On the Ontology and Semantics of Absence[1]

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Absence is peculiar notion, yet it has been recognized as playing a role both in ontology and in semantics. There are different notions of absence, tough. On one understanding, absence contrasts with presence: being absent just means not being present. As such the notion has been discussed in the context of truthmaking: if there is an absence of a truthmaker of a sentence S, then that absence, as a reified absence, can be viewed as the truthmaker of the negation of S, of $\neg$ S. Absence has also been discussed in the context of the notion of part: there are parts of certain types of entities that consists in the absence of constituting material – the hole of a donut, openings in walls, empty spaces in design and art. But absence contrasts not only with presence (of a truthmaker or material). There is a stronger notion of absence on which the absence of a thing presupposes that that thing should have been there, to make something else complete. Absence in that sense is a modal notion that crucially involves the notion of completion. This notion is the one that is reflected linguistically in the semantics of what I will call 'completion-related verbs of absence'. In English, these verbs are *lack* and *be missing*, as below:

(1) a. The house lacks a door.

   b. A screw is missing (from the chair).

(1a) roughly states that for the house to be complete, it needs to have a door. (1b) states that for the chair to be complete there needs to be a screw (in a particular place in it).

   The notion of completion itself is a challenging notion, since it has an intensional dimension. Completion may relate to something that may be merely conceived as a whole,

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what I will call a 'conceptual whole'. Sentences with completion-related verbs of absence presuppose that the conceptual whole has only an incomplete actual manifestation, and they state that the full manifestation of the conceptual whole entails the presence of particular sorts of entities (a door in (1a), a screw in (1b)). With its relation to a conceived whole, completion-related absence is a modal notion, involving a form of weak necessity. I will outline a semantics of completion-related verbs of absence which is based on the satisfaction conditions of modal objects generated by conceptual wholes and their actual manifestations, objects which one may call 'lacks'. The semantics based on such modal objects will be similar in a number of respects to the 'object-based truthmaker semantics' of modals of the more familiar sorts, which I had pursued in Moltmann (2008, to appear). On that semantics, modal sentences describe modal objects, entities of the sort of needs, obligations, and permissions that come with truthmaking or, more generally, satisfaction conditions and that would be denoted by a corresponding nominalization if available. Thus, deontic modal sentences describe entities like obligations and permissions, entities that can be satisfied and (in the case of obligations) violated by actions. Circumstantial modal sentences describe entities of the sort of dispositions, which can be satisfied by situations, and sentences conveying metaphysical modality describe modal objects based on essences, which can be satisfied by situations. Whereas an obligation and certain needs are satisfied or complied with by actions, a lack is satisfied by a completing part of the whole. Like certain needs, a lack when satisfied will disappear, unlike lasting obligations and permissions.

Modal objects are typically denoted by nominalizations of modal verbs (*need, obligation, permission, disposition*). While in English there is no nominalization for *be missing,* the verb *to lack* comes with the nominalization *lack,* which I will adopt as the general term for the modal objects described by verbs of completion-related absence.

The view that the noun *lack* serves to permit reference to an object has often been subject to ridicule, most notably by Chomsky. Chomsky recognizes that *John's lack of talent*, like *the flaw in the argument* behaves in relevant respects like a referential NP:

'If I say 'the flaw in the argument is obvious, but it escaped John's attention', I am not committed to the absurd view that among the things in the world are flaws, one of them in the argument in question. Nonetheless, the NP *the flaw in the argument* behaves in all respects in the manner of truly referential expressions like *the coat in the closet* – for example, it can be the antecedent of *it* and serves as an argument, taking a theta-role. Suppose now that we make a rather conventional move, and assume that one step in the interpretation of LF is to posit a domain D of individuals that serve as values of variables and as denotata. Among these individuals are specific flaws (…), John's lack of talent, and so on.' (Chomsky 1982, p. 324).

The domain D, for Chomsky does not consist in actual objects, but constitutes just another level of syntactic representation. NPs like *John's lack of talent* were a motivation for Chomsky's semantic internalism and the rejection of the view that referential NPs serve to make reference to actual objects (see also Chomsky 1986 Pietroski 2017). This is in starl contrast to the view of this paper, which aims at building a semantics of verbs of absence on an ontology of absences like 'lacks'.

