**Chapter 4**

**Object-Based Truthmaker Semantics for Modals**

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The semantics of modals this chapter will develop centers on the ontology of modal objects and the application of truthmaker semantics to such objects. It can thus be called ‘object-based truthmaker semantics for modals’. Modal objects, entities like obligations, permissions, needs, options, strategies, epistemic states, dispositions, abilities, and perhaps essences, are all carriers of satisfaction conditions, which will be taken to be truthmaking conditions. Modal objects come with satisfiers and some also come with violators, namely modal objects with the force of necessity. The involvement of modal objects in the semantics of modals has a range of philosophical and linguistic motivations, regarding distinctions between modal objects that underlie notions such as that of weak and strong permissions and the actual modal expressions there are in natural language.

 This chapter will not deal in detail with the different types of modals, but rather focus on deontic modals with their distinction between strong and weak permissions and obligations. It will only briefly address the question of how the object truthmaker semantics can be extended to other modals, based on modal objects such as epistemic states, dispositions, and essences.

 We have seen that modal objects are to an extent overtly reflected in natural language, though less so than attitudinal objects. Nouns such as *need, permission, obligation ability, disposition, option*, and *strategy* denote modal objects. We have also seen that the distinction between weak and strong permissions is reflected in the distinction between the predicate *be permitted* (weak and strong reading) and the complex predicate *have permission* (only strong reading), with its explicit reference to a strong permission*.* Modal auxiliaries, though, such as *can*, *may, must,* and *should* do not come with nominalizations. Yet modal objects should play the same role in the semantics of modal sentences whether or not they contain nouns that make explicit reference to them.

 Quite independently of their linguistic reflection, notions close to that of a modal object figure in certain recent theories of modalities, such as the notion of an essence in Fine’s (1994) theory of metaphysical modality and the notion of a potentiality in Vetter’s (2015) theory of circumstantial modality. Like those approaches, object-based truthmaker semantics of modals treats modality locally, tying the truth of a modal statement to a particular modal object (which pertain sometimes to a particular individual), rather than starting out with a set of entire worlds.

 Object-based truthmaker semantics when applied to deontic modals 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 (2018 a, b) sentence-based truthmaker semantics of deontic modals, and a comparison of the two approaches will be given later in this chapter. But first I will give a general outline of object-based truthmaker semantics of modals, with its linguistic and philosophical motivations. I will focus on deontic modals and briefly discuss applications to other modals at the end.

**1. A semantics of modals based on modal objects**

**1.1. The logical form of modal sentences**

Object-based truthmaker semantics of modals leads to radically different logical forms of modal sentences than the standard view of the semantics of modals. On the standard view, modals are represented as operators, generally interpreted as quantifying over possible worlds that act as parameters of evaluation for the prejacents 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 function *f* maps the world *w* at which the entire sentence is evaluated to the relevant set of worlds, depending on the type of modality or modal flavor.

 Modals in natural language, it can be noted, are not obviously best represented by modal operators or quantifiers ranging over worlds. Modals in natural language belong to various different syntactic categories none of which is obviously quantificational. Modals may take the form of modal auxiliaries (*may, must, could, should*), modal full verbs (*need, is obliged to, is permitted/ allowed to*), modal adjectives (*possible, necessary, obligatory, optional*), adverbs (*possibly, necessarily, perhaps, certainly*), and nouns (*need, possibility, necessity, permission, obligation*). In addition, there are agentive verb that convey modality (*allow, forbid, promise, offer, order*). Generally, it appears that modals across languages do not take the form of quantifiers, for example a quantifier like *sometimes* can be used in many languages to range over both times and events, but generally not over worlds (as noted by Viola Schmitt, p.c.)

 This concurs with a central assumption of the present approach, namely that modals do not play the semantic role of operators quantifying over worlds, but rather, simplifying, act as predicates of modal objects of the various kinds. Thus, modal auxiliary and full verbs, modal adverbs, and nouns are (simplified) considered predicate of modal objects. Furthermore, the prejacent, complement clause or subject clause in a modal sentence acts as a predicate of the modal object, giving its satisfaction conditions. The modal sentence itself involves existentially quantification over modal objects. Thus, the logical form of (3a) will be (3b), where *John to leave* is considered a predicate predicated of the modal object:

(3) a. John needs to leave.

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

 Modals of necessity and of possibility lead to the very same logical form, the difference in forces will reside entirely in the truthmaker-based content of the corresponding modal objects. Thus, the logical form of (4a) will be (4b):

(4) a. John can leave.

