Taxonomy of Relations - Internal and External

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**Abstract**

In this paper, we discern different types of possible relations. We focus on the distinction between internal and external relations and their various possible sub-types. In the first section, we present what is nowadays more or less the standard distinction between internal and external relations. In the second section, we make two contributions to the literature of internal relations: a new taxonomy of internal relations and a novel distinction between formal and material ontological relations. In the third section, we discuss three distinctions among external relations, in particular the distinction between relata-specific and relata-unspecific relations. We argue that relata-specific external relations are a promising but incomplete solution to the vexed problem of Bradley’s relation regress.

# Introduction

Being related seems to be a pervasive feature of the world. For example, we perceive objects as numerically distinct from each other all the time. Objects also bear different spatial relations to each other in our perceptions: inferno by Dante is for instance seen on top of the livingroom table. To take a scientific example, the Big Bang happened around 13.8 billion years ago.

In this paper, we discern different types of possible relations. We shall focus on the distinction between internal and external relations and their various possible sub-types. We will set aside the adicity or degree of relations, possible multigrade relations, the degree of which may vary, and the order of relations (e.g. asymmetry). Accordingly, our discussion concerns rather metaphysical than logical taxonomy of relations. In metaphysics, we will set aside the questions about the more detailed classifications, such as the sub-types of spatio-temporal relations.

The paper has three parts. In the first section, we present what is nowadays more or less the standard distinction between internal and external relations. To the literature on the former, we will make two contributions in the second section: a new taxonomy of internal relations and a novel distinction between formal and material ontological relations. In the last section, we shall discuss three distinctions among external relations, the distinction between relata-specific and relata-unspecific relations in particular. We will argue that relata-specific external relations are a promising but incomplete solution to the vexed problem of Bradley’s relation regress.

# Internal vs External Relations

Consider the case that Romeo is far away from Juliet. For sure, Romeo’s being far away from Juliet is not necessary to the existence of Romeo and Juliet. They could be just next to each other, embracing one another. It is not necessary that if Romeo and Juliet exist, then they are far away from each other. Their existence does not determine the obtaining of the relation of being far away from between them. The obtaining of this relation is contingent upon the existence of Romeo and Juliet: possible but not necessary. Therefore it has to be something more than the mere existence of Romeo and Juliet. There must exist at least a third entity in order to determine Romeo’s being far away from Juliet. A strong candidate for this third entity is the one identified with the relation of being far away. So it is reasonable to reify the relation of being far away from here: in addition to Romeo and Juliet, there is such an entity.

Consider then a different situation of a more theoretical nature. There is an entity that is identified with unit 1 mass and there is another entity that is identified with unit 2 mass. Arguably, it is necessary that if there are these two entities, then the unit 2 mass is greater than the unit 1 mass. The existence of the two mass entities determines the holding of the greater than relation between them. This is not dependent on the choice of the unit or measuring. The existence of the two mass entities is sufficient for one of them being greater than the other. Therefore it is not necessary to the holding of the greater than relation between the masses that there is an entity that is identified with this relation; the mere plurarity of the two masses is enough. Given that the two masses exist, they are in the greater than relation.

These cases of entities standing in relations are paradigmatic examples of holding of two different types of relations: external and internal. Additional typical examples of internal relations, which have been presented in current discussions, are (inexact or exact) resemblance as well as relations of proportion and other quantitative relations. Such internal relations may be thought to hold between substances as well as particular and universal natures (tropes and property universals). Other examples are mathematical relations (if there are mathematical objects), ontological dependence, numerical identity and distinctness. The paradigmatic type of external relations is provided by spatio-temporal relations, of which being far away from is an instance. At least spatio-temporal relations among enduring complex objects are external.

Since these are paradigmatic examples, they generalize into a characterization of the distinction between internal and external relations. It is a shared, distinguishing feature of internal relations that they are not entities in addition to their existing relata. They are internal to their relata in the sense of being relatednesses of entities without there being anything that relates these entities. Regarding existence, we are eliminativists about internal relations. Yet truth-bearers (propositions, or whatever else they may exactly be) can be true of the relata, which are real entities, and these relational truths are in principle expressible by relational statements.[[1]](#footnote-2) Actual internal relations do hold of their relata. This view of internal relations as non-existing actual relatednesses is further supported by the point that since we do not reify internal relations, they do not fall afoul of Bradley’s relation regress. The starting assumption of Bradley’s relation regress—that an entity relates other entities—is not true of internal relations. So the regress does not get off the ground if internal relations are not reified.[[2]](#footnote-3)

External relations are distinguished from internal relations by the point that external relations are reified: they are relational entities numerically distinct from their relata. Relational entities are entities that relate, that is, bear relational inherence to some numerically distinct entities. Note that this does not have to lead to a regress of external relations since relational inherence may be an internal relation.[[3]](#footnote-4) Relational inherence holds between an external relation and its relata, which are two or more entities. Since there are no internal relations, internal relations do not relationally inhere in anything. A non-existent cannot realize such a role; only existences can relate.