In what follows, I will first focus on the verb *lack*, establishing a range of linguistic generalizations about it and outlining its general semantics with its connection to weak necessity. Then I turn to *be missing*, which differs in its semantics in important respects from *lack* and involves another intensional dimension, namely for the parts of the conceptual whole. Finally, I will make a few remarks about the related verb *replace.*

1. The semantics of *lack*

1.1. Absence vs. presence

I will start with some remarks about the notion of absence as such. On one understanding of absence, absence is just the negation of presence, as the equivalence between (2a) and (2b) suggests:

(2) a. John is absent.

b. John is not present.

But in this context, absence has also been viewed as an object on its own itself, as a negative event or situation that makes a negated sentence true. Thus, rather there being nothing that makes *It is not raining* true, there is in fact an entity, the absence of rain, that makes the sentence true. Such 'reified absences', it has been argued, may even play causal roles (Kukso 2006). A related notion of absence is that of absence of material, which can lead to apparent parts of entities, such as holes, openings and intended empty spaces.

1.2. Completion-related verbs of absence

The notion of absence that I want to discuss in this paper differs from absence as the negation of presence. It is a notion related to completion and as such it is a modal notion.

Semantically, it is a notion involved in the semantics of completion-related predicates of absence like *lack* and *be missing*.

Lack is an intensional transitive verb. That is, its indefinite complement has a particular nonspecific reading which does not permit existential quantification, the inference from (2a) to (2b):

(2) a. The door lacks a key.

    b. There is a key x, the door lacks x.

Lack does not mean being absent, as opposed to present, of course. *Lack* primarily relates an individual to a missing part, rather than a location. Thus, *lack* seems to convey the negation of *have*, in examples as below:

(3) a. The door has a key.

    b. The door does not have a key.

    c. The door lacks a key.

(4) a. The cat has a tail.

    b. The cat does not have a tail.

    c. The cat lacks a tail.

(5) a. The picture has a frame.

    b. The picture does not have a frame.

    c. The picture lacks a frame.

There is one major difference, however, between *(not) have* and *lack*: unlike *have*, *lack* presupposes some form of incompleteness of the subject referent. Thus, the item said to be lacking generally plays a role of a required structural or functional part of an integrated whole.[2] By contrast, in corresponding sentences *have* just expresses a relation between an entity and something that is a structural part, which need not be essential or even expected.

Have, moreover, can convey relations such as kinship and possession, which *lack* cannot generally convey, unless there is a particular context in which such relations are expected or required:

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[2] For the notion of an integrated whole or form/structure of an object see Simons (1987) and Koslicki (2008); for linguistic applications of the notion to plurals, mass nouns, and part-structure modifiers see Moltmann (1997, 2018, 2005).

(6) a. Mary has a ponytail.

  b. ?? Mary lacks a ponytail.

(7) a. The house has a balcony.

  b. ?? The house lacks a balcony.

(8) a. John has a daughter.

  b. ??? John lacks a daughter.

(9) a. John has a painting by Picasso.

  b. ??? John lacks a painting by Picasso.

(6b), (7b), and (8b) are acceptable only if there was an expectation that Mary should have a ponytail, the house better have a balcony, or John better own a Picasso (given his general ambitions, for example).

   The difference between *have* and *lack* is also reflected in the possibility of modal inferences. (5c) entails (10), but not so (b):

(10) The picture should have a frame.

Likewise, on a reading on which (8b) is acceptable, it entails (11), but not so (8a):

(11) John should have a daughter.

   Lack in the examples in (3c), (4c), and (5c) relates an entity that is the subject referent (a house, cat, or picture) to a *conceptual whole*, the full or ideal 'form' of the entity, a house with a door, a picture with the frame, and a cat with a tail. The presupposition thereby is that the entity the subject refers to manifests only to a limited extent that conceptual whole. The object NP of *lack* then describes the type of entity that is required for the subject referent to complete a manifestation of the conceptual whole.

   The notion of a conceptual whole is not a hard to grasp technical notion needed only for the purpose of the semantics of completion-related verbs of absence. Rather there are conceptual wholes that we refer to explicitly in natural language and that are clearly part of our ordinary ontology. Architectural designs and plans (for actions) are of that sort. Plans in particular, that is conceptual wholes for actions, play a role for the semantics of *complete(ly)* and *partial(ly)*:

(12) a. John's partial / complete realization of the plan

    b. The army partially / completely destroyed the house.