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

 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 acts semantically as a predicate of the modal object argument of the modal. The clausal predicate may be a sentential subject (for modal predicates like *is necessary* or *is permitted*), a clausal complement (for modal predicates like *is* *allowed* or *need*), a prejacent (for modal auxiliaries), the scope of an adverb (*necessarily, essentially*), and a modifier of a noun (*obligation, permission, need*). The clausal predicate will in all cases serve to give the satisfaction conditions of the modal object.

 There are also complex modal predicate consisting of a light verb (*have*), a noun for a modal object (*need*), and a clausal modifier of the noun:

(8) John has the need to work

There are other complex modal predicates that make explicit reference to a modal object. Besides *have (the / a) need*, there is *have the ability to, have permission to, have the obligation to, have the option of*. Sometimes only the complex predicate is available, for example the one for ‘need’ in French and Italian (*avoir besoin*, *avere bisogno*). Complex modal predicates are important regarding the syntax-semantics interface of modal sentences based on modal objects. In Chap. 5, I will endorse the view that the interpretation of both modal sentences and attitude reports is based on underlying complex predicates as in (8). This matches the syntactic analysis of Harves/Kayne (2012) on which verb *need* is derived syntactically from an underlying complex predicate *have need.* As we will see in the next section, though, there is a semantic difference between the simple predicate *be permitted* and the complex predicate *have permission to* (which will require the simple predicate to be derived from a different light verb - noun configuration, involving an abstract noun).

 In this chapter, I will just assume that the various modal expressions have an argument position for modal objects and that the clausal predicate, whatever forms it takes, acts as a predicate of the modal object. Given (5), 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, (10a) and (11a) will have the logical forms in (10b) and (11b) respectively:

(10) a. John has an obligation to leave.

 b. ∃d(have(John, d) & obligation (d) & prop([*John to leave*])(d))

(11) a. John has permission to leave.

 b. ∃d(have(John, d) & permission(d) & prop([*John to leave*])(d))

The clausal predicate *John to leave* acts as a predicate of a modal object that is an obligation in (10a) and of a modal object that is a permission in (11a), giving satisfaction conditions of the need and the permission respectively. The differences between the two modal forces resides entirely in the ontology of modal objects, or more precisely, in their satisfaction and violation conditions.

**1.2. Modal objects and their truthmakers**

This semantics centers on the notion of a modal object. Let us therefore quickly review and extend what was said about modal and attitudinal objects in Chapter 3.

 Modal objects share characteristic properties with attitudinal objects, properties that jointly distinguish them from events, acts, and propositions and that are reflected both in language-based and language-independent intuitions. Most importantly, modal and attitudinal objects share content-related properties such as having satisfaction conditions and having a part structure based on partial content. While attitudinal objects generally display features of concreteness (limited lifespan, causal efficaciousness, perceivability), modal objects can be more abstract, as is the case for modal states (weak permissions and obligations). Laws, rules, commitments, permissions, offers etc. are modal objects that are abstract artifacts in the sense of artifacts that lack a physical realization (if they are not written down) and that may endure past the act that created them (depending on their intended validity).

 Some modal objects are associated with illocutionary acts or mental states, for example deontic modal products (laws, permissions). Moral obligations, by contrast, need not have been produced by particular acts.[[1]](#footnote-1) Other modal objects that are not modal products include abilities (physical modality) and essences (metaphysical modality). Modal objects may also be constituted by evidence (epistemic modality) or formal conditions (teleogical modality).

 Illocutionary acts may at once come with illocutionary products and with modal products. An act of commanding comes with a command, an illocutionary product, and, under the right circumstances, an obligation on the part of the addressee. An act of asserting or promising comes with a promise, an illocutionary product,as well as an enduring commitment, a modal product. Modal products share with the corresponding illocutionary product their content-related properties (but not necessarily their duration).[[2]](#footnote-2)

 Given object-based truthmaker semantics, not only sentences are associated with a content consisting of a set of satisfiers and a set of violators, but also modal (and attitudinal) objects. The satisfiers of modal objects may be of different sorts, depending on the nature of the modal object. Modal objects that are obligations or permissions generally have actions as satisfiers, whereas modal objects of epistemic, circumstantial, or metaphysical sorts generally have situations as truthmakers. Situations and actions play the very same roles within truthmaker semantics, in particular they satisfy the very same truthmaking conditions of complex sentences. 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 (imperatives require actions as satisfiers, declaratives require situations). In the case of clausal predicates of modals, it the modal object that determines what exactly its satisfiers are.[[3]](#footnote-3)

 The symbol ‘╟’ stands for the relation of exact truthmaking or satisfaction both between situations or actions and sentences and between situations or actions and modal objects. It comprises different sorts of satisfaction relations reflected in the use of different satisfaction predicates applicable to modal objects, the truthmaking, satisfaction, fulfillment, acceptance, compliance, manifestation, and realization relation. The symbol ‘╢’ is used for the relation of exact falsification or violation between situations or actions and sentences or modal objects. A modal object d is associated with a positive extension (pos(d) = {s | s ╟ d}) and a negative extension (neg(d) = {s | s ╢ d}). Sentences embedded under modal predicates can semantically act as predicates of modal objects in virtue of the derived meaning below (given already in Chap. 3):

(5) Truthmaker-based derived meanings of sentences (as predicates of content bearers)

 For a clausal predicate S,

 prop([S]) = λd[pos(d) = pos(S) & (neg(d) ≠ Ø 🡪 neg(d) = neg(S))].