# Taxonomy of Internal Relations

## Existential Conception

External relations are not external only in the sense that they are reified but also because relatedness by them requires entities additional to the relata. The mere existence of their relata is not sufficient for their existence as relational entities.[[4]](#footnote-5) By our illustration of the two masses above, we saw that this does not seem to be correct about internal relations. So one can defend the view that their internality consists in the point that their holding does not require anything else than the existence of their relata. This “existential conception” of internal relations is held, for instance, by Kevin Mulligan[[5]](#footnote-6) and historically it is attributed to G.E. Moore.[[6]](#footnote-7) On the existential conception of internal relations, the sole existence of the relata is jointly sufficient and individually necessary for the holding of the relation.

A further reason why the existential conception is a promising view of internal relations is that it can cover cases where the character of the relata, that is, what they are like, is not making any difference to the holding of an internal relation. We may find this kind of cases for example in metaphysical theories according to which some entities have primitive numerical identity: it is an inexplicable feature of them that they are numerically identical to themselves. Therefore the feature that each such an entity is numerically distinct from every other is necessitated by the mere existence of these entities; their character is irrelevant for the holding of numerical distinctness among them. One such theory is the form of trope nominalism in which the numerical identity of tropes is primitive and hence their numerical distinctness is independent from their character (the identity of indiscernibles is not true of them).[[7]](#footnote-8)

A severe problem in a competing conception of internal relations, due to Armstrong, is that it cannot capture this kind of case, which is non-negotiably an example of internal relations. According to Armstrong, internal relations hold because of the existing properties of their relata:

Objects having certain properties are *internally* related by relation R if and only if, in each possible world which contains these objects, and where they have these properties, the objects are related by the relation R.[[8]](#footnote-9)

The insurmountable problem here is that primitive numerical identities that would necessitate numerical distinctnesses cannot be properties because they are not entities. The *property conception of internal relations* is not able to classify primitive numerical distinctnesses internal relation – as it should be.[[9]](#footnote-10) Consequently, we have good grounds to reject it as a universal view of internal relations. Let us therefore pursue the existential line of view and argue that it can be modified into a superior account that can cover a wide variety of plausible examples of internal relations. Below, we will also show that the modified existential conception is able to deal with cases of internal relations involving properties.

The existential conception of internal relations requires modification since it does not cover two plausible types of cases of internal relations in metaphysical literature. The first of them is the alleged situation where the mere existence of the relata is jointly sufficient for the holding of a relation but the existence of entities distinct from the relata is, in addition to the relata, necessary to the holding of the relation. Due to the sufficiency, there is no ontological need to reify the relation although the existence of additional entities to the relata is necessary to the holding of the relation. The second type of case is the theoretical example of a relation that is internal but it is contingent rather than necessary upon the existence of its relata.

E.J. Lowe claims that one internal relation in his metaphysical system has both these kinds of cases: exemplification. Exemplification holds between substances and attributes (property universals), for example between Dobbin the horse and warm-bloodness.[[10]](#footnote-11) According to Lowe, substances have both necessary and contingent attributes. Therefore there hold both exemplifications that are necessary upon the existence of a substance and an attribute and exemplifications that are contingent upon these entities. This difference is due to the point that exemplification can be “mediated” by both kinds and modes, which are Lowe’s two other basic categories besides substances and attributes.

Let us consider first necessary exemplification. According to Lowe, each substance is necessarily an instance of a specific kind, which has at least one essential attribute. For example, necessarily, if Dobbin exists, it instantiates the kind horse. The kind horse is characterized by an attribute that is essential and hence necessary to the kind: warm-bloodness. Thus, necessarily, if Dobbin exists, then also warm-bloodness exists and Dobbin exemplifies warm-bloodness. The mere existence of Dobbin (and warm-bloodness) is sufficient for Dobbin exemplifying warm-bloodness.[[11]](#footnote-12) The relation of Dobbing exemplifying warm-bloodness does not have to be refied. Nevertheless, the existence of the kind horse is also necessary for Dobbin being warm-blooded (but not sufficient). This is something that the existential conception of internal relations does not distinguish from the situation where nothing else than the existence of the relata is necessary for the holding of the relation.