Partially and *completely* in (b) relate to a conceived destruction of the house and convey that that conceived event is partially / completely manifested in the army's action.[3]

    The conceptual whole and its completion does not require an object. Manifestations of conceptual wholes may also be individuals together with their (expected) possessions, or individuals together with relevant kinship or friendship relations needed, say, for the individual's wellbeing:

(13) a. John lacks a car.

    b. John lacks a father.

    c. Mary lacks a close friend.

Instead of a single object, the conceptual whole may also relate to a plurality (as many, cf. Carrara er at. 2017, Oliver / Smiley 2015):

(14) The protesters lack a good leader.

Lack involves a notion of an integrated wholes that is itself not tied to single objecthood.

    Both *have* and *lack* can relate an individual to a quality:

(15) a. Joe has wisdom.

    b. Joe lacks wisdom.

(16) a. Mary has talent.

    b. Mary lacks talent.

Should qualities be considered parts of an individual? As particularized properties or tropes (or modes), they certainly pertain to just one individual and are ontologically dependent on it. But tropes are not parts in a standard understanding of the notion of individuals. Intuitively, material objects have as parts spatial parts (at least that is what *part of* when applied to

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[3] See Moltmann (1997) for such an analysis of *partially* and *completely.*

material objects picks out). But qualities can be considered part of a conceived whole, which means they need to be realized as particularized properties or tropes by any (complete) manifestation.

If a quality is said to be lacking, the quality need not be required for the object to fulfill standard conditions, but may just be desirable for a particular purpose. In such a case *lack* involves an *ideal conceptual whole*. An ideal conceptual whole may also pertain to particular circumstances of an expectation at a given occasion:

(17) a. Mary's lack of understanding was astonishing.

b. Mary's lack of attention to detail ruined the project.

Neither *lack* nor *have* mpose any constraint to the effect that the absent entity be a structural part or even a well-delimited object. In that respect, as we will see, *lack* differs from *be missing* as well as *replace*.

The nominalization *lack* also appears without a subject in existential constructions as below, where it relates not to an object, but to a location at a time, just like the simple existential sentence in (18b):

(18) a. There is a lack of water

b. There is water.

Here the conceptual whole involves not a particular object, but a location.

The nominalization *lack* forms a complex predicate with *have*, in alternation to the simple verb *lack*:[4]

(19) a. John has a lack of understanding.

b. John lacks understanding.

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[4] *Lack* has semantic correlates in other languages, for example German morphologically unrelated *Mangel*:

(i) a. Es mangelt Wasser.
   b. Es gibt's einen Mangel an Wasser.
(ii) a. Es mangelt ihm an Talent.
   b. Er hat einen Mangel an Talent.
(iii) a. Joe hat Talent.
   b. Es mangelt Joe an Talent.

This can be taken to be significant for the semantic analysis of *lack*-sentences. This is just what we have with many intensional verbs, including *need, believe*, *assume*, and *think*.: the noun in the complex predicate generally is a noun describing a modal or attitudinal object that comes with satisfaction conditions.

(20) a. John needs to have a car.

    b. John has a need to have a car.

(21) a. John believes that S

    b. John has the belief that S.

(22) a. John is permitted to leave.

    b. John had permission to leave.

(23) a. John offered to buy the use.

    b. John made an offer to buy the house.

The existence of the complex form in fact motivated object-based truthmaker semantics. The complex predicate always consists in a light verb such as *have* or *make* and a noun describing a modal or attitudinal object, an object that comes with satisfaction conditions, involving situations or actions as truthmakers or satisfiers. In the case of a need, this is an object that can be fulfilled or violated through actions. In the case of a belief, this is an object that can be made true or false by particular situations. In the case of a permission and an offer, it is an object that can be taken up by an action. The complex report, on that view, displays the logical form of modal sentences and attitude reports more transparently than the simple report. Thus, the logical form of (17d) would be as follows, where *John to have a car* gives the satisfaction conditions of the need:

(24) $\exists d$(have(d, John) & need(d) & [*John to have a car*](d))

Likewise, the logical form of *lack*-sentences as in (19b) will be based on the complex predicate as I (19a), as below:

(25) $\exists d$(have(John, d) & lack(d) & [*of understanding*](d))

The paraphrase in (26c) is an informal way of describing the semantics of the simpler sentence in (26a), whose logical form is given in (26b):

(26) a. The house lacks a door.

    b. $\exists d$(have(the house, d) & lack(d) & [*a door*](d))

    c The house's lack *d* of a door (based on a conceptual whole *C*) is satisfied iff

      for any possible entity *y* such that the composition of the house and *y* is a complete

      manifestation of *C*: there is an entity *z*, door(*z*) such that *z* is part of *y*.

