Instantiation and Characterization: Problems in Lowe's Four-Category Ontology

Markku Keinänen

University of Tampere

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ABSTRACT.

According to Lowe's Four-Category Ontology, the general nature of the entities belonging to the four fundamental categories is determined by the basic formal ontological relations (instantiation and characterization) that they bear to other entities. I argue that, in closer analysis, instead of one formal relation of characterization, this category system introduces two, one connecting particulars and another universals. With regard to the characterization relation connecting particulars, it remains an open issue whether it would need further analysis. By contrast, the status of instantiation as an internal relation is comparatively clear. Nevertheless, because of holding by virtue of the essences of particulars, the holding of instantiation between universals and particulars rules out the possibility of kind change and entails that particulars are essentially rigidly dependent on universals. Finally, Lowe's analysis of necessary exemplification gives us some reasons to suspect that some property universals need not have any instances in order to exist.

1. Introduction

In his main ontological works, E.J. Lowe develops and presents a Neo-Aristotelian category system, *Four-Category Ontology* (Lowe 1998, 2006, 2009). The category system involves two fundamental categories of particulars (objects and modes) and two fundamental categories of universals (kinds and attributes), respectively. In several places, Lowe sets his ontological category system against the rival views because of its superior ontological explanatory merits. Substances, which Lowe considers the most important category, are required to function as bearers of properties, subjects of change and basic particulars, by means of which all other particulars are individuated (Lowe 1998). Substances have determinate identity conditions only as instances of kinds (Lowe 2009, 2015). Finally, Lowe identifies laws of nature with kinds being characterized by (monadic or relational) attributes. Here,

kinds are not only required to function as truthmakers of the statements of fundamental laws but also as collectors of essential properties certain kinds of objects (e.g. electrons).

In characterization of ontological categories, Lowe anchors his views to the formal ontological tradition, which goes back at least to Husserl (cf. Smith & Mulligan 1983). The four categories (objects, modes, kinds and attributes) constitute the *fundamental categories* of Lowe's system because all other categories (e.g. living organisms) are sub-categories of these most general categories. The fundamental category to which an entity belongs is determined by its general category features and the formal ontological relations in which it stands to other entities. Lowe introduces two basic formal ontological relations, *instantiation* and *characterization*. The basic idea here is, first, that different kinds of universals are instantiated by different kinds of particulars. Hence, an individual substance such as Dobbin the horse instantiates the *kind* horse (i.e. a substantial universal). Correspondingly, a particular property (i.e. *mode*) such as Dobbin's whiteness instantiates the non-substantial universal (i.e. *attribute*) of whiteness. Second, modes can only exist as characterizing *substances* – Dobbin's whiteness characterizes Dobbin, for example. Attributes (i.e. property universals) characterize kinds: the property of warm-bloodedness characterizes the kind horse.

Hence, we have the following figure well-known from Lowe's later ontological works, which provides a visual outline of the basic formal ontological relations of instantiation and characterization between the entities belonging to the distinct fundamental categories (Lowe 2006, 2009):