A clausal predicate can apply with the meaning (5) both to modal objects that have violators (modal objects of necessity) and modal objects that lack violators (modal objects of possibility).

 Modal objects themselves, being objects, cannot be negated; only their clausal predicates can. (5 takes into account negated clausal predicates, which will specify the satisfiers of a modal object in terms of the falsifiers of the clause:

(6) You should not open the window or the door.

According to (5), the satisfiers of the obligation described in (6) are just the actions that violate *you open the window or the door* (and thus that fail to satisfy you open the window and you open the door). More tricky is the case of prohibitions (*You are forbidden to open the window*).The clausal predicate of a prohibition gives the violation conditions of the modal object, not its satisfaction conditions. Here the option decomposing the predicate is the most obvious solution (*forbidden to* VP = *obliged not to* VP).

 (5) also applies to independent sentences when uttered with a performative use of a modal. Deontic modals when used performatively make the same contribution as imperatives used under circumstances under which they setup an obligation or permission (Lemmon 1962a, Portner 2007, Kaufman 2012):

(7) a. You must leave the room!

 b. You may take an apple!

The prejacent of a performative modal can then be taken to express a property to be predicated of the deontic modal product (obligation or permission) meant to be produced by the utterance of the sentence, as below:

(8) λd[must(d) & [you leave the room](d)]

This kind of meaning will be important in Chapter 5 for the analysis of harmonic modals.

 Adopting (5) as the meaning of clausal predicates applying to for modal objects may seem problematic in view of the fact that clausal predicates may underspecify the satisfaction conditions of a modal object, as below:

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

The need described by (9) is not simply satisfied if John writes some book or other. It is satisfied only when he writes a book in his field that gets published by a sufficiently good publisher. This suggests a need report, the clausal complement of *need* may give only necessary, not sufficient conditions on the satisfaction of the reported need. Such cases underspecification has been discussed by Fara (2013) in the context of desire reports. In my previous work (Moltmann 2017a, 2018a, 2020a). I took such underspecification to mean clausal predicates give only a partial content of an attitudinal or modal object to which they apply. I now take the view that they generally give the complete content, with modal and attitudinal objects with a world-to-word/mind direction of fit (e.g. needs and desires) constituting special cases. I will discuss the issue in an appendix in Chapter 5.

**1.3. Modal objects and the notion of a modal base**

Modal sentences are often understood against a set of background assumptions. Thus, sentence like (10) does not claim that in all ideal worlds John is speeding. Rather (10) is understood against a background assumption on which John is speeding and claims that he in ideal worlds he then pays a fine:

(10) John must pay a fine for speeding.

The phenomenon was a motivation for Kratzer’s (1981, 1991) notion of a modal base within the standard view of modals: the modal base consists in the set of worlds in which the background assumptions are true. The ordering source, by contrast, orders those worlds according to the type of modality, deontic, epistemic etc.

 This is a way of incorporating the modal base into object-based truthmaker semantics of modals. Modal objects (and attitudinal objects) may come with a background, which itself can be conceived as a modal or attitudinal object, an object whose truthmakers make the background assumptions true and whose falsifiers make them false. Such a modal object then would be a more complex object composed of a background and a simple modal object. Let’s say, certainly simplifying, that such a complex modal object is a pair consisting of a background object and a (simple) modal object. Then the following condition will obtain for its satisfaction and violation:

(11) For a complex modal object <d, d’> with a (simple) modal object d and a background d’,

 for any situation (or action) s, s ╟ <d, d’> iff s ╟ d and s╟ d’,

 for any situation (or action) s, s ╢ <d, d’> iff s ╢ d and s╟ d’.

Backgrounds of modal objects correspond to presuppositions of attitudinal objects and as such will be addressed again in Chapter 5. They also a play a role in certain modal paradoxes, as we will see.

**2. Inferences with deontic modal sentences**

**2.1. Conditions on modal objects**

There are general conditions on modal objects some of which were introduced as conditions on modal and attitudinal objects in Chapter 5 and some of which are specific to modal objects only.

