Ontological Dependence, Spatial Location, and Part Structure

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Abstract. This paper presents new observations about ontologically dependent objects which cannot have a host-independent spatial location or a physical part structure, namely disturbances (holes, folds, scratches), tropes, and attitudinal objects (claims, thoughts, promises, requests). It proposes an account of such attributively limited objects in terms of Fregean abstraction, which has so far been applied only to abstract objects.

Keywords. Ontological dependence, spatial location, part structure, abstraction, disturbances, tropes, attitudinal objects

1. Introduction

Applied ontology, natural language ontology as well as the metaphysics of ordinary objects generally recognize that their domain of entities comprises a great range of ontologically dependent, minor entities. Such entities include what are called disturbances (entities of the sort of holes, folds, faults, and scratches) and tropes (particularized properties or features). A general approach to such entities is to take them to be ontologically derivative, introduced by an ontological operation from more basic entities or conditions, an operation which one may consider an operation of reification.

There are two important operations of reification that have been discussed in the literature. One of them introduces an entity on the basis of the truthmaking relation [1,2,3,4,5]. The other operation is more familiar from the philosophy of mathematics, namely abstraction in the Fregan sense [6,7,8]. In this paper, I argue that certain ontologically dependent entities, including disturbances and tropes, should be viewed as entities introduced by a combination of truthmaking and abstraction. This is needed in order to order to account for both their concreteness and a surprising lack of specification for certain types of properties.

It is a standard view in contemporary metaphysics that concrete objects come with a spatial location and a physical part structure. This view faces a serious challenge from our intuitions about the spatial location and the part structure of certain ontologically dependent concrete objects. Those ontologically dependent objects, it appears, simply lack a *non-relative spatial location* (a location not just relative to another object) or the sort of part structure they are expected to have as concrete objects.

I will call objects of this sort attributively limited objects and their peculiarity attributive limitation. Attributive limitation is more familiar from abstract objects as

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entities introduced by a form of Fregean abstraction, such as numbers or directions on the Fregean account. This paper will suggest that the attributive limitations of the relevant class of concrete objects be accounted for by a form of abstraction as well. It will do so by drawing on a notion of an abstract state that is already an entity somewhat between abstract and concrete, and arguably plays a significant role in the semantics of natural language.

I will first present standard assumptions regarding the distinction between concrete and abstract objects as well as particular views about the inheritance of properties of objects from more fundamental ones. I then present the central issue of the paper, intuitions about the spatial location and part structure of certain ontologically dependent concrete objects. Finally, I will suggest a way of applying an abstractionist account to the relevant types of ontologically dependent concrete objects.

2. The abstract-concrete distinction

The distinction between abstract and concrete objects is a central distinction in metaphysics, and according to the standard view, concrete objects and abstract objects are distinguished by different sorts of properties they may have, without there being agreement as to what sorts of properties best characterize the distinction. Properties that have been proposed as characteristic of abstract objects are properties such as being non-mental, being nonphysical, being causally inefficacious, and not having a spatio-temporal location [9]. Whether abstract objects have a temporal duration is a matter of controversy: abstract artifacts are abstract in the sense of not being physical, but they come into being at some point in time and may go out of being at some point in time as well. Having a spatial location, by contrast, is a less controversial characteristic that concrete objects are taken to have and abstract objects are taken to lack.[2]

While the distinction between abstract and concrete objects is generally based on general conditions on what sorts of properties concrete and abstract objects may have, there is also an approach according to which certain types of objects do not come to bear properties directly, but derivatively, by inheritance from more fundamental entities [10,11]. This particularly applies to material objects and the material that constitutes them. Entities individuated, at least in part, by their shape such as artifacts, inherit, on that view, color, texture, weight from the material constituting them [10,11]. Also the spatial location of artifacts can be considered inherited from the spatial location of their material manifestation at a time.