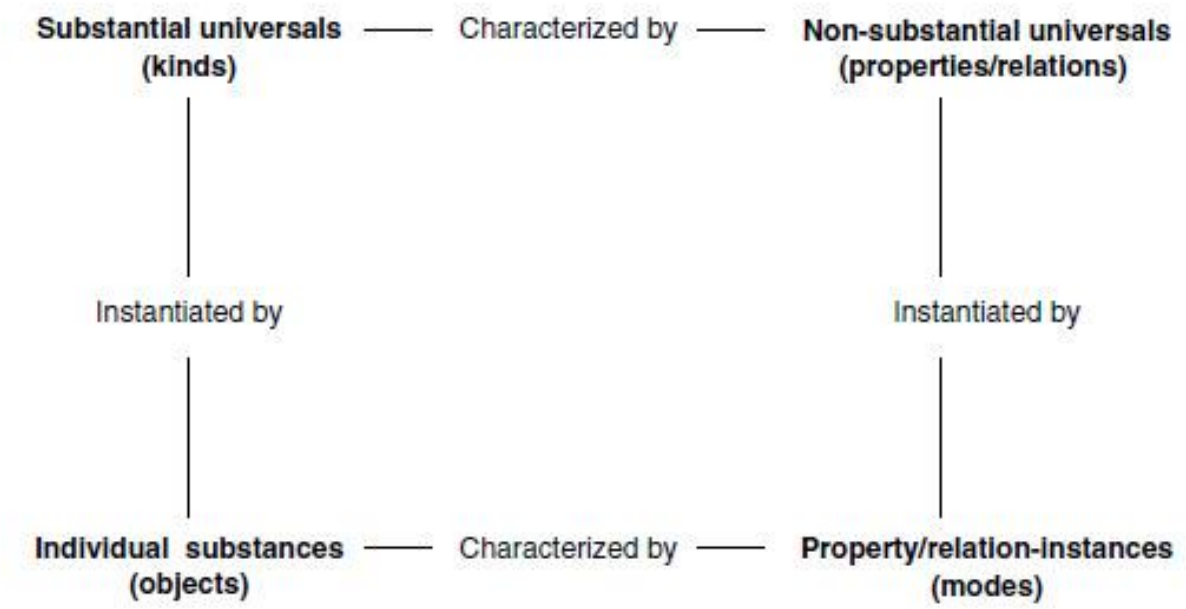

Figure 1

According to Lowe (2006, ch.7), the fundamental category to which an entity belongs is fully determined by the basic formal ontological relations in which it stands to other entities. For instance, an individual substance (e.g. a rubber ball, a particular horse) necessarily instantiates some kind(s) and is characterized by some modes. An attribute (e.g. the property universal of redness) is necessarily instantiated by some mode (particular redness) and may characterize some kind. The basic formal ontological relations determine the fundamental ways an entity can exist as a constituent of the world as a member of some of the four fundamental categories.

In this article, I will argue that, in closer analysis, a systematic account of these basic formal ontological relations leads to certain unexpected consequences. They both put the Four-Category in tension with certain widely accepted claims and point to some new problems. In Section 2, I begin with the major consequence of assuming that instantiation and characterization are basic formal ontological relations, namely, that they hold necessarily given the existence of their relata. Section 3 takes up the general properties of characterization relation and draws specific consequences of the necessity of formal ontological relations with regard to characterization. Perhaps the most dramatic one will be that, in Four-Category Ontology, there is not only one but two distinct formal relations of characterization: one between substances and modes, and another between kinds and attributes. In Section 4, I will argue that one needs to introduce only one formal ontological relation of instantiation in Four-Category Ontology. Nevertheless, since ontological basis of the holding of instantiation is the essences of particulars, particulars are essentially rigidly dependent on universals (kinds or attributes) which they instantiate. This is a fairly radical result in a Neo-Aristotelian category system, which usually assume particulars to have some kind of ontological priority over universals. Finally, Lowe's conception of attributes (property universals) is in tension with the Aristotelian immanent realist claim that attributes need to have instances in order to exist.

2. The metaphysical necessity of basic formal ontological relations

According to Lowe, instantiation and characterization are two - and the most important - basic formal ontological relations in Four-Category Ontology. Basic formal ontological relations are not additional elements of being but they are *internal relations*: the existence of the entities connected by these relations is sufficient for the relation to obtain (Lowe 2006, 167; 2012, 241-242). This conception of instantiation and characterization as internal relations has two consequences relevant to the present concerns. Both of these consequences are claims that hold true of all other basic formal ontological

relations as well – such as distinctness and identity – but here I confine myself to instantiation and characterization.

The first consequence may be presented in a form of principle, which I call "necessity of basic formal ontological relations" (NBF, for short). NBF states that, necessarily, if the relata of a basic formal ontological relation exist, the relation obtains. Thus, according to Lowe, as internal relations, the basic formal ontological relations of instantiation and characterization hold metaphysically necessarily given the existence of their relata.