The complement of *lack* describes only part of what needs to be added to yield a complete manifestation of the conceptual whole. Thus (26a) is compatible with the house lacking also a chimney and a roof. The object NP of verbs of completion-related absence in general specifies only part of what is needed to yield the complete manifestation of the whole.

    I take a lack to be an entity that can be satisfied by what needs to be added for the thing that has the lack to be complete. The conceptual whole is only an implicit part of the semantics of *lack*; the object argument of lack gives a partial description of what needs to be added for the subject referent to be complete.

    The relation between what is to be added and the lack is closely related to the relation of truthmaking or satisfaction. Unlike standard semantics, truthmaker semantics allows entities of various sorts to act as truthmakers or satisfiers, both of sentences and entities of the sort of needs, beliefs, and offers, in object-based truthmaker semantics. A lack as characterized in (26) actually needs to be mapped onto a closely related object, a lack', which has situations, rather than completing material, as satisfiers. This is the way to account for the inference from *lack*-sentences to *should*-sentences. In the next section, I will give an outline of truthmaker semantics with its object-based version, before returning to the formal semantics of *lack*.

1.3. Object-based truthmaker semantics

Here are briefly the essentials of truthmaker semantics and object-based truthmaker semantics in particular. Truthmaker semantics is based on situations rather than entire worlds, as well as on the relation ⊩ of exact truthmaking (or satisfaction) holding between a situation and a sentence. Truthmaker semantics is actually meant to be ontologically neutral in the

sense that any entity can in principle play the truthmaker role as long as it serves the overall purposes imposed by the semantics. The term 'situation' should be understood as a blanket term for entities able to act as truthmakers or satisfiers. Truthmaker semantics involves a domain *D* of situations containing actual, possible, as well as impossible situations.[5] Actual situations are part of the actual world; impossible situations are part of impossible worlds and would be truthmakers of contradictory sentences. The domain of situations is ordered by a part-whole relation < (a partial order) and is closed under fusion ⊕. *D* includes a null situation (the fusion of the empty set) and the complete situation (an impossible situation that is the fusion of the set of all situations). Actions are a specific kind of situation. Actions may satisfy (comply with) or violate imperative sentences (rather than verify or falsify them).

A situation s stands in the relation ⊩ of exact truthmaking or verification (satisfaction) to a sentence *S* just in case *s* verifies (satisfies) *S* and is wholly relevant for the truth (or satisfaction) of *S*. This means that *s* should not include anything that fails to bear on the truth (or satisfaction) of *S*. A situation *s* is an exact falsifier (or violator) of a sentence *S* just in case *s* falsifies (violates) *S* and *s* is wholly relevant for the falsity (or violation) of *S*. For Fine, situations are parts of worlds; but no further assumptions are made regarding their ontology beyond the roles they play within truthmaker semantics.

The truthmaking / satisfaction relation ⊩ applies to both declarative and imperative sentences: declarative sentences are made true by situations that are their exact truthmakers or verifiers, imperatives are complied with by actions that are their exact satisfiers. The following standard conditions on the truthmaking of sentences with conjunctions, disjunctions, and existential and universal quantification then hold. Here '⊕' stands for the operation of fusion, applying to two entities or a set of entities:[6]

(27) a. s ⊩ S & S' iff for some s' and s'', $s = s' \oplus s''$ and s' ⊩ S and s'' ⊩ S'.

    b. s ⊩ $S \vee S'$ iff s ⊩ S or s ⊩ S'.

    c. s ⊩ ∃x S iff s ⊩ $S[x/d]$ for some individual d.

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[5] It should be emphasized that truthmaker semantics, unlike what the name may suggest, does not pursue the philosophical project of grounding the truth of a sentence in actual objects. The interest of truthmaker semantics is semantic only, involving descriptive metaphysics or 'naïve metaphysics', rather than 'foundational metaphysics' (to use Fine's 2017d terms).