Fine [12] applies property inheritance to another relevant case, qua objects (which includes non-basic actions). A qua object such as John qua father is an object individuated by particularly restricted condition of property inheritance from its base (John). John qua father inherits only those properties from John that John has while being a father [12] or, better, that John has in virtue of being a father [13]. John qua father thus comes out as an attributively limited object, displaying a lack of specification for all properties that are not based on John being a father.

Making use of property inheritance conditions thus deviates from the standard view according to which all concrete objects by nature come with the same types of characteristic properties.

[2] There is some controversy, though, regarding the spatial location of sets of concrete objects [9].

3. The intuition about some ontologically dependent entities

3.1. Spatial location

We can now turn to the central issue of this paper, intuitions about the spatial location and part structure of ontologically dependent concrete objects. Let us first consider entities like holes, folds, flaws and scratches. Entities of this sort are based on regular or irregular gestalt conditions in material objects, and are generally called *disturbances* [14,15,16]. We clearly treat disturbances as entities: they generally are countable and come into existence and go out of existence at particular points in time. Thus, we can say that a hole, fold, flaw, or scratch exists or no longer exists, and that there are several of them.

Disturbances are ontologically dependent objects par excellence. They exist only if the object which hosts them (their base) exists. Also, for their identity, they require the identity of the object that hosts them. They are thus ontologically dependent in the sense of existence dependence and identity dependence [17,18].

Linguistically, the ontological dependence of disturbances is reflected in the applicability of the *have*-construction, which can be used to express ontological dependence: *the bag has a hole, the cloth has a fold, the paper has a flaw,* and *the surface has a scratch*.

Disturbances have a location relative to the object on which they depend, requiring a suitable spatial preposition such as in or *on*, as in *the hole in the bag*, *a fold in the cloth*, *a scratch on the surface*. The prepositions *in* and *on* in fact may also convey the dependence relation of a disturbance to the host itself, permitting a further specification of a location of the disturbance within the host, as in *the hole in the bag is near the handle* or *the scratch on the surface is close to the edge*.

Now what is remarkable is that disturbances do not have a spatial location that is not relative to their host. Thus, if the hole is in the bag and the bag is in the drawer, it does not follow that the hole is in the drawer. In fact, the hole can only be in the bag and located within the bag; it lacks a location that is independent of the bag.[3] Similarly, a fold cannot be on the table even if the cloth is that has the fold. The fold is nowhere in fact but in a particular place in the cloth. A scratch on the screen is not on the table even if the screen is; the scratch is nowhere in fact but in a particular place on the screen. Disturbances do not inherit their location from the object on which they depend: they do not have a location that is not relative to their host.

Disturbances also cannot move, even when the object on which they depend moves. If the flag has a hole and the flag moves in the wind, the hole would not move in the wind. The hole cannot move, unless it does so within the object that has it If the surface has a scratch and the surface moves, the scratch does not move (it can be said to move only when it is not clear that it is something on a particular surface). Mary may put away the dress, but she thereby would not put away the fold in the dress.

Tropes display the same sort of behavior as disturbances with respect to a spatial location. Tropes in twentieth century one-category reductionist ontological theories are considered entities more fundamental than individuals and properties, coming with two fundamental relations: similarity and co-location [21]. On such a view, tropes would not be ontologically dependent, but rather individuals and properties would be constituted by tropes. However, on the older, Aristotelian tradition, tropes (or

[3] See [19] and [20] for observations about the non-monotonicity of *is in* for holes.

'accidents') are ontologically dependent objects par excellence. A trope exists only if its bearer exists and a trope is identical to another trope only if their bearers are identical, or so the standard view maintains.

Again the ontological dependence of tropes is reflected in the applicability of the *have*-construction, though when conveying the ontological dependence of tropes on their bearers the *have*-constructions imposes particular restrictions: Socrates 'has' wisdom, the painting 'has' an unusual quality, though the apple does not really 'have' redness, and the pillow does not really 'have' softness.