Second, since instantiation or characterization are not any kind of relational entities, they hold simply because of the existence of their relata. We need not introduce any additional entities. If we want to put the two just-mentioned characteristics of instantiation and characterization in terms of truthmaking, the relata of these internal relations (e.g. a redness mode and some particular rose, and a redness mode and the attribute of redness) are minimal truthmakers of the claims that the corresponding internal relations obtain.[1]

In order to illustrate the features of these two formal ontological relations, let us first consider a mode, say, a one kilogram mode of an iron ball. According to Lowe, modes instantiate attributes (property universals). Necessarily, if this one kilogram mode exists, it instantiates the corresponding attribute, the property universal of the mass of 1kg. Similarly, necessarily, if this particular one kilogram mode exists, the iron ball is characterized by that particular mode. Moreover, the *source* of these necessities is the *nature* or *essence* of that particular one kilogram mode *m*. First, it is essential to mode *m* to characterize (or, to be a particular property of) that particular iron ball. Second, mode *m* is similarly by its nature a one kilogram mode and it instantiates the property universal of the mass of 1kg because of its essence (Lowe 1998, 181-183; 2006, 206-207).

Consider now an entity, which is in the opposite of corner of the above diagram, the kind horse. Dobbin, a particular horse instantiates this substantial universal. Exactly the same formal ontological relation of instantiation holds between Dobbin the horse and the kind it instantiates, on the one hand, and between mode *m* and the attribute of the mass of 1kg the mode instantiates, on the other. Thus, necessarily, if Dobbin and the kind horse exist, Dobbin instantiates the kind horse (Lowe 2012, 242). According to Lowe, universals (kinds and attributes) are only non-rigidly (or, generically)

[1] We have defended a new conception of internal relations – calling internal relations in our refined sense "basic internal relations" -, which involves these two characteristics, i.e., first, that basic internal relations hold necessarily iff their relata exist, and second, that the holding of a basic internal relation is not dependent on the existence of the entities distinct from its relata (Keinänen, Keskinen & Hakkarainen 2017, sec. 2). Instantiation and characterization as considered here would also be basic internal relations in our sense. Cf. O'Connaill & Tahko (2016) for minimal truthmakers.

dependent on their instances (Lowe 2006, 36). Thus, they must have *some* instances in order to exist but their existence is not dependent on the existence of any particular instance.[2] Unless it is necessary to Dobbin that he is a horse, we can construe a "possible world" in which both Dobbin and the kind horse exist but Dobbin is not a horse – he could have been, say, a rhinoceros. This would render instantiation metaphysically contingent given the existence of the relata (object and kind). Therefore, it must be necessary to Dobbin that he is a horse. Moreover, the source of the necessity of instantiation of the kind horse by Dobbin (given that these entities exist) is the nature or essence Dobbin. As Lowe puts it:

> Similarly, it is very plausibly part of the essence of a particular horse, Dobbin, that he is an instance of the kind horse. (Lowe 2012, 242)

According to Lowe, kinds are characterized by attributes. Nevertheless, the relation of characterization behaves in a notably different fashion in the case of universals than in the case of particulars. As John Heil (2012, sec. 7.5) points out, the same attribute can characterize different kinds. By contrast, a mode characterizes a single object and is identity dependent on it (cf. note 4). To take a simple example, both the kind horse and the kind tiger are characterized by the attribute of warm-bloodedness. Assuming that natural kinds of microparticles such as leptons are plausible examples of substantial universals (kinds in Lowe's sense), the same attribute of –e charge characterizes several different kinds (electron, muon, etc.). Thus, it seems that attributes are not rigidly dependent on any particular kind they characterize: it is easy to construe a possible world in which the attribute of warm-bloodedness exists but there are no horses – it could have existed as an attribute of some other kind (such as tiger). Also in the case of universals, characterization is a basic formal ontological relation and it holds necessarily if its particular relata exist. However, attributes are unlike modes in the following important respect: it is not necessary to an attribute (such as warm-bloodedness) that it characterizes the particular kind it happens to characterize. Instead, the source of the necessity of characterization relation is the nature or essence of kinds – kinds have their characteristics essentially (cf. Lowe 2012, 244).

According to Lowe and most other Neo-Aristotelians (cf., e.g., Smith 1997; Ellis 2001), all universals are kinds – kinds of substances or kinds of modes.[3] Lowe denies the existence of Russellian property universals, that is, property universals directly exemplified ("instantiated") by

[2] Cf. Lowe's (2006, 36) characterization of *non-rigid existential dependence*. This notion is a close relative to Simons' (1987, 297) notion of *generic dependence*, which could also have been employed here.