 First of all, modal objects will have a non-empty content and thus will always have some satisfiers (which may also be impossible actions or situations) and modal objects of necessity should have some violators. A modal object with a contradictory content has only impossible situations or action as satisfiers. Moreover, the set of satisfiers and violators of a modal object should not overlap.

 Another general condition on modal objects is convexity, 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.[[4]](#footnote-4)

 The set of satisfiers of a modal object is not generally closed under fusion. 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*.

 The notion of a partial content introduced in Chapter 3 applies to both sentences and derivatively to modal objects (which, we have seen, is reflected in the applicability of *part of* and *partially* to modal objects):

(12) 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*.

Partial content also underlies the part-relation among modal objects. 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:

(13) 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, origin, and agent-dependence.

 Extraction is the property that for any partial content of a modal object there is a part of that modal object with that partial content as its content:

 (14) Extraction 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*.

 The fusion of modal objects is not as intuitive as with objects that are not content-bearers. This has 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 modal flavor and the same force, involving the same agent is unproblematic.[[5]](#footnote-5) The fusion of John’s obligation to work and his obligation to pay taxes, a plurality of two modal objects, is John’s obligation to do work and to pay taxes, a single modal object with a conjunctive clausal predicate. The fusion of John’s obligation to work in the evening and Mary’s obligation to work in the evening can be described as the obligation for John and Mary to work in the evening. This is the fusion of two modal objects with different agents, but that have the same sorts of actions as satisfiers. 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 *s1* ˅ *s2* of an action *s1* of John working in the evening and an action *s2* of Mary working in the evening. Given Extraction, it suffices to characterize the fusion of two modal objects in terms of its content (based on the contents of *d1* and *d2*) and the condition that it contains *d1* and *d2* as parts:

(15) Fusion of modal objects

 For modal objects *d1* and *d2* of the same modal flavor, of the same force, with

 non-overlapping sets of satisfiers and violators ,

 the fusion *d1* and *d2* , *d1* ⊙ *d2* = the modal object *d* with d1 and *d2* as parts and pos(d)

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

(15) does not permit fusions that would result in violating the conditions on modal objects of not having overlapping sets of violators and satisfiers. This will be relevant for inferences with modals discussed in Section 3.

 Can modal objects of different forces have a fusion, say an obligation and a permission? How would such a modal object look? A modal object of this sort should have as satisfiers sums of a satisfier of the obligation and a satisfier of the permission. Its violators would simply be the violators of the obligation. Thus, the violators would violate just part of the content of such a fusion. For the fusion of two modal objects with the same flavor but different modal forces the very same definition is in fact applicable.[[6]](#footnote-6)

 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 be conceived as a modal object itself. 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. Just as there are separate lists for different sorts of modals, there will be separate fusions for the associated modal objects.

**2.2. Strong and weak permissions**

One central feature of the present approach is that modality is tied to particular modal objects. The involvement of different modal objects, though, has also a particularly good reflection in natural language, and not just in the presence of complex modal predicates involving explicit reference to modal objects. One particularly good linguistic reflection concerns the distinction between strong and weak (or explicit and implicit) permissions (von Wright 1963). Traditionally, the two readings have long been recognized for modal auxiliaries *can* and *must*,

But the two readings are not equally available in in (16a) and (16b):

(16) a. Mary *is permitted* to leave.

 b. Mary *has permission* to leave.

(16a) has both a strong and a weak reading, whereas (16b) has only a weak reading. The strong reading is strictly tied to the nominalization, whereas the simple predicate allows for both readings, depending on context.

 Possible-worlds semantics has notorious problems dealing with strong and weak permissions since it would give the same semantics to the two sorts of permission sentences: a permission sentence such as (16a) or (16b) is true just in case the clausal predicate is true in *some* world compatible with the agent’s obligations. But having permission means more than that: it means that there was an act whose product, the permission, can be taken up by performing the act described by the complement clause. Moreover, giving or receiving permission does involve a change, but not, or rather not directly, in the set of worlds compatible what the agent is obliged to do. Rather it more directly involves a change in a set of options to act that are at the agent’s disposal.[[7]](#footnote-7)

 On the present view, strong permissions and obligations are associated with the products of particular norm-giving acts, which are described by modal nouns such as *permission*. If the object *d* to which a clausal predicate *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*).

 Weak permissions and obligations, on the present view, are associated with deontic states, which are individuated on the basis of general conditions and guide a greater range of actions. The choice of different modal objects is well-reflected linguistically not only in (16), but also in the semantic difference between (17a) and (17b):

(17) a. Mary appreciates the permission to leave.

 b. Mary appreciates being permitted to leave.

The object of appreciation in (17a) is the (non-enduring) product of an act of permission. By contrast, in (17b) it is a deontic state or the product of an act of permission.[[8]](#footnote-8) As expected, (18a) and (18b) display only the strong reading:

(18) a. John *gave permission* for Mary to leave.

 b. Mary *obtained permission* to leave.