The same point is correct about the case in different metaphysical theories in which an internal relation holds of objects in virtue of some essential or de re necessary properties of the objects. For instance, let us assume for the sake of the argument that electrons are objects and the electron charge (-e) is their de re necessary property. Independent from the details of the metaphysical description of this circumstance, the sole existence of two electrons is jointly sufficient and individually necessary for the holding of the internal relation having the same charge as between the electrons. However, the existence of the essential or de re necessary property –e charge is also necessary here.

Returning to Lowe’s four category system, we may illustrate contingent exemplification by Dobbin exemplifying whiteness. Most likely, Dobbin is not necessarily white. How can Lowe state that contingent exemplification is an internal relation although the existence of Dobbin and whiteness is not sufficient for Dobbin exemplifying whiteness? His answer is that given the contingent actual fact that Dobbin is white, there is a contingently existing white mode that characterizes (modifies) Dobbin necessarily given the existence of the mode, but not given the existence of Dobbin. The mode, in turn, necessarily instantiates whiteness. Thus, it is necessary that if the white mode exists, then Dobbin exemplifies whiteness. Therefore the joint existence of both Dobbin, whiteness and the white mode necessitates the holding of exemplification between Dobbin and whiteness. This exemplification can hold without reifying it. But because the white mode exists contigently, it is possible that Dobbin is not white. Dobbin exemplifying whiteness is not necessary to the existence, not even joint existence of its relata: Dobbin and whiteness. The existential conception of internal relations does not capture this theoretical case either.

One could, of course, claim that Lowe is wrong and exemplification is not an internal relation (it should be identified with facts, for instance). However, we consider it a merit of the account of internal relations if it can accommodate Lowe’s system. Such an account should be as neutral on category systems as possible. As a consequence, there is a theoretical need for an account of internal relations that covers both cases of Lowe’s exemplification and internal relations holding in virtue of essential or de re necessary properties. Moreover, it should be capable of capturing the purely existential case where the mere existence of the relata is both necessary and sufficient for the holding of the relation.

## Modified Existential Conception

To this end, we wish to introduce a distinction between two different kinds of internal relation, *basic* and *derived* and hence get to the taxonomy of internal relations. The distinction between basic and derived internal relations (respectively, BIR and DIR below) can be framed in terms of a more basic notion, that of *proto internal relation* (PIR):

[PIR]: Necessarily, entities *a*1, …, *a*n stand in *proto internal relation* R if and only if *a*1, …, *a*n exist.

[DIR]: Necessarily, entities *a*1, …, *a*n stand in *derived internal relation* R if and only if the holding of R of *a*1, …, *a*n is derivative from proto internal relations holding between entities some of which are distinct from *a*1, …, *a*n.

[BIR]: Necessarily, entities *a*1, …, *a*n stand in *basic internal relation* R if and only if R is a proto internal relation and the holding of R of *a*1, …, *a*n is not derivative from proto internal relations holding between entities some of which are distinct from *a*1, …, *a*n.

The two types of internal relation, basic and derived, are mutually exclusive and jointly exhaustive. All *basic* internal relations are proto internal. Some *derived* internal relations may be proto internal, others are not proto internal because they hold contingently relative to the existence of the relata (e.g. Lowe’s contingent exemplification). Thus, among *proto internal relations*, we have a further distinction between basic and derived. In order for a basic internal relation to hold, there need not be any specific entities distinct from the relata (such as their properties). *Derived* proto internal relations (for short**,** DPIR) hold of their relata in virtue of proto internal relations holding between entities some of which are distinct from the relata. Yet they are proto internal because the existence of their relata is jointly sufficient and individually necessary for the holding of these relations. The existence of the entities distinct from the relata is necessitated by the relata.

Salient examples of DPIRs are those which hold in virtue of the essential or de re necessary properties of the relata, provided the relata are distinct from these properties. For example, two electrons have exactly the same charge because they have two exactly similar charge tropes or modes as their necessary properties. Here, the holding of the internal relation of *having the same charge as* is derivative from the holding of exact similarity between the charge tropes or modes and the proto internal relations which must be invoked to account for the inherence or characterization between a charge trope or mode and an electron. Lowe’s necessary exemplification is also a derived proto internal relation. First, it satisfies the definition of proto internal relation because the existence of its relata is both jointly sufficient and individually necessary to its holding. Secondly, it is derivative from a substance necessarily instantiating a kind and the kind being necessarily characterized by an attribute.