Clearly, tropes clearly do not inherit a location from their bearer. If Socrates is in Athens and Socrates has wisdom, Socrates' wisdom is not in Athens. The painting may be on the wall and there may be an unusual quality in the painting, but the unusual quality of the painting is not on the wall. If the stone has an enormous weight (a quantitative trope), and the stone is on the table, the enormous weight of the stone is not on the table. Tropes have no bearer-independent location. Moreover, a great range of tropes cannot even be attributed a bearer-dependent location. Despite locutions Aristotle may have used, Socrates' wisdom is not 'in' Socrates, Socrates just has it. The weight of the stone is not 'in' or 'on' the stone, the stone just has the weight.

Not all ontologically dependent objects, though, behave that way with respect to their spatial location. Shadows, for example are generally considered ontologically dependent on the object throwing the shadow, but they can be attributed a location independently of the object on which they depend as well as movement. (The shadow may be here and there and moves across the wall etc.).

What then are the conditions on entities unable to have non-object-relative locations? The condition appears to be that such entities need to be constituted by features of the base object whose location is properly included in that of the base object.[4] This condition is not satisfied for the relation between material and the objects they constitute.

A trope (such as the quality of the painting) need not be limited to a location properly included within the bearer (the painting). Thus, the relevant class of ontologically dependent objects should be characterized as those entities that have a location properly within the object on which they depend on or else are tropes.

The attributive limitations of disturbances and tropes could not be accounted for by considering them qua-objects that fail to inherit a location from their bearer. Qua objects inherit whatever property they may have from their base. Disturbances and tropes are not individuated by restricted property inheritance from their base or bearer; rather, they are constituted by features of (part of) the object on which they depend, without themselves having such features (e.g. a roundness trope is not itself round).

3.2. Part structure

There is another important case of attributive limitation that I want to mention, and that concerns the part structure of objects. Sometimes an object is expected to have part structures in different 'dimensions', but displays just a single part structure.

Some objects come with a part structure based on partial content. Yet those objects may be physical objects at the same time and thus have two part structures, in two dimensions. An example is a book. A book is an entity that comes with two distinct

[4] Note that the location of a hole is strictly speaking not included in the location of its host because where there is hole, there is no matter constituting the host, by the very definition of what a hole is.

facets, as a material object and as an information object, and they involve two part structures. 'Part of the book' can mean a material part of the physical object or else a partial content.[5] However, there are also physical objects that lack a physical part structure. Entities of the sort of claims, requests, and offers are of this sort, that is, the non-enduring products of illocutionary acts, illocutionary products [22,23,24,25].[6] A claim can be overheard and cause uproar and it is made at a particular point in time, at a particular place. Thus a claim has a range of features of concrete objects. But part of a claim can never be a physical part, say a temporal part of an action of claiming. Part of a claim can only be a partial content. A claim, intuitively, has only parts that are partial contents of what is claimed. Thus, claims are peculiar in that they clearly display features of concreteness, but yet cannot have physical parts. They are thus what I will call *mereologically restricted objects*.

Tropes in a way are also mereologically restricted. Tropes are particular property manifestations in objects, their bearer. Their bearer may have a spatial part structure, yet tropes will generally not inherit a spatial part structure.[7] The parts of tropes can only be features constitutive of the (complex) trope or perhaps temporal parts. For example, part of John's happiness can be features of John constitutive of his happiness or else a perhaps a period of his happiness. This is different for events [26,23]. Events may have several part structures in different dimensions at once, say a temporal part structure, a participant-related part structure, and a spatial part structure [13]. Part of the battle, for example, can be a temporal part of the event or a spatial part or a subevent constitutive of the battle at the time and place of the battle. Tropes are thus mereologically restricted in a way events are not.[8]

4. Towards an account of attributive limitations of disturbances and tropes

Disturbances and tropes thus are entities that are attributively limited. The question then is, how are such attributive limitations to be accounted for? I want to suggest an approach to the puzzle of attributive limitation by drawing a connection to one particular ontological theory about abstract objects, namely abstractionism, the theory of an object being introduced by a form of Fregean abstraction [6,7,8]. Frege proposed

[5] As a referee has pointed out, a book in fact can have parts that themselves come with the two facets, such as a chapter: one can read a chapter or tear off a chapter from a book.