[6] I will set aside the truthmaking conditions of conditionals, as they involve issues not relevant for present purposes.

d. $s \Vdash \forall x \, S$ iff for a minimal set X of situations such that for each individual d, there is a situation s', $s' \in X$, and $s' \Vdash S[x/d]$, $s = \oplus(X)$

Truthmaker semantics assigns to a sentence S not only truthmakers (or verifiers), but also falsifiers (or violators), situations in virtue of which S is false and which are wholly relevant for the falsity of S. This allows a straightforward formulation of the truthmaking conditions of negated sentences: a truthmaker of $\neg S$ is a falsifier of S. With $\dashv\vdash$ as the relation of (exact) falsification, the condition on the truthmaking of a negated sentence is given below:

(27) e. $s \Vdash \neg S$ iff $s \dashv\vdash S$.

Also complex sentences are assigned both verification and falsification conditions. For conjunctions and disjunctions, the falsification conditions are those below:

(28) a. $s \dashv\vdash S \, \& \, S'$ iff $s \dashv\vdash S$ or $s \dashv\vdash S'$.

   b. $s \dashv\vdash S \vee S'$ iff for some s' and s'', $s = s' \oplus s''$ and $s' \dashv\vdash S$ and $s'' \dashv\vdash S'$.

Given sentence-based truthmaker semantics, a sentence S will have as its meaning a bilateral content, a pair $\langle pos(S), neg(S) \rangle$ consisting of the set $pos(S)$ of exact verifiers of S and the set neg(S) of exact falsifiers of S.

The idea of object-based truthmaker semantics is that modal and attitudinal objects come with truthmaking conditions as well, or rather satisfaction conditions of various sorts which are best formulated in terms of truthmaker semantics. Thus, a particular obligation can be fulfilled by certain actions and can be violated by other actions. A permission differs from an obligation in that it only has satisfiers not violators. A belief can be made true by situations and be made false by others. If a modal or attitudinal predicates comes with a clausal complement or subject, then that clause will act as a predicate of the described attitudinal or modal object, giving its satisfaction conditions. Truthmaker semantics permits a single formulation of the content of a clause applicable to both modal objects of necessity and possibility. This condition consists in establishing that the satisfiers of the object and the truthmakers of the clause are identical, and if the object has violators, the violators of the object and the falsifiers of the sentence are identical as well. This is the property *prop(S)* that

holds of an object d just in case d has the same satisfiers as S and, if d has violators, d has the same violators as S:[7]

(29) For an (imperative or declarative) sentence S,

$\quad$ prop(S) = λd[pos(d) = pos(S) & (neg(d) $\neq \emptyset$ $\rightarrow$ neg(d) = neg(S))].

The very same sentence meaning in (29) is applicable to modal and attitudinal objects of different flavors and forces. Modal and attitudinal objects of possibility (of any flavor or type) have both satisfiers and violators; modal and attitudinal objects of necessity (of any flavor or type) have only satisfiers.

1.4. Lacks as modal objects

Completion-related verbs of absence describe modal objects, entities of the sort of 'lacks'. Modal objects may come into existence in different ways. In the case of strong obligations and strong permissions, the modal object is created by an illocutionary act of, for example, commanding or offering (under suitable circumstances). In the case of weak permissions, the modal object is constituted in part in relation to what is not excluded by a weak obligation (Moltmann 2008, to appear). Not all modal objects are 'created' or constituted that way. Abilities or dispositions are modal objects as well, satisfied by behavior manifesting the ability. Telic modality presents a very different way in which a modal comes about. In the case of telic modality as in *John needs to practice in order to win the competition*, the modal object is generated by a particular condition, John's winning the competition. The satisfiers of that modal object are just the actions required by the circumstances of winning the competition.

Essences 'generate' modal objects too, and in object-based truthmaker semantics would be at the center of the semantics of sentences conveying metaphysical necessity (Moltmann 2018). Essences in fact are closely related to the conceptual wholes involved in completion-related verbs of absence. But essences involve essential properties of objects, rather than conditions of unified wholes not necessarily pertaining to objects and yielding only a weak form of necessity.

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[7] See Moltmann (2018b, 2021a).

Let us then turn to the modal objects described by the verb *lack*, that is, 'lacks'. *Lack* is a noun for a modal object, an entity that comes with satisfaction condition. In English, the satisfaction predicate for lacks is perhaps *take care of*, or in German *beheben* 'suspend':

(30) a. The lack of chairs was taken care of.

b. Der Mangel an Stuehlen wurde behoben.