Lowe’s contingent exemplification is not a proto internal relation since the existence of its relata is not sufficient for its holding (Dobbin could be brown, for instance). Yet it is derivative from the white mode necessarily instantiating whiteness and characterizing Dobbin. So Lowe’s contingent exemplification is a derived non-proto internal relation. This example and the case about essential or de re necessary properties show that our modified existential conception of internal relations can cover instances of internal relations in which properties make a difference for the holding of an internal relation—as we claimed above while discussing Armstrong.

The notion of *derivativeness* at work in our definitions is not intended as a precise technical concept. The notion is purported to be somewhat loose and theory-neutral, awaiting a more detailed theoretical account. In the present paper we do not attempt to give a rigorous account of what being derivative from amounts to. However, in order to throw some preliminary light on this question, we will venture some remarks concerning derivativeness.

There are at least three important constraints on any suitable conception of derivativeness. First, the notion of derivativeness must be hyperintensional. A merely intensional notion, whose fineness of grain only reaches the level of necessity, would be incapable of distinguishing between two different kinds of cases:

(1) those in which an internal relation holds in virtue of some entities that are necessarily co-existent with but distinct from the relata (such as Lowe’s necessary exemplification), and

(2) those in which an internal relation holds in virtue of the mere existence of the relata (e.g. internal relations among particular or universal natures).

In both kinds of cases, we are dealing with *proto internal* relations because the mere existence of the relata necessitates the holding of the relation; in (1), the relation is derived (DPIR) whereas in (2) it is basic (BIR). Thus, it is not an option here to say that derivativeness is just metaphysical necessitation. It is metaphysical necessitation plus. The question is, plus what—that is a question for future research, which we will not pursue here because of space constrains.

Second, derivativeness in the sense here discussed must be *asymmetric*. If the holding of an internal relation R1 of *a*1, …, *a*n is derivative from internal relations R2, …, Rk holding between entities some of which are distinct from *a*1, …, *a*n, then the holding of R2, …, Rk of these entities is not derivative from the holding of a R1 of *a*1, …, *a*n.

Third, derivativeness is not a relation between entities of any kind. Internal relations are not entities, and their “holdings” of entities are not facts nor any other kinds of entities.[[12]](#footnote-13) For this very reason, derivativeness cannot be construed as factive wordly grounding, which presupposes that its relata are entities.[[13]](#footnote-14)

## Formal vs Material Ontological Relations

Internal relations, whether basic or derived, proto internal or not, divide into *formal ontological* and *material ontological relations*. To elucidate this distinction, we need to introduce first the concept of *nature-neutrality*. It involves the notion of *nature*, which we are using here in the technical sense of non-relational character: character that an entity has (what the entity is like) independent from its being related to something in any way whatsoever. Paradigmatic examples of natures in metaphysical literature are particular and universal natures in both trope theory and realism about property universals (e.g. attributes in Lowe). Accordingly, we may say that nature-neutrality is neutrality on, or indifference to, the nature of entities. In principle, nature, as well as character, may be essential, necessary or contingent to an entity. The concept of nature here is different from the concept of essence—whether essence is understood modally or non-modally.

When we ascend to the level of statements, we can say that nature-neutral relational statements as such do not tell us anything about the non-relational character of the related entities. So nature-neutral statements making claims about internal relations, even if true, are not alone informative about the nature of the relata of the relation. Rather, this kind of statements describe the nature-neutral relational *form of existence*, that is, ontological form of the relata. We may say that nature-neutral internal relations are “formal ontological relations”. This we can see from the paradigmatic example of numerical distinctness among entities having primitive numerical identity (other paradigms being parthood and existential dependence). The statement that x is primitively numerically distinct from y as such does not tell us anything about the nature of x and y but about their form of existence as numerically distinct from each other. Hence, formal ontological relations are nature-neutral internal relations.[[14]](#footnote-15)

By contrast, the true statements about material ontological relations are informative of the nature of their relata. They are not nature-neutral. For example, the statements about exact or inexact resemblance or quantitative relations among particular natures (e.g. proportion and greater than) tell us something about the nature of the relata. Arguably, these relations divide their relata into the determinate and determinable kinds of natures. For example, particular -e charges form a determinate kind because they stand in 1:1 proportion (or, exact resemblance, if one likes) to each other.

