteristic properties of modal objects (Moltmann 2017b). Abilities have satisfaction conditions in the sense of manifestation conditions. They have a part structure based on share content, and enter similarity relations strictly on the basis of being the same in content, properties displayed by the applicability of *part of* and *is the same as* to abilities (*part of John’s ability, John’s ability is the same as Mary’s*).

 Other modal objects may be generated by particular conditions, in particular the modal objects involved in teleological uses of modals as below:

(52) In order to travel to Russia, John must get a visa.

Here the modal object is generated by the condition given by the *in order*-clause and the modal object has satisfaction that are satisfied by actions that a necessary for S to be in place.

Such a modal object is not the product of an act or based on physical conditions, but rather it is ontologically derivative, based on conditions for a state of affairs to obtain or an action to be possible.

 Epistemic modals may involve modal objects of different sorts, and they appear to display be a parallel distinction to that between heavy and light permissions and obligations (Przyjemski 2017). ‘Heayy’ epistemic modals may involve a modal object that is, for example generated by piece of evidence, permitting or requiring particular sorts of situations, which would be their satisfiers. Epistemic modal objects of necessity permit situations and rule out situations; epistemic modal objects of possibility only permit situations. ‘Light’ uses of epistemic modals would involve as modal objects states for which the duality of necessity and possibility is constitutive, just as in the case of light permissions and obligations.

**12. Metaphysical modality**

In this last section I would like to suggest an application of object-based truthmaker semantics to metaphysical modality. This application relates to Fine’s work on essentialism and draws a connection between truthmaker semantics and Fine’s logic of essence.

 Fine (1994, 1995) argued that metaphysical necessity should be understood as essentiality. That is, (53a) should be understood as in (53b):

(53) a. Socrates is necessarily a man.

 b. Socrates is essentially a man.

Fine proposed an essentiality operator OF for individuals that are F, so that OF S is understood as S is true in virtue of the nature of thing that are F. Fine makes two assumptions about OF.

[1] S in OF S can only be about objects that bear on the essence of objects that are F. This explains for the contrast below, where only (54b), not (54a) is intuitively true:

(54) a. Socrates is essentially member of the singleton Socrates

 b. Singleton Socrates essentially contains Socrates as member.

[2] OF is closed under logically consequences as long as the consequences are about objects that pertain to the essence of objects that are F.

 Object-based truthmaker semantics allows for a new perspective on statements of essence. This will involves conceiving of an essence as an object separate from the individual bearer (a view that can be traced to Aristotle). An essence is thus a modal object with its distinctive properties: having satisfaction conditions, having a part structure based on partial content, and entering similarity relations based on shared content. In particular, a modal object is an essence has satisfiers, situations that obtain in virtue the object’s essence, as well as violators, situations that would falsify the object’s essence.[[12]](#footnote-12)

 English *essentially* then is to be considered a predicate of essences, more precisely a predicate that expresses a relation between essences and their bearers. The logical form of (55a) will thus be as in (55b):

(55) a. Socrates is essentially a man.

 b. ∃d(essentially(d, Socrates), [Socrates is a man](d))

In order for (55a) to be true then, the same condition should hold as for all modal sentences: the content of the clausal predicate needs to be partial content of the content of the modal object, Socrates’ essence.

 The partial-content condition allows deriving condition [1] imposed by Fine on the essentiality operator, that the scope only be about objects that pertain to the essence in question. Partial content preserves aboutness and thus is tailored to capturing that condition.

 The condition [2] on closure under logical consequence as long as the same relevant objects are involved does not come out on this account. The partial-content condition captures only analytic entailment, not classical entailment restricted to the same objects. However, [2] does not in fact seem intuitively valid. Given [2], (53a) should imply (56a) as well as (56b), which both seem counterintuitive:

(56) a. Socrates is essentially a man and influential or not influential.

 b. Socrates is essentially a man or a tiger.

For (56a) and (56b), the partial-content condition does not obtain since not every satisfier of the clausal predicate (Socrates not being influential, Socrates’ being a tiger) is contained in a satisfier of Socrates’ essence. This appears the right result.