That is, a modal object that is a lack is satisfied just in case it is made to disappear. Lacks share that property with needs. Telic modal objects (needs of some sort) and completion-related modal objects disappear once they are satisfied. By contrast, obligations may have to be continually satisfied.

I take lacks to be generated like telic modal objects, on the basis of conceptual wholes. Conceptual wholes in fact will serve to generate two sorts of objects. First of all, conceptual wholes as 'forms 'generate' variable objects - variable embodiments in the sense of Fine (1999). Variable embodiments, for Fine, are entities that allow for the replacement of parts or of constituting material. A variable embodiment or, what I call, a variable object d is an entity that is associated with a function f mapping d to a concrete manifestation at a time. A ship, allowing for a replacement of part, is a variable embodiment, as is a 'the water in the container' (which allows for replacement of water quantities), as is 'the president of the US' (which can be manifested by different people at different time). Clearly, the manifestation of a variable object need not realize all of the form associated with the object. A statue may lose a part, yet still remain the same statue. This means the form needs to be conceived in a more differentiated manner, permitting for non-essential or, better, less essential structural parts. The notion of a conceptual whole is meant to incorporate such differentiations.

A conceptual whole will also generate a modal object that is a lack, on the basis of a variable object associated with it. Suppose for a conceptual whole C and a variable object d associated with a function f_C, such that for the present time t and actual world w, the entity a, $a = f_C(d, t, w)$, is incomplete manifestation of C. Then there is a lack e at t in w such that an entity b satisfies e just in case $a \otimes b$ is a complete manifestation of C, where $\otimes$ is a suitable structure-preserving composition function. Here e can be called the lack generated by C and d. Thus, the satisfaction conditions of the lack decsribed in (37) will be, informally; as in (31b):

(31) a. the house's lack of a door.

    b. For a conceptual whole C such that the house is an incomplete manifestation of C, for the lack e generated by C and the house (= the house's lack of a door), any possible entity y satisfies e iff the composition of the house and y is a complete manifestation of C and there is an entity z, door(z) such that z is part of y.

More formally, the semantics of the noun *lack* together with an indefinite complement will be as below:

(32) For a conceptual whole C, a variable object d (= [NP]) associated with the manifestation function f_C, a time t and world w such that $f_C(d, t, w)$ is an incomplete realization of C, for the modal object e generated by C and d, $<e, C> \in$ [NPs *lack of an* N]$^{t, w}$ iff for any x in an (accessible) world w', x satisfies e iff there is a y, $y \in$ [N]$^{t,w'}$ and $y < x$.

Note that this semantics makes use of the actual world and present time, it is thus not fully embedded within truthmaker semantics. The present interest is simply to show the similarity to object-based truthmaker semantics to the semantics of completion-related verbs of absence based on lacks as satisfiable objects to be satisfied by particular entities. A more satisfactory formalization will have to await another occasion.

    We do not need to take care of the semantics of the verb *lack*, given the decomposition of *lack* as a complex predicate *have (a) lack* and the assumptions that semantic interpretation applies to the underlying structure as in (26b).

    Let us then turn to the inferences from lack-sentences to sentences conveying weak necessity, such as the inference from (5c) to (10) and from (8b) to (11). Given object-based truthmaker semantics of modals, *should* as in (33a) will be a predicate of modal objects and its prejacent will specify the satisfaction conditions of that modal object, as in (33b):

(33) a. The house should have a door

    b. $\exists e'$(should(e') & [*the house have a door*](e'))

All this requires is generating another lack e' from the lack e that is the house's lack of a door. This is achieved by fixing e's satisfiers as informally below:

(34) For a situation *s*, *s* satisfies *e'* iff *s* is a situation of the house having x, for some entity *x*,
   such that x satisfies *e*.

The inference in (35) thus follows from the logical forms of *lack*-sentences and *should*-sentences as in (36) as well as the ontology of lacks in the two senses, as having entities and as having situations as satisfiers:

(35) <u>The house lacks a door.</u>
   The house should have a door.

(36) a. ∃e(have(e, house) & [*lack of a door*](e))
   b. ∃e'(should(e') & [*the house have a door*](e'))

Should applies to derived lacks, but of course these are not the only modal objects that *should* applies to. *Should* applies to a great range of different types of modal objects, including deontic and epistemic modal objects.