[6] See [23,24,25] for arguments that nouns like *claim, request* and *offer* are not ambiguous standing either for acts or events or else contents, as the standard view would have it, but rather always stand for entities of a third sort, illocutionary products. I argued that illocutionary and cognitive products belong to a broader class of attitudinal objects, which also include state-like objects of the sort of beliefs, intentions, and desires [23,25]. *Offer* and *claim* may also refer to modal objects, which unlike illocutionary products may endure past the illocutionary act that produced them [25].

[7] One might think that tropes based on a pattern or the shape of an object should inherit a spatial part structure, for example the triangularity of the figure. However, such tropes are in fact not generally treated as having a part structure that reflects the relevant spatial part structure of the base. Thus, *part of the triangularity of the figure* makes little sense.

[8] One might also consider enduring material objects as mereologically restricted. Enduring material objects are in space and time, but have only a spatial part structure, according to our intuitive notion of them. Temporal stages of material objects do not intuitively count as parts of enduring objects. The part structure of enduring objects, however, is linked to their mode of persistence, to what is constitutive of their identity at a time. Enduring objects exist in time (or endure), which basically means they need to be (more or less) wholly present (present with all their parts) at each moment of the time at which they exist – at least according to one influential view of endurance.

that numbers be introduced by the abstractionist principle below, which gives identity conditions for objects obtained by the abstraction function g from entities *o* and *o'* that stand in some equivalence relation *R*:

(1) For an equivalence relation *R*, for all *o* and *o'*, $g(o) = g(o') \leftrightarrow R(o, o')$.

Frege used (1) to introduce natural numbers as entities obtained by abstraction from concepts for whose extensions there is a 1-1 mapping.

What is special about an abstractionist theory of an object type is that it introduces an object as an object that will have only those properties specified by the method employed for its introduction. Thus numbers introduced by the principle in (1) do not have other properties that could not be derived from the condition of their identity with other numbers introduced in the same way. The abstractionist account thus introduces a number as an object that is not specified as to whether it is identical to a non-number, say, the individual Caesar, or has any properties of concreteness.

Abstractionist theories have not only been proposed for abstract objects in the context of the philosophy of mathematics. There is also an abstractionist theory of states (and of non-worldly facts).[9] This is what Kim's [27] account of events amount to. Kim's account, it is generally agreed, is not an account of events, but of states, more specifically of 'Kimean states' as Maienborn [28] calls them or 'abstract states', as I prefer to call them [29,3]. Kim's account is given below, now formulated as a theory of states (of a rather simple sort, consisting of a property holding of an object):

(2) *The Kimian account of states*

a. For a property *P*, an object *o*, the state $s(o, P)$ obtains at a time *t* iff *P* holds of *o* at *t*.

b. For properties *P* and *P'* and objects *o* and *o'*, $s(o, P) = s(o', P')$ iff $P = P'$ and $o = o'$.

Kim's account is an abstractionist account: (1) can be generalized to n-place abstraction functions applying to *n* objects that stand in respective equivalence relations to each other. Kim's account then introduces states on the basis of a two-place abstraction function applying to objects and properties and the equivalence relation of identity. On the Kimian account of states, states will have identity conditions and a temporal duration, but no other intrinsic properties.

Kimean or abstract states are not on a par with events ontologically. Events involve a particular manifestation and a spatial location, and they can act as relata of causal relations [2,3,28]. By contrast, states as entities introduced by abstraction as in (2) will carry only properties specified for them by the method of introduction. This means that they have a particular temporal duration and that their identity depends strictly on the property and object from which they are abstracted. But it also means that such states have no spatial location, won't stand in causal relations, won't involve a particular manifestation or particular manner, won't be perceivable etc. They may act, though, as objects of mental attitudes and as relata of causal explanation [28].