# Taxonomy of External Relations

We can discern three such distinctions among external relations that possibly divide entities into exclusive groups. First, external relations may be considered both universals and particulars—relational universals, tropes or particular relational facts—depending whether one has a realist or nominalist metaphysical view. Views about the formal ontological distinction between universals and particulars vary, so one may pick her favourite here. Suffices it to mention only two ways to understand the distinction. (1) If it is possible that an external relation has instances, then it is universal. If this is not possible, then it is particular.[[15]](#footnote-16) (2) If it is possible for an external relation to be mutually exactly resembling and numerically distinct, then the external relation is particular. If this is not possible, then it is universal.[[16]](#footnote-17)

Secondly, according to Anna-Sofia Maurin, Jan-Willem Wieland and Arianna Betti, relating by external relations may be specific or unspecific to the relata. External relations can necessarily relate specific relata or not. This alleged possibility provides means to draw another distinction among external relations. External relations may be divided into those relational entities that must relate specific numerically distinct entities, and those that do not have to.[[17]](#footnote-18)

Relating is bearing the relation of relational inherence to something; if x relates y and z, then x bears relational inherence to y and z. In the class of relata-specific external relations, the holding of relational inherence is both specific to certain entities numerically distinct from the external relation and necessary to its existence. To put it heuristically in terms of possible worlds, the external relation bears relational inherence only to certain numerically distinct entities in every possible world where the external relation exists. The relational inherence is therefore *specific relational inherence.* It holds in every possible world in which its subject, an external relation, exists, and between the external relation and certain specific relata.

By contrast, this necessary holding relative to the external relation is not true of relata-unspecific external relations. There is at least one possible world for each relata-unspecific external relation where it exists but it does not relate the entities it relates in some possible world w (e.g the actual world): it may, for instance, relate some other entities. Relata-unspecific external relations are characterized by the negation of the modal characterization of relata-specific external relations.[[18]](#footnote-19)

A third distinction among external relations follows from the second. Necessarily, if an external relation is relata-specific, then it is rigidly existentially dependent on its relata.[[19]](#footnote-20) Let us assume that x is a relata-specific external relation and that, for the sake of simplicity, x is dyadic. On this assumption, x bears specific relational inherence to entities y and z in every possible world where x exists. Since any token of specific relational inherence can hold only if each of its relata exists, y and z exist in all the worlds where x exists. Moreover, x, y and z are all contingent existents. Such a polyadic rigid existential dependence may be called “multiple rigid dependence”: x is multiply rigidly dependent on y and z.[[20]](#footnote-21) From this result, we may see that every relata-specific external relation is multiply rigidly dependent on its relata. By contrast, relata-unspecific external relations may exist without their specific relata existing because they do not have to relate specific relata. We have arrived at a distinction between external relations that are multiply rigidly dependent on their relata and those that are not.

We wish to emphasize that the holding of multiple rigid dependence from an entity to certain distinct entities (e.g. from x to y and z) does not necessitate the holding of specific relational inherence. Multiple rigid dependence of x upon y and z guarantees the existence of y and z in every possible world in which x exists, but it does not have any consequences to the holding of specific relational inherence. Entity x may depend for its existence on y and z but not relate them at all.

Maurin’s, Betti’s and Wieland’s reason for postulating relata-specific external relations is to answer to two closely related, difficult metaphysical problems: the complex-unity problem and Bradley’s relation regress. To put it briefly, the question the complex-unity problem poses is, why do some pluralities of numerically distinct entities compose a complex entity that is an additional individual to the members of the plurality.[[21]](#footnote-22) For the reasons of space, we set the discussion of this problem aside and concentrate on Bradley’s relation regress. The metaphysical explanation challenge that Bradley’s relation regress presents is to account for the circumstance that an entity relates entities numerically distinct from it without a vicious infinite regress ensuing.[[22]](#footnote-23) Postulating external relations, or at least some of them, relata-specific gives promising resources to meet this challenge.