2. The predicates of absence *be missing*

Be missing seems to share shares uses with *lack*.

(37) a. A leg is missing from the chair.
   b. The chair lacks a leg.

(38) a. A door is missing from the hut.
   b. The hut lacks a door.

However, despite apparent equivalences in some contexts, *be missing* differs semantically from *lack* in a number of respects. Basically, *be missing* involves a restriction to structural parts, but not so *lack*; a difference that has significant consequences for the semantics of the two verbs. There is another more obvious difference between *be missing* and *lack*:
The subject of a *lack*-sentence explicitly refers to an entity said to be incomplete. By contrast, *be missing* involves implicit reference to a conceptual that is said to be incomplete (Zimmermann 2014).

One manifestation of that is that unlike *lack*, *be missing* is not generally possible with qualities:

(39) a. John lacks talent.

    b. ??? John is missing talent.

(40) a. John lacks deeper understanding.

    b. ??? John is missing deeper understanding.

Be missing also dislikes mass NPs, in contrast to *lack*:

(41) a. The well lacks water.

    b. ??? Water is missing from the well.

(42) a. The dish lacks salt.

    b. ??? Salt is missing from the dish.

Lack and *be missing* thus, more or less, display the mass-count distinction with respect to their object argument position. The subject argument of position of *be missing* is restricted to structural or functional part with respect to a structured whole, but not so the object argument position of *lack*.

This difference goes along with another significant semantic difference. The subject of *be missing*-sentences may quantify not over particular possible objects, but what standardly would be regarded individual concepts restricted by the conceptual whole (Zimmermann 2014, Saebo 2014):

(43) a. Three screws are missing (from the IKEA set).

    b. Three stamps are still missing (from John's almost complete stamp collection).

(43a) can mean that three screws of a particular kind meant to be in the IKEA self-assembly package were not there. (43b) can mean that particular kinds of stamps meant to complete the collection were not yet there. (43a) and (43b) can be true even if those screws or stamps do not exist. On a standard semantic view, pursued by Zimmermann and Saebo, in these examples the subject of the sentence ranges over individual concepts or rather pragmatically individuated individual covers, sets of properties, or functions from properties to truth values.

The issue is how it is possible for such individual concepts to be restricted by the intensional part of the sentence. An important observation, made by Saebo (2004), is that the same quantifier may range over actual and intensional parts of the whole:

(44) Several things are missing from the collection,

Saebo takes this to mean that quantifiers with *be missing* range uniformly over individual concepts.

   On the present view, the cases discussed by Zimmermann receive a straightforward account. The subject of be missing may apply to variable parts themselves. Given a conceptual whole, there will also be parts of conceptual wholes, concepts of screws or stamps, say; and these parts themselves generate variable parts, associated with a function mapping a time and a world to a manifestation at the time and the world. Variable objects are of the very same type as particular object (of type *e*), thus quantifiers range over variable objects and particular manifestations (rigid objects) alike. But the semantics of *be missing* now needs to take of the possibility of quantifying over variable objects. Below the predicate *be missing* is taken to be a four-place predicate holding of a lack, a conceptual whole *C*, a variable object generated by *C* and a variable object generated by a sufficiently small part of *C*:

(45) For a time *t* and world *w*, a conceptual whole C and a variable object *d* associated with
   the manifestation function f_C and such that $f_C(d, t, w)$ is an incomplete realization of *C*,
   and a variable object *d'* associated with the manifestation function $f_{C'}$, for a small part *C'*
   of *C*, for a lack *e*, if $[be\ missing]^{t,w}(e, C, d, d')$ iff *e* pertains to *d* and for any *x* in an
   (accessible) world *w'*, if *x* satisfies *e*, then $[d']^{t',w'} < x$.

 Unlike *lack*, *be missing* thus is restricted to entities play the role of structural or functional parts and therefore need to come with some form of unity themselves

3. The transitive verb *miss*

The transitive verb *miss* has an apparently quite different meaning from the predicate *be missing*, by describing an objectual attitude of longing for an object:

(46) John misses his brother.

In fact, the polysemy of the root *miss*, describing, in English, a completion-related modal verb of absence with *be missing* and an objectual attitude of absence with *miss*, appears in many languages (French, *manquer*, Italian, *mancare*, German *fehlen*). There is certainly a way in which the objectual attitude of longing is related to the completion-related modal verb.