 As products of acts, strong permissions and strong obligations are entirely independent of each other. Unlike in standard deontic logic, this allows obligations to be incompatible with each other, and it allows 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. Only modal states, which are not the products of illocutionary acts, are constituted by normative conditions, and modal states, of course, consist of weak permissions and weak obligations,

 There are normative conditions on modal objects that obtain relative to a particular context. Thus, a normative condition on the production of deontic modal objects in a given context should be that no violator of an obligation should be a satisfier of a permission. This will be part of a more general condition on modal objects, namely that in a given context no violator of a modal object of necessity should be a truthmaker of a modal object of possibility:

(19) Normative condition on deontic modal objects in a (legislative) context

 For any legislative context *C* and modal object of necessity *d1* in *C*, for any *s* such that

 *s* ╢ d1, there is no modal object *d2* of possibility in *C* such that *s* ╟ d2.

(19) accounts for the validity of the inference OS 🡪 ¬P ¬S (if S is obligatory, then not S is not permitted). But the other direction ¬P ¬S 🡪 OS (if not S is not permitted, then S is obligatory) does not obtain for strong obligations and permissions. That is, the lack of a permission for not doing S does not entail the existence of an obligation for doing S. This means that strong obligations and permissions are not duals.

 Unlike in standard deontic logic, in object-based truthmaker semantics there are no inferential connections between strong permissions and strong obligations as such. A strong permission is simply the product of an illocutionary act, and its content need not relate to any obligation, and vice versa for a strong obligation. But this is different for weak permissions and weak obligations. Weak permissions and obligations are modal states that are not (just) the result of particular illocutionary acts, but have various sources for their obtaining, subject to conditions on how states of permission and states of obligation are to cohere with each other. Strong permissions and obligations can be inconsistent, whereas consistency is a constitutive condition for deontic modal states. It is a constitutive condition on deontic modal states that a state of weak permission does not have satisfiers that are violators of a state of weak obligation, and conversely violators of a weak state of obligation are not satisfiers of a state of permission. Extraction of course also holds for modal states (for a modal state *d1* and a partial content *C* of *d1*, there is a modal state d2 that is part of d1 and whose content is *C*).

 The maximal modal state of permission (representing the conjunction of all that is permitted) is satisfied only by actions (perhaps only impossible ones) that take up (or carry out) all that is permitted. Due to extraction, however smaller actions can be satisfiers of modal states of permission that are parts of the maximal state of permission.

 The maximal modal state of obligation (representing the conjunction of all that is obligatory) has only actions as satisfiers that comply with all that is obligatory. Bu again extraction allows smaller actions to satisfy modal states of weak obligation that are part of the maximal state of obligation.

 In contrast to strong permissions and obligations, weak permissions and obligations are duals (OS ↔ ¬ P ¬S). Not violating a (modal state of) weak obligation now is a condition constitutive of a modal state of weak permission, defining its satisfiers. The condition is given below, where < is the part of-relation that holds between situations or actions as well as between modal objects:

(20) Condition on weak obligation

 In a given context *C*, for a modal state *d2* of weak obligation in *C* and the

 maximal modal state *d1* of weak permission in *C*, and any action *s*:

 ¬∃s’(s’ < s & s’ ╢ d2) 🡪 s ╟ d1)).

That is, any action that contains no exact violator of the obligation state is weakly permitted. Given (19), (20) establishes the duality between weak permission and weak obligation, and ensures that what is obligatory is also permitted.

 The context-relativity in (20) is important. There may be different maximal states that belong to different modal systems or contexts. Moreover, for a given context, there may be states of the same force but with different degrees of strength, for example a ‘must-state’ and an ‘ought-state’. Only the former involves a duality with respect to permissions (*John ought to do X* does not imply *John is not permitted to not do X* ).

**3. Inferences with deontic modal sentences**

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 truth conditions of sentences. Rather they can be traced to the following different factors:

[1] the truthmaker-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] constitutive conditions on modal states.

 First, as already mentioned, there is no duality between strong permissions and strong obligations. While OS implies ¬P¬S, ¬P¬S does not imply OS. The reason is that the absence of a modal product does not entail the presence of any other modal product.

 Object-based truthmaker semantics provides a straightforward, account of Ross’ paradox with deontic modals as below:[[9]](#footnote-9)

(21) You may take an apple.

 You may take an apple or burn the house.

The invalidity of (21) (on the free-choice reading) follows from the fact that the clausal predicate in the premise does not have the same truthmaker-based content as the clausal predicate of the conclusion and thus the modal object described in the premise could bear the property attributed to it in the conclusion.

 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 5):

(22) You must post the letter.