The crucial point here is that specific relational inherence holding from an external relation to its relata is supposed to be an internal relation. So it is not the case that specific relational inherence is an entity that relates the external relation and its relata; rather, these entities stand in that relation. Therefore the explanatory challenge presented by Bradley’s relation regress (why an entity relates) just does not rise with regard to specific relational inherence. There is nothing that relates the external relation to its relata. Furthermore, as was seen above, the holding of specific relational inherence is allegedly necessary to the existence of the relata-specific external relation and the latter is multiply rigidly dependent on its relata. Necessarily, if there is a relata-specific external relation, then it relates those entities it relates *and only them* in every possible world where the relation exists. So if Maurin, Wieland and Betti are right about this, specific relational inherence satisfies the sufficient and necessary conditions for being a basic internal relation: the existence of its relata is sufficient and necessary for its holding that is not derivative from proto internal relations holding between entities some of which are distinct from its relata. There seems to be no ontological need to reify specific relational inherence (or, multiple rigid dependence for that matter). No regress, infinite or finite, vicious or non-vicious, would ensue.[[23]](#footnote-24)

Construing at least some external relations as relata-specific is, indeed, promising because it opens up an avenue for a metaphysics of relations that steers away from the vexed problem of Bradley’s relation regress. However, this is almost too good to be true; there is a signicant worry about the metaphysics of relata-specific external relations. Even if it halted the regress right from the start, it does not give any answer to one explanatory question involved in the metaphysical explanatory challenge presented by Bradley’s relation regress: What is relating, that is, relational inherence, and why does it hold? The relata-specific metaphysics of relations just assumes that specific relational inherence holds from some external relations to their relata and that this holding is necessary to the existence of those external relations. It does not tell us anything more. Part of the *explanandum* in the Bradley’s relation regress problem is left in the dark. At the same time, Maurin, Wieland and Betti think that this *explanandum* is substantial and needs illumination. Therefore they have not fully met the goal they have set up to themselves although there does not seem to be ontological need to reify specific relational inherence.

We are not saying that this worry is a devastating objection to the metaphysics of relata-specific external relations, or, at least to the metaphysics of external relations. We are just pointing out that more work has to be done in order to complete the answer to Bradley’s relation regress along these lines. The crucial question for future research on metaphysics of external relations is, why does relational inherence, specific or not, hold? Most likely, this metaphysical explanatory question is a constitutive problem. Its concerns the constitution of relational inherence: what it is to relationally inhere. One theoretical possibility here is that specific relational inherence is rather a derived proto internal relation than a basic internal relation. If that were the case, then Bradley’s relation regress would not ensue and we would have an illuminating account of the constitution of specific relational inherence as deriving from some proto internal relations.

# Bibliography

Armstrong, David M., *Nominalism and Realism*, part 1 of *Universals and Scientific Realism*, (Cambridge: Cambridge University Press, 1978).

Armstrong, David M., *Universals - an Opinionated Introduction*, (Boulder: Westview Press, 1989).

Armstrong, David M., *A Combinatorial Theory of Possibility*, (Cambridge: Cambridge University Press, 1989).

Betti, Arianna, *Against Facts*, (Cambridge (Mass.): MIT Press, 2015).

Bradley, Francis H., *Appearance and Reality* (second edition, first edition 1893). (London: George Allen & Unwin, 1897).

Campbell, Keith K., *Abstract Particulars*, (Oxford: Basil Blackwell, 1990).

Ehring, Douglas, *Tropes – Properties, Objects, and Mental Causation*, (Oxford: Oxford University Press, 2011).

Fine, Kit, 'Guide to Ground', In Fabrice Correia, and Benjamin Schnieder (eds.), *Metaphysical Grounding*, (Cambridge: Cambridge University Press, 2012), pp. 37-80.

Hakkarainen, Jani, and Markku Keinänen, 'Bradley's Regress of Relations and Formal Ontological Relations', In Hemmo Laiho and Arto Repo (eds.), DE NATURA RERUM - Scripta in honorem professoris Olli Koistinen sexagesimum annum complentis (Turku: University of Turku, 2016), pp. 246-261.

Hochberg, Herbert, 'Nominalism and Idealism, *Axiomathes* 23 (2) (2012), 213-34.

Keinänen, Markku, and Jani Hakkarainen, 'The Problem of Trope Individuation – A Reply to Lowe', *Erkenntnis* 79(1) (2014), 65-79.

Keinänen, Markku, and Jani Hakkarainen, 'Kind Instantiation and Kind Change – A Problem for Four-Category Ontology', Studia Neoaristotelica 14 (2) (2017), 139-165.

Keinänen, Markku, Jani Hakkarainen, and Antti Keskinen, 'Why Realists Need Tropes', *Metaphysica* 17(1) (2016), 69-85.

Lowe, Edward Jonathan, *The Four-Category Ontology – A Metaphysical Foundation for Natural Science,* (Oxford: Oxford University Press, 2006).