States in that sense play an important role in natural language semantics, as Davidsonian, implicit arguments of stative verbs such as *own, owe, know, weigh,*

[9] Frege also proposed an abstractionist account of directions (the direction of *a* is identical to the direction of *b* iff *a* is parallel to *b*).

resemble, weigh, measure, have and *be*, or so it has been argued [28]. The states described by most stative verbs (including those just mentioned) accept only a very restricted set of adverbial modifiers. They resist in particular location modifiers, manner adverbials, instrumentals, and causal and perceptual predicates, representing just the sorts of properties that states introduced by abstraction as in (2) should not be specified for.[10] If abstract states play a semantic role as implicit arguments of (most) stative verbs, this explains the resistance of stative verbs to adverbials of the relevant sorts. Abstract states also play a semantic role as referents of gerundive nominalizations of stative verbs such as *John's owning the house, Mary's owing an amount of money, John's knowing French, Bill's weighing over 100 kilo*, *Socrates' having wisdom*, *Mary's being happy* etc.

Abstract states have a temporal duration and thus are in time, and they obtain (at a time) on the basis of what is going on in the world. Even though they do not contain the individual and the property from which they abstracted as parts, their identity and existence depends on them. Abstract states thus display some features of concreteness, yet they clearly show attributive limitations.

I want to propose that ontologically dependent objects that are disturbances be viewed similarly, as entities obtained in a particular way by abstraction from relevant properties of their base. The abstraction principles however will be different from that of abstract states in that they should not involve a particular (possibly nonspecific) property, but rather a range of fully specific features of the base objects.

Disturbances will be entities based on features of the base object that together meet certain gestalt conditions, a relation that can be viewed as a truthmaking relation. Disturbances will then be individuated as objects having only properties strictly pertaining to those features and their relation to the base object (in particular their location within the base object) and nothing else. Unlike abstract states, disturbances will involve a very particular manifestation of the particular gestalt conditions in question (truthmakers of the relevant gestalt conditions). But they will not be specified with properties in respects not strictly related to the manifestation of those gestalt conditions in the base object; and thus in particular they will lack an independent spatial location. Disturbances will then be fully specific in certain respects only, for example regarding the shape and size of a hole or fold as well as the location of the hole or fold with respect to the base object.

Tropes have often been viewed as entities obtained by abstraction in a psychological sense, the act of attending to only one property of an object and abstracting from all others.[11] But the relation between a trope and its bearer need not be understood in a psychological sense. It can be viewed rather in the same sense of a formal ontological operation of abstraction as in the case of disturbances. The relation of abstraction obtaining between the bearer and the trope involves two things. First, the trope will be based on features of the bearer fulfilling a particular condition, a relation that may be regarded as the truthmaking relation. Second tropes will have properties only pertaining to those features of the bearer and the bearer itself. Tropes will then lack a specification with respect to other types of properties such as that of an

[10] This is known as the *Stative Adverb Gap*. Some researchers have taken the Stative Adverb Gap to mean that stative verbs lack a Davidsonian [30] event argument position, rather than having one filled in by abstract states [31].

[11] This is reflected in Campbell's [32] term 'abstract particular' as an alternative term for William's [21] term 'trope'.

independent spatial location. Like disturbances, tropes will be fully specific with respect to some types of property attributions, but lack other types of property attributions.

Disturbances and tropes thus would be introduced by a combination of truthmaking and abstraction, a complex ontological operation that of course needs to be developed in much further detail formally.

The mereological restrictions of illocutionary products would be accounted for in similar ways. Illocutionary products would be introduced as products of illocutionary acts with specific physical features, but yet at the same time as being specified for parthood only in one respect, that of content.