 You must post the letter or burn it.

(22) is invalid because the truthmaker-based content of the clausal predicate of the premise is not the same as that of the conclusion.

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

(23) 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 can be impossible actions). *May* in the conclusion of (23) can then take *d* as its implicit argument.

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

(24) 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 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.

 While the inference in (24) appears valid, there is in fact one type of circumstance in which it is not valid, namely in which the permissions cannot both be taken up. Thus, there is no contradiction saying *you may take and apple and you may take a pear, but not both*. What appears to go on in such cases is that there are no simple permissions given, but rather permissions that also incorporate a proscription (to take up the other permission) (that is, fusions of a permission and a proscription). The permission to take an apple thus is in fact a modal object that has both satisfiers (actions of taking an apple) and violators (actions of taking the pear). It is not described that way, but that is because there are no straightforward terms for such modal objects in English and the construction for simple permissions is used to described the more complex modal object. The two permission-prescription modal objects do not have a fusion because the fusion would have the same satisfiers and violators (actions of taking an apple and a pear), violating the precondition on fusions in (15).

 Two permissions may have inconsistent contents (*I may stay and I may leave*). If they are just permissions, they would then have a fusion with an inconsistent content, validating the inference to *I may stay and leave*. This inference can be considered valid despite the fact that the permission described by the conclusion has only impossible satisfiers. (Thus the following reasoning does not seem faulty: If I am permitted to stay and I am permitted to leave, then I am also permitted to stay and leave, even though this will be impossible for me to do.)

 Extraction also accounts for the validity of the inference below:

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

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

Extraction 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 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 to Fine (2018b), 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 themselves are certainly not actions, but entities of a different type. They are themselves modal objects (or entities closely related to the modal objects deontic sentences quantify over, say states of a modal object meeting the conditions specified by the sentence) (see Section 4). This means that ∃d(P(d) & S(d)) could not serve to specify satisfiers of the modal object introduced by PP(S).

 The nature of actions as truthmakers can also account for the invalidity of the inference below, the well-known puzzle of the Good Samaritan (McNamara 2014):

(26) 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 (26) need to be understood against the background of Smith having been robbed. Actions, by nature, carry presuppositions, and it will be the modal object with its background that 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. Also, the content of *John pays taxes* won’t be a partial content of *John must pay taxes* or *John may pay taxes*. 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 or 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 not 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.

**4. Comparison with Fine (2018b)**

Fine (2018b) 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*. A 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:

(27) 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:

(28) 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 deontic modal object. In fact, a code of conduct would be the set of satisfiers of the fusion of all permissions and all obligations. While such fusions are permitted on the present approach, they could not play the semantic role modal objects are supposed to play. That is because a clausal predicate of a modal object that is a fusion of a permission and an obligation could not serve to convey both the content of what is permitted and what is obligatory. The satisfiers of a fusion *d* of a permission and an obligation would consist of actions that take up the permission and satisfy the obligation, but its violators would just be the violators of the obligation. Take *d* to be the fusion of John’s obligation to work and his permission to smoke. A satisfierof *d* would be the action *s* of John working and John smoking and a violator an action of not working, though not an action of refraining from smoking. But the clausal predicate *John works and smokes* could be true only of a modal object that has John’s refraining from smoking as a violator.

 There are 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, deontic modal statements are interpreted relative to a set of actions fulfilling all that is obligatory and all that is 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 an issue if it were to serve as a semantics for the purpose understanding and communication, namely of how to identify and convey a code of conduct. For a speaker to understand and communicate that John needs to publish a book does not require knowing what sort of book exactly John need to publish and what else John is obliged or permitted to do. For communicating that Bill is allowed to park the car 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 given the role of 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 actions of a much greater size 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 a 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 obligations, though they may be jointly be constitutive of deontic modal states

 For understanding and knowing the truth conditions of a sentence giving a particular permission or obligation, the speaker need not know the content of the maximal states of permission and of obligation, but only that the clausal predicate gives the content of the modal object in question.

 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:

 (29) John may leave the room.

 John may leave the room or stay.

If the premise of (29) 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 stays* 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):

(30) John must leave the room

 John must leave the room or stay.

If the premise of (30) 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:

(31) 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 (30) has just a single reading, on which John can discharge the obligation either by leaving or staying. There is no difference in intuition between (29) and (30). Object-based truthmaker semantics treats disjunctive permissions and obligations in the very same way: the inferences in (29) and (30) are both excluded because the clausal predicates in the premise and the conclusion fail to have the same truthmaker-based content. Fine could not carry over such a simple 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 (32):

(32) 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 valid:

(33) 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 it is valid only due to extraction.