 In this way, then, the semantics of the essentialist operator OF , suitably understood and reconceived as a predicate of essences, can be subsumed under the general object-based truthmaker semantics of modals.

 Fine (1995) also proposes an essentialist conception of metaphysical necessity, on which metaphysically necessary truths are true in virtue of the essence of all objects. Given the present approach, this would mean that metaphysical truths are partial contents of the content of the modal object that is the essence of all things. That modal object would have as its satisfiers situations reflecting everything that is essential to some object or other.

**13. Conclusion**

This paper has outlined a novel semantics of modal sentences based on a novel ontology of modal objects and their truthmakers. Not only sentences, but also modal objects are considered bearers of truthmakers or satisfiers. This paper has focused on applying object-based truthmaker semantics to deontic modals. In addition it has indicated a particularly interesting application to metaphysical modality. Object-based truthmaker semantics thus has advantages beyond that of giving more adequate account of the inferential behavior of deontic modals than standard deontic logic.

 What is also very important about this approach is that it is motivated by linguistic data that are not generally taken into account. These are in particular, nominalizations of modal predicates and the semantically reflected properties of the objects they stand for, that is, modal objects. Particularly significant is the fact that modal predicates may take the form of simple predicates and of complex modal predicates containing a nominal standing for a modal object, a contrast that at least sometimes goes along with heavy and light interpretations of the modal.

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1. According to Harves/Kayne (2012), the English verb *need* is itself derived syntactically from an underlying complex predicate *have need,* an analysis that could not carry over to be cases such as *be permitted to*- *have the permission to*, *be able to – have the ability to*, since *permission* and *ability* are derived from *permit* and *able* respectively. Moreover, as we will see in the next section, there is an important semantic difference between *be permitted to* and *have the permission to*. [↑](#footnote-ref-1)
2. Similar issue arises for epistemic modals (and epistemic or doxastic attitude verbs), which arguably display the same sort of distinction between weak and strong readings (Przyjemski 2017). See Section 8. [↑](#footnote-ref-2)
3. In general, the modal product produced by an illocutionary act *e* shares its satisfaction conditions with the illocutionary product produced by *e*. But unlike illocutionary products, enduring modal products do not require subsequent sustaining actions ensuring their persistence; they only require the initial act establishing them. [↑](#footnote-ref-3)
4. It should be emphasized that truthmaker semantics, unlike what the name may suggest, does not pursue the philosophical interest of grounding the truth of a sentence is actual objects. Rather the interest of truthmaker semantics is semantic only, involving ‘shallow metaphysics’ as Fine would but it, rather than foundational metaphysics. [↑](#footnote-ref-4)
5. The truthmaking conditions for sentences with existential and universal quantification are ultimately not correct, they are just meant to serve the current purpose of indicating that truthmaker semantics is meant to apply to all types of sentences. [↑](#footnote-ref-5)
6. There are particular contexts required for an imperative to be used in the weaker way. See Iatridou / von Fintel (2017) for discussion. [↑](#footnote-ref-6)
7. Unlike Fine (to appear a, b), I will not have to assume that modals apply to imperative sentences in some form, which is implausible linguistically since there is nothing imperative-like about the prejacent of a deontic modal. [↑](#footnote-ref-7)
8. Also illocutionary are distinguished in terms of having violators or not. An offer or an invitation has only satisfiers, but no violators. By contrast, a request or an order has both satisfiers and violators. [↑](#footnote-ref-8)
9. The conditions on modal objects are similar to those imposed by Fine (to appear b) on codes of conduct, which play a similar role in Fine’s account of deontic modals as the satisfiers of modal objects in object-based truthmaker semantics. See Section 10. [↑](#footnote-ref-9)
10. If the condition on such fusions is imposed that any satisfier of the permission contain a part that is a satisfier of the obligation, then this would be a modal object that has as its satisfiers the ideal courses of actions that forms the basis of Fine’s semantics of deontic sentences. See Section 7.3. [↑](#footnote-ref-10)
11. Such underspecification has recently been discussed by Graff Fara (2013) in the context of desire reports [↑](#footnote-ref-11)
12. Essences thus display only correlates of obligations, not permissions, as there is only an essence-related modal operator of necessity not possibility. [↑](#footnote-ref-12)