Jonathan Lowe, 'A Neo-aristotelian Substance Ontology: Neither Relational nor Constituent', In Tuomas Tahko (ed.), *Contemporary Aristotelian Metaphysics* (Cambridge: Cambridge University Press, 2012), pp. 229-48.

Maurin, Anna-Sofia, *If Tropes,* (Dordrecht: Kluwer, 2002).

Maurin, Anna-Sofia, 'Trope Theory and the Bradley Regress', *Synthese* 175 (3) (2010), 311-326.

Maurin, Anna-Sofia, 'An Argument for the Existence of Tropes', *Erkenntnis* 74 (1) (2011), 69-79.

Maurin, Anna-Sofia, 'Bradley’s Regress', *Philosophy Compass* 7 (11) (2012), 794-807.

MacBride, Fraser, 'Relations', *The Stanford Encyclopedia of Philosophy* (Spring 2016 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/spr2016/entries/relations/>. November 30, 2017.

Moore, George Edward, *Selected Writings*, (London: Routledge, 1993).

Mulligan, Kevin, 'Relations: Through Thick and Thin', *Erkenntnis* 48 (2), (1998), 325 - 353.

Simons, Peter, 'Relations and truthmaking', *Aristotelian Society Supplementary Volume* 84 (1) (2010), 199-213.

Wieland, Jan-Willem, and Arianna Betti, 'Relata-specific Relations: A Response to Vallicella', *Dialectica* 62 (4) (2008), 509-524.