[3] Michael Loux (1978) postulates Russellian universals in his broadly neo-Aristotelian ontology. Loux also rejects the existence of modes.

objects (cf. Bergmann 1967). Instead, Lowe analyzes exemplification as a derivative formal ontological relation, by means of characterization and instantiation (Lowe 2006, 23-24). Dobbin the horse exemplifies the attribute of whiteness ("Dobbin is white") if a suitable kind of mode (Dobbin's whiteness) exists; because of its essence, that particular mode both characterizes Dobbin and instantiates the attribute of whiteness. Since the existence of mode is contingent relative to the existence of Dobbin, the exemplification of whiteness by Dobbin is itself contingent (Lowe 2006, 205-207). Nevertheless, substances also exemplify some of their attributes necessarily – Dobbin is necessarily warm-blooded. Lowe analyzes *necessary exemplification* by means of substances being instances of kinds and kinds being characterized by certain attributes (Lowe 2012, 244). Here, the necessity of exemplification is a result of instantiation of a kind (horse) being necessary to the substance, characterization by an attribute (warm-bloodedness) being necessary to the kind, and the analysis of exemplification by means of instantiation and characterization.

3. Characterization

Modes are particular properties of objects – they have some determinate spatial or temporal (or spatio-temporal) location. Like the nominalist substance attribute theorists (cf. Martin 1980; Heil 2009), Lowe maintains that modes are not any kind of parts of objects – they are rather the ways objects are. Lowe takes characterization (or, inherence) as a basic formal ontological relation, which holds between mereologically disjoint entities (objects and their modes). Hence, Lowe has a completely different explanatory strategy than the trope bundle theorists, who attempt to analyze inherence by means of parthood, co-location and/or existential dependencies (cf. Williams 1951; Campbell 1990; Keinänen 2011, sec.3). Instead of analyzing inherence, Lowe considers it to be the best over-all strategy to leave inherence as primitive.

Nevertheless, leaving characterization (or, inherence) primitive brings with itself some serious difficulties. The basic problem here is that modes characterizing objects bear different relations to the objects they characterize and we must put the mutual connections between these relations under scrutiny. Consider again a one kilogram mode *m* of an iron ball. According to Lowe, mode *m* is also identity dependent on that particular iron ball. Thus, at least in standard cases, in which a mode characterizes exactly one object, characterization *entails* identity dependence.[4]

[4] However, Lowe's (1998, 80-83) discussion of sphericality modes, which do not have any determinate identity conditions, betrays that, according to Lowe, some modes are not identity dependent on the objects these modes characterize. In the case of identity dependence, a mode has identity conditions determined by the identity conditions of the object on which the mode is identity dependent.

According to Lowe (2006, 37), the rigid existential dependence relation between an individual object and its mode *is constituted* by the characterization relation between the mode and the object. The same seems to hold true of identity dependence, which entails rigid dependence. Constitution is, according to Lowe, one of the formal ontological relations (Lowe 1998, 149; 2006, 37).

However, Lowe's claim about the "constitution" of rigid dependence/identity dependence does not shed much light on the mutual relations between these different formal ontological relations. Since formal ontological relations are not entities (existent constituent constituents of reality), it does not seem to be correct to claim that *they* would stand in some additional formal ontological relations. In other words, formal ontological relations (at least standardly considered) hold between entities, but are not themselves entities. Because of not being entities, formal ontological relations cannot be relata of any additional formal ontological relations. Therefore, it seems that Lowe's talk about constitution here is a re-statement of the well-known fact that characterization is entails rigid dependence.

The fact that characterization entails rigid dependence/identity dependence (in the case of modes) seems to betray unexplored connections between these different formal ontological relations introduced in Four-Category Ontology. Or, rather, there might be unexplored conceptual connections among the ways we characterize reality by means of formal ontological relations. There is a dire need of clarification of these connections. For instance, if a mode characterizes some definite object (and not just some object), it is identity dependent on that object.[5] Instead of characterization being primitive, we might ask whether one could *analyze* characterization of some definite object by means of identity dependence and some additional relation.