 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 themselves. 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 *c1*, *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, 2018b). The following conditions then are imposed on when an atomic deontic statement X is verified or falsified by a code of conduct *C*:

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

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

(35) 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, a modal statement about a modal object d, would be of the form ‘P(d) & S(d)’ (for a permission statement) or ‘O(d) & S(d)’ (for an obligation statement), with ‘S’ representing the clausal predicate. Such a statement will have as truthmakers situations of P and S holding of d or of O and S holding of d. In fact one may then take the verifiers of ‘P(d) & S(d)’ and of ‘P(d) & S(d)’ to be the modal object d itself, as S gives the full content of d and P or O ensure d is the right kind of modal object.

**5. Object-based truthmaker semantics for other modals**

Object-based truthmaker semantics should apply to modals other than deontic modals as well. In fact, one may expect sentences with non-deontic modals to have the very same logical forms, with the only difference being the modal objects involved.

 There are a few challenges however, for applying object-based truthmaker semantics to other modals. One of them is that identifying the modal objects for other sorts of modals is not always straightforward. Not all modal predicates come with nominalizations or nouns that can be used for referential terms whose semantic behavior would reflect the ontology of the modal objects in question, as was the case with deontic modals. In such cases, the modal object needs to be identified by semantic and ontological considerations only. The characteristic properties of modal objects should of course be the same, namely having satisfaction conditions, having a part structure based on partial content, and entering similarity relations based on shared content, and perhaps featuring properties of concreteness. Here are some remarks about the sorts of modal objects involved in the semantics of other kinds of modals.

 For physical and circumstantial modality, there are a variety of nouns that appear to display corresponding modal objects. *Ability* and *disposition* denote modal objects. Abilities and dispositions come with satisfaction conditions in the sense of conditions of manifestation or realization. They also come with a part structure based on partial content (‘part of John’s ability’ cannot be a temporal part, but rather is something whose manifestations are partial manifestations of John’s ability).[[10]](#footnote-10)

 Another potentially promising application of object-based truthmaker semantics is to metaphysical modality. This application draws a connection between truthmaker semantics and Kit Fine’s (1994, 1995) logic of essence. On Fine’s account, (37a), on one reading, should be understood as in (37b), formalized as in (37c):

(37) a. Socrates is necessarily a man.

 b. Socrates is essentially a man.

 c. Os Ms

The logical form of (37b) involves an essentiality operator OF for individuals that are F: 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 (38b), not (38a) is intuitively true:

(38) 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 essentialist statements in this sense if essence is conceived as an object separate from its individual bearer.[[11]](#footnote-11) That is, an essence would be a modal object with the usual characteristic properties, in particular having satisfaction conditions. English *essentially* then will be a predicate of essences, more precisely a predicate that expresses a relation between essences and their bearers. The logical form of (39a) will thus be as in (39b), with existential quantification over essences as modal objects:

(39) a. Socrates is essentially a man.

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

In order for (39a) to be true, the same condition should hold as for all modal sentences: the clausal predicate *Socrates is a man* needs to share its satisfiers with the modal object d.

If essences as modal objects have truthmaker-based satisfaction conditions, this means that an essence has as its verifiers just the situations that obtain wholly in virtue the object’s essence, fulfilling, roughly, conditions [1] and [2] of Fine. In addition an essence as a modal object will have violators, situations that fail to obtain in virtue of the object’s essence.

 The condition [2] on closure under logical consequence as long as the same relevant objects are involved does not come out on this account, though. [2] does not seem intuitively valid in fact. Given [2], (45a) should imply (40), which seems counterintuitive:

(40) Socrates is essentially a man or a tiger.

Instead [2] should be replaced by a condition of partial content or analytical entailment. This will come out given the condition of Extraction: for a modal object d, if S makes d true, then a sentence S’ whose content is a partial content of S makes D true. In this way, the semantics of the essentialist operator OF, suitably understood and reconceived as a predicate of essences, may 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. Again, the essence of all things may be conceived as a modal object. That modal object would have as its satisfiers the situations just reflecting everything that is essential to all objects.

 Epistemic modals may involve modal objects of different sorts. ‘Strong’ uses of epistemic modals may involve a modal object that may have been generated by a piece of evidence against a particular background, 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. ‘Weak’ 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 weak permissions and obligations.

 Modal objects may be generated by particular conditions, as conveyed by a particular construction. This is the case for *in order*-clauses with a teleological use of a modal:

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

 b. In order to travel to Paris, John can take a plane

Here teleological modal objects are generated by the condition given by the *in order*-clause. In (41a), the modal object has as its satisfiers actions of John getting a visa and as violators actions in virtue of which John does not get a visa. In (41b) the modal object has as its satisfiers actions of John taking a plane and no violators.