First of all, we can note that transitive *miss* is also restricted, in its object position, to single objects, excluding quantities and qualities (unless they form a particular kind (the hot water she was used to, the kindness of his parents):

(47) a. ?? Mary misses hot water.
    b. ?? Joe misses kindness.

Transitive *miss* generally relates an individual to an existing object or an object that existed in the past. It describes a mental state whose satisfaction requires the closeness (in physical space or interaction) with the missed object. There then is an intuitive sense in which a satisfied mental state involves completeness: the mental satisfaction will be based on the establishing of relevant relations to the object in question. By contrast, the mental dissatisfaction is due to those relations not being in place.

4. Predicates of replacement

Predicates of replacement are semantically related to the predicate *be missing*. Both *replace* and *be missing* relate to variable parts, based on merely conceived parts. Let us first note that replacement can apply only to well-delimited, often functional parts.:

(48) Mary replaced the wheel / the table top / the screw.

Replace cannot apply to qualities and aspects of objects such as surfaces or appearances of objects:

(49) ??? Mary replaced the color / the texture / the weight / the surface / the appearance of

the object.

Quantities can be replaced only when they are described as well-delimited:

(50) a. John replaced the water in the container.

     b. ??? John replaced a bit of water in the container.

Replacement means taking away a structural or functional part and putting a similar or equivalent object in its place. Interestingly, *replace* can even apply to structural / functional parts described as absent:

(51) John replaced the missing screw.

This is what seems to be going on in such examples. *The missing screw* refers to a variable object that fails to have an actual manifestation, and it is that variable object that is being replaced by an actual part, or rather by a variable part that has an actual manifestation at the present time. The missing screw is treated as an object (which fails to have an actual manifestation) and as such is replaced by an object that does have an actual manifestation.

5. Conclusion

Completion-relates verbs of absence crucially involve the notion of a conceived whole with the possibilities of an incomplete and a complete manifestation. The notion of such a unified whole is broader (or perhaps just distinct) from single objecthood: it comprises various sorts of wholes without objecthood being at stake, including individuals together with their possessions, family relations or friendships, locations and pluralities. What matters for occasions to constitute wholes are relations such as possession, kinship, expectations, suitability for certain purposes or goals.

Conceptual wholes in turn have conceptual parts. Both give rise to variable objects (or variable embodiments). Conceptual wholes give rise to variable wholes, wholes that may have differ manifestations at different times and in different circumstances. Likewise, parts of conceptual whole, conceptual parts, give rise to variable parts, which may fail to have actual manifestations. Variable wholes and variables parts semantically have the very same status as 'ordinary' objects (rigid objects).

The proposed semantics of verbs of completion-related absence made central use of the notion of a 'lack', a modal object that can be satisfied by actual or variable parts that have actual manifestations. A lack appears to be on a par with an object of metaphysical necessity based on essence, conceived as an object. But a lack is based on a conceptual whole that permits only partial manifestation and thus involves only a weak form of necessity. The involvement of graded modality is also reflected in a natural ordering among lacks. Lacks are ordered in part by the size of satisfiers, as in (52a) as well as the degree of manifested qualities, as in (52b):

(52) a. Mary's lack of money is greater than John's.

   b. Joe's lack of kindness is greater than Bill's

Can the modal objects of missing also be objects also be ordered by the importance of the object missing for the particular whole at hand? That does not really seem to be possible:

(53) The house is more missing from the house than the door.

Why that should be so is still to be investigated.

   Lacks are objects that like needs, permissions, and laws come with satisfaction conditions. What is peculiar about lacks, tough, is that their satisfiers are completing parts of wholes. This yields the connection to truthmaker semantics. Truthmaker semantics permits various kinds of objects to act as truthmakers (or satisfiers), as long as they play the truthmaking role. In the case of lacks the completing parts would manifest an implicitly understood conceptual whole. Even if this is not quite the same relation as truthmaking, there are significant similarities, and joint contrasts to possible worlds semantics.

   One overall conclusion from the proposed semantics of verbs of completion-related absence one can draw is that the notion of in integrated whole and the correlated one of a structural part are important notions in the semantics of natural language: they pertain to a level of 'intensional' mereology that is in stark contrast to the use of extensional mereology that has dominated natural language semantics for quite some time.[8]

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[8] See Champollion / Krifka (20127) for the use of extensional mereology in natural language semantics

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