5. Conclusion

Entities like disturbances, tropes, and illocutionary products are ontologically secondary, derivative objects. Yet they play an important role for ontology, in particular applied ontology, natural language ontology, and just the metaphysics of ordinary objects. This paper has pointed out that entities of this sort are attributively limited and challenge standard ontological views about the spatial location and the physical part structure of concrete objects.

Such attributive limitations could not be accounted for if the entities in question were just the result of reification based on truth making in Guarino and Guizzardi's [4,5] sense. The paper rather argued that entities of this kind be viewed on a par with objects introduced by abstraction, mathematical objects as well as abstract states, entities which have some features of concreteness and play a particular role in natural language semantics. Disturbances, tropes, and illocutionary products, on that proposal, are introduced by abstraction, ensuring they lack certain property specifications; at the same time, they would be based on a fully specific manifestation of a condition or set of conditions, a truthmaker of sorts in the case of disturbances and tropes. The proposal was presented as a sketch, of course, and needs to be developed in much greater detail on another occasion.[12]

There are also further application of the proposal to be pursued, in particular to functional or nonexistent intentional objects, entities that arguably depend ontologically on (unsuccessful or pretended) acts of reference and are attributively limited to the extent to which those acts do not go along with attributions of particular properties [34].

Acknowledgments

The paper has greatly benefited from comments on a previous version by Fabrice Correia, Kathrin Koslicki, Jonathan Schaffer, Achille Varzi, and three anonymous referees, as well as from conversations with Kit Fine.

[12] The proposal bears some similarities to Guarino and Guizzardi's [33] theory of relationships, where (reified) relationships are taken to be sums of 'aspectual slices' of the relevant relata and in that sense would involve abstractions over relational qualities inhering in the relata. For example, the marriage m between John and Mary is taken to be the sum of two entities: John-qua-husband-of-Mary and Mary-qua-wife-of-John, aspectual slice of John and Mary respectively.

References

[1] K. Mulligan, K., P. Simons, and B. Smith, Truthmakers, *Philosophy and Phenomenological Research* 44 (1984), 287–321.

[2] F. Moltmann, Events, Tropes and Truthmaking, *Philosophical Studies* 134 (2007), 363-403.

[3] F. Moltmann, Nominals and Event Structure, in R. Truswell (ed.), *Oxford Handbook of Event Structure*. Oxford University Press, Oxford, to appear.

[4] N. Guarino and G. Guizzardi, Relationships and Events: Toward a General Theory of Reification and Truthmaking, in G. Adorni G., S. Cagnoni S., M. Gori, and M. Maratea (eds), *Advances in Artificial Intelligence*, Springer, Cham, 2016, 237-249.

[5] N. Guarino, T. P. Sales, and G. Guizzardi, Reification and Truthmaking Patterns, inTrujillo J. et al. (eds), *Conceptual Modeling*, Lecture Notes in Computer Science, vol. 11157, Springer, Cham, 2018, 151-165.

[6] G. Frege, *Die Grundlagen der Arithmetik: eine logisch-mathematische Untersuchung über den Begriff der Zahl, 1884,* translated by J. L. Austin as *The Foundations of Arithmetic*. Blackwell, New York, 1950.

[7] B. Hale, *Abstract Objects*. Blackwell, Oxford, 1987.

[8] [C. Wright, *Frege's Conception of Numbers as Objects*, Aberdeen University Press, Aberdeen, 1983.

[9] G. Rosen, Abstract Objects, in Edward N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* (fall 2018 edition), , URL <https://plato.stanford.edu/archives/fall2018/entries/abstract-objects/>.

[10] K. Fine, Things and Their Parts, *Midwest Studies in Philosophy* 23 (1999), 61-74.

[11] K. Koslicki, *The Structure of Objects*, Oxford University Press, New York, 2008.

[12] K. Fine, Acts, Events and Things, in *Language and Ontology: Proceedings of the 6th International Wittgenstein Symposium,* Hölder-Pichler-Tempsky, Vienna, 1982, 97-105.