 The distinction between weak and strong permissions generalizes to teleogical modality, which is reflected linguistically in the difference below:

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

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

In contrast to (42a), (42b) claims the existence of a particular way (i.e. a particular type of actions) that leads to the satisfaction of the goal, the opening of the bottle, and it suggests that the speaker has practical knowledge about it.[[12]](#footnote-12) The strong cases would be ‘strategies’ or possibilities when referred to, for example, as ‘a possibility of opening the bottle’. Strategies and possibilities come with other predicates of satisfaction than *fulfill, accept*, or *realize*, namely *take on, pursue*, or *follow*. The reason appears to be that strategies and possibilitiesfail to be associated with a norm, unlike permissions, and unlike decisions and intentions, they fail to have violators.[[13]](#footnote-13)

 To summarize, modal objects of the different sorts have various sources, they may be products of illocutionary or mental acts, they may be constituted by various norms or rules, they be based on pieces of evidence, and they may be grounded in objects, as in the case of dispositions, abilities, and essences. Finally modal objects may be generated by particular conditions.

**6. Conclusion**

This chapter has outlined a novel semantics of modal sentences, object-based truthmaker semantics, based on an ontology of modal objects and their truthmaker-based content. On that view, modals and their prejacent or clausal complement / subject act as predicates of modal objects. New parameters: different satisfiers determined by modal object, different backgrounds for modal objects, different sorts of satisfiers / falsifiers for modal objects. In particular, no difference in logical form between sentences with modals pf necessity and modals of possibility. The focus has been on applying object-based truthmaker semantics to deontic modals. But the chapter has also suggested further promising application to epistemic, metaphysical, and circumstantial modality.

 What is also very important about this approach is that it is motivated by linguistic data that are not generally taken into account, in particular the fact that modal predicates may take the form of simple predicates and complex predicates, a contrast that, to an extent, goes along with strong and weak interpretations of the modal.

1. There are also views, though, according to which moral obligations and permissions are created by acts of god, pointed out to me by Kit Fine. [↑](#footnote-ref-1)
2. An act of permitting comes with both a permission as an illocutionary product and a permission as a modal product; likewise for offers, which come with acts of offering. Nominalizations such as *permission* and *offer* are polysemous, denoting both illocutionary products and modal products. [↑](#footnote-ref-2)
3. The view that it depends on the modal object itself what its satisfiers are differs from that of Fine (2018a, b), who makes the choice of types of satisfiers strictly dependent on types of sentence. As a consequence, Fine (2018a, b) takes deontic modals to select imperatives, which have only actions as truthmakers. Such an assumption is avoided on the present approach. That deontic modals apply to imperative sentences in some form is implausible linguistically since there is nothing imperative-like about the prejacent of a deontic modal. [↑](#footnote-ref-3)
4. The conditions on modal objects are analogous to those imposed by Fine (2018 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 Sect. 5. [↑](#footnote-ref-4)
5. Just to make sure, modal flavors distinguish deontic modal objects (of a certain strength) epistemic modal objects, circumstantial modal objects etc. The two modal forces are either are necessity and possibility. [↑](#footnote-ref-5)
6. 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 form the basis of Fine’s semantics of deontic sentences. See Section 10. [↑](#footnote-ref-6)
7. 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 6. [↑](#footnote-ref-7)
8. Arsenijeviç (2020) points out that (i) has only a strong reading:

(i) Mary was permitted to leave.

Past tense in (16a) is suggestive of the act of permission having taken place, thus triggering a strong reading. By contrast, (ii) allows both a strong and a weak reading: [↑](#footnote-ref-8)
9. Fine’s (2018a, b) sentence-based semantics of imperatives provides an account of Ross’ paradox involving imperatives making use of the notion of partial content. [↑](#footnote-ref-9)
10. Dispositions play a central role as potentialities in Barbara Vetter’s (2015) work on circumstantial modals. Vetter takes a potentiality not to be an object, though, but rather to be property of an object, which leads to a different logical form of the corresponding modal sentences. [↑](#footnote-ref-10)
11. But see Correia (2006) for arguments against essences being objects. [↑](#footnote-ref-11)
12. The same semantic effect is not associated with *possibility* when used with circumstantial modals that are not action-directed, as in *There is a possibility that it rains tomorrow*. [↑](#footnote-ref-12)
13. This was pointed out by Kaufmann (2021). Kaufmann suggests that strategies and possibilities may have violators in that when all other strategies have been eliminated, only the pursuit of one strategy allows reaching the goal. But this does not mean the strategy can be violated. It means that there are no other strategies that can be pursued. But what has violators in that case appears to be a second-level attitudinal object, to pursue the goal by adopting strategies. When presenting it as a ‘necessity’, though, the pursuit of other strategies counts as a violation. [↑](#footnote-ref-13)