Both modes and objects are concrete (spatial, temporal or spatio-temporal) entities. Take again one kilogram mode *m* of iron ball *i*. As concrete entities, both mode *m* and iron ball *i* have a specific spatial/spatio-temporal location. Moreover, it seems that the one kilogram mode is where the iron ball itself is – these two entities are co-located at each moment of mode's existence. Presumably, an advocate of Four-Category Ontology would be inclined to maintain that the location of the object determines (or "grounds") the location of mode that characterizes the object. As an "adjectival" entity the mode has exactly some location as the object.

Nevertheless, regarding to this conception of the location of modes, one can make two, interconnected remarks. First, the formal ontological relations of dependence (i.e. identity

[5] By contrast, a sphericality mode, which is only essentially rigidly dependent on some objects, discussed in note 4 would be a mode "characterizing some objects".

dependence or rigid existential dependence) do not have any implications with regard to the spatial/spatio-temporal location of the related entities. For instance, mutually rigidly dependent entities can be co-located or, alternatively, exist spatially widely apart from each other. By contrast, according to the conception just outlined, the (alleged) formal ontological relation of characterization has such implications: in addition to identity dependence of a mode on an object, characterization entails that the mode is co-located with the object. It seems that concrete entities have their spatio-temporal locations contingently and we must introduce spatio-temporal relations to determine the locations of concrete beings. Hence, an advocate of this view would own us an explanation of the necessary co-ordination of the location of a mode and the location of the object the mode characterizes. For instance, can this kind of co-ordination take place without introduction of additional entities?

To sum up, since characterization entails – at least in standard cases - identity dependence of a mode upon an object, an advocate of the Four-Category Ontology would be obliged to provide a more detailed account of characterization in the case of particulars. If characterization is claimed to be a primitive formal ontological relation – as Lowe maintains – one would need to deal with the suspicion that it can be further analyzed. Second, if characterization entails co-location between a mode and an object (as it seems), a new and potentially dangerous element is included in the characterization relation: a possible need for introducing additional entities, which would be required for the obtaining of characterization. Such a need for additional entities would put the very status of characterization as a formal ontological relation and internal relation in jeopardy.

The relation of characterization works in a very different way in the case of universals. As I noted in the previous section, according to Lowe, the source of the necessity of characterization relation between kinds and attributes is the essence of kinds. Take, for instance, the kind electron or the kind horse. The kind electron is characterized by the attribute of –e charge. Here, the formal ontological relation of characterization holds because of the essence of the kind electron (Lowe 2015, 84). Consequently, it is necessary to the kind electron to be characterized by this attribute. According to Lowe, kinds are identity dependent on the attributes that characterize them (Lowe 2006, 216; 2012, 243). Hence, it is a partial factor determining the identity of the kind electron – what specific natural kind the kind electron is – that electrons have –e charge. In similar way, the kind horse is identity dependent on the attribute of warm-bloodedness.

There are two major differences between characterization of kinds by attributes, on the hand, and characterization of substances by modes, on the other. The first difference is based on the fact that, in Four-Category Ontology, kinds and attributes are universals, which do not have any

spatio-temporal location. Thus, spatial/spatio-temporal location does not constitute any further problem for attributes characterizing kinds. Second, the direction of identity dependence is reverse to the direction of characterization (or, characterizing) in the case attributes and kinds: that kind K is characterized by a group of attributes entails that K is identity dependent on these attributes. By contrast, modes are identity dependent on substances which they characterize. In addition to these existential dependencies, there are the following *existential independencies*: attributes are (or, seem to be) rigidly existentially independent of any specific kinds and substances are ridigly existentially independent of any specific modes.[6]

Because of this crucial difference in the identity dependencies entailed by these different types of characterization, we are entitled to consider them *distinct formal ontological relations* (cf. Heil 2012, 113). These relations are distinct because they are elucidated in fundamentally different ways and they put very different kinds of constraints on how their relata can occur as constituents of the world. Accordingly, the characterizing entities have radically different functions. Attributes are needed in Lowe's system to provide real definitions of distinct natural kinds, which these attributes characterize. By contrast, modes are concrete particulars that