[13] F. Moltmann, *Parts and Wholes in Semantics*, Oxford University Press, Oxford, 1997.

[14] T. Karmo, Disturbances, *Analysis* 37 (1977), 147–148.

[15] P. Simons, *Parts. A Study in Ontology*, Oxford University Press, Oxford, 1987.

[16] R. Casati and A. C. Varzi, *Holes and Other Superficialities*, MIT Press, Cambridge, MA, 1994.

[17] K. Fine, Ontological Dependence, *Proceedings of the Aristotelian Society* 95 (1994), 269–290.

[18] T. E. Tahko and J. E. Lowe, Ontological Dependence, in E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* (winter 2016 edition), URL= <https://plato.stanford.edu/archives/win2016/entries/dependence-ontological/>.

[19] M. Aurnague and L. Vieu, A three-level approach to the semantics of space, in C. Zelinski-Wibbelt (ed.), *Semantics of Prepositions: From Mental Processing to Natural Language Processing*, Mouton de Gruyter, Berlin, 1993, 393–439.

[20] A. Varzi, Reasoning about Space. The Hole Story, *Logic and Logical Philosophy* 4 (1995), 3-39.

[21] D.C. Williams, The Elements of Being, *Review of Metaphysics* 7 (1953), 3-18.

[22] K. Twardowski, Actions and Products. Some Remarks on the Borderline of Psychology, Grammar, and Logic, 1911, in J. Brandl and J. Wolenski (eds.), *Kazimierz Twardowski. On Actions, Products, and Other Topics in the Philosophy*. Rodopi, Amsterdam and Atlanta, 1999, 103-132.

[23] F. Moltmann, F., *Abstract Objects and the Semantics of Natural Language*, Oxford University Press, Oxford, 2013.

[24] F. Moltmann, Propositions, Attitudinal Objects, and the Distinction between Actions and Products, *Canadian Journal of Philosophy* 43 (5-6) (2014), 679-701.

[25] F. Moltmann, Cognitive Products and the Semantics of Attitude Reports and Deontic Modals', in F. Moltmann and M. Textor (eds.), *Act-Based Conceptions of Propositions: Contemporary and Historical Contributions.* Oxford University Press, Oxford, 2017, 254-290.

[26] F. Moltmann, F., Degree Structure as Trope Structure A Trope-Based Analysis of Comparative and Positive Adjectives'. *Linguistics and Philosophy* 32 (2009), 51-94.

[27] J. Kim, Events as property exemplifications, in M. Brand and D. Walton (eds.), *Action Theory*. Reidel, Dordrecht, 1976, 310-326.

[28] C. Maienborn, On Davidsonian and Kimian States, in I. Comorovski and K. von Heusinger (eds.), *Existence: Semantics and Syntax*, Springer, Dordrecht, 2007, 107–130.

[29] F. Moltmann, F., On the Distinction between Abstract States, Concrete States, and Tropes, in A. Mari, C. Beyssade, and F. Del Prete (eds.), *Genericity*, Oxford University Press, Oxford, 2013, 292-311.

[30] D. Davidson, D., The Logical Form of Action Sentences, in N. Rescher (ed.), *The Logic of Decision and Action*. Pittsburgh University Press, Pittsburgh, 1967, 81–95.

[31] G. Katz, Events as Arguments, Adverb Selection, and the Stative Adverb Gap, in E. Lang (eds.), *Modifying Adjuncts*, de Gruyter, Berlin, 2003, 455-474.

[32] K. Campbell, *Abstract Particulars*, Blackwell, Oxford, 1990.

[33] N. Guarino and G. Guizzardi, 'We Need to Discuss the Relationship': Revisiting Relationships as Modeling Constructs, *CAiSE* (2015), 279-294.
[34] F. Moltmann, Quantification with Intentional and with Intentional Verbs, in A. Torza (ed.), *Quantifiers, Quantifiers, Quantifiers*. Springer, Dordrecht, 2015.