1. This eliminativist conception is a fairly common view among analytic metaphysicians nowadays, cf. David M. Armstrong, *Nominalism and Realism*, *part 1 of* *Universals and Scientific Realism* (Cambridge: Cambridge University Press, 1978), p.86; Keith K. Campbell, *Abstract Particulars* (Oxford: Basil Blackwell, 1990), pp.99-101; Peter Simons 'Relations and Truthmaking', Aristotelian Society Supplementary volume, 84 (1) (2010), 199-213, (pp. 204–5); Jonathan Lowe, 'A Neo-aristotelian Substance Ontology: Neither Relational nor Constituent', In *Contemporary Aristotelian Metaphysics*, ed. by Tuomas Tahko, (Cambridge: Cambridge University Press, 2012), 229-48, p. 242. Arianna Betti, *Against Facts*, (Cambridge Ma.: the MIT Press, 2015), p. 89. By contrast, Hochberg and MacBride disagree, Herbert Hochberg, 'Nominalism and Idealism, *Axiomathes* 23(2) (2012), 213-34, (p. 232), Fraser MacBride, 'Relations', *The Stanford Encyclopedia of Philosophy*, Spring 2016 edition, ed.by Edward N. Zalta, 2016. [↑](#footnote-ref-2)
2. Jani Hakkarainen, and Markku Keinänen, 'Bradley's Regress of Relations and Formal Ontological Relations', In Hemmo Laiho and Arto Repo (eds.), *De NATURA RERUM – Scrtipta in honorem professoris Olli Koistinen sexagesimum annum complentis*, (Turku: University of Turku, 2016), 246-261 (pp. 248-253). [↑](#footnote-ref-3)
3. For a defence of the view that relational inherence is an internal rather than external relation, cf. below. [↑](#footnote-ref-4)
4. In what follows, we will speak about metaphysical modalities unless otherwise noted. Our argument does not depend on any specific view of metaphysical modalities. [↑](#footnote-ref-5)
5. Kevin Mulligan, 'Relations: Through Thick and Thin', Erkenntnis 48 (2) (1998), 325 – 353, (p. 344), cf. Keith Campbell, 1990), (p. 37, 112). [↑](#footnote-ref-6)
6. George Edward Moore, 'External and Internal Relations', *Selected Writings,* ed. by Thomas Baldwin, (London: Routledge, 1993), pp. 79-105, cf. Anna-Sofia Maurin, 2002, *If Tropes*, (Dordrecht, Kluwer Academic Publishers, 2002), (pp 90-91). [↑](#footnote-ref-7)
7. See Markku Keinänen, and Jani Hakkarainen, 'The Problem of Trope Individividuation – A Reply to Lowe', *Erkenntnis* 79 (1) (2014), 65-89. [↑](#footnote-ref-8)
8. David M. Armstrong, *A Combinatorial Theory of Possibility*, (Cambridge: Cambridge University Press, 1989), (p. 105). [↑](#footnote-ref-9)
9. In another context, Armstrong puts the same point in terms of what he calls the *natures* of objects (David M. Armstrong, *Universals – an Opionated Introduction*, (Boulder: Westview Press, 1989), (p.43). This does not mean rejecting the property conception. The nature of an object, as Armstrong uses the term (vs our use below), is the conjunctive property formed by all the intrinsic properties an object has at the moment (*ibid*, p. 45, 95). [↑](#footnote-ref-10)
10. Jonthan Lowe, *The Four Category Ontology - A Metaphysical Foundation of Natural Science*, (Oxford: Oxford University Press, 2006), (pp. 23-8, 95-6); Lowe (2012), (pp. 241-44); Markku Keinänen, and Jani Hakkarainen, 'Kind Instantiation and Kind Change - A Problem for Four-Category Ontology', *Studia Neoaristotelica* 14(2) (2017), 139-165, (pp. 146-9). [↑](#footnote-ref-11)
11. Lowe (2012), (pp. 243-44). [↑](#footnote-ref-12)
12. We are critical of assuming facts (cf. Markku Keinänen, Jani Hakkarainen, and Antti Keskinen, 'Why Realists Need Tropes', *Metaphysica* 17(1) (2016), 69-85 (pp. 71-75) and Betti (2015)) and wish to do without assuming propositions, too. [↑](#footnote-ref-13)
13. Kit Fine, 'Guide to Ground', in Fabrice Correia, and Benjamin Schnieder (eds.), *Metaphysical Grounding*, (Cambridge: Cambridge University Press, 2012), pp. 37-54. [↑](#footnote-ref-14)
14. This is a further reason to reject the property conception of internal relations. It cannot accommodate nature-neutral internal relations and hence formal ontological relations. On that conception, every internal relation, when claimed by a true relational statement, is descriptive of the properties of its relata. [↑](#footnote-ref-15)
15. Lowe (2006), (pp.113-18). [↑](#footnote-ref-16)
16. Douglas Ehring, *Tropes - Properties, Objecs, and Mental Causation*, (Oxford: Oxford University Press, 2011), (pp. 30-45). [↑](#footnote-ref-17)
17. Jan-Willem Wieland, and Arianna Betti, 'Relata-specific Relations: A Response to Vallicella', *Dialectica* 62(4) (2008), 509-24, (pp. 517-20); Anna-Sofia Maurin, 'Trope Theory and Bradley's Regress', *Synthese* 175(3) (2011), 311-26. [↑](#footnote-ref-18)
18. Betti proposes that the relata-unspecific external relations might bear relational inherence to something only possibly. So if there were only possibly relating entities, they would be relata-unspecific external relations, cf. Betti (2015), p.90-1. One may compare this with Platonic universals which instantiate only possibly. In fact, according to Wieland and Betti, the distinction between relata-specific and relata-unspecific external relations cross-cuts with the distinction between universal and particular external relations, Wieland and Betti (2008), p. 519-20. Relata-specific particular relations are easier to understand, but perhaps it is at least conceivable that there is a relata-specific universal relation that has to relate only certain n-tuples of entities numerically distinct from it (ibid.). [↑](#footnote-ref-19)
19. If entity *r* is rigidly dependent entity *a*, then, necessarily, if *r* exists, then *a* exists. Moreover, the existence *r* is possible, and *a* does not exist necessarily. Rigid existential dependence is a formal ontological relation. It is nature-neutral internal relation. The true statements about its holding are not informative of the nature of its relata. [↑](#footnote-ref-20)
20. If entity xis multiply rigidly dependent on two entities *y* and z, then, x is rigidly dependent on these two entities. In other words, necessarily, if xexists, then y and zexist. Moreover, the existence xis possible, and y or zdo not exist necessarily. [↑](#footnote-ref-21)
21. Cf. Anna-Sofia Maurin, 'Bradley's Regress', *Philosophy Compass* 7 (11) (2012), 794-807, (p.801). [↑](#footnote-ref-22)
22. Francis H. Bradley, *Apparearance and Reality*, (London: George Allen & Unwin, 1897), p. 18; Anna-Sofia Maurin, 'An Argument for the Existence of Tropes', Erkenntnis 74(1) (2011), 69-79; Maurin (2012); Keinänen, Hakkarainen, and Keskinen, (2016), (pp.73-4). [↑](#footnote-ref-23)
23. In general, Bradley’s relation regress does not apply to internal relations, cf. Hakkarainen and Keinänen (2016.). [↑](#footnote-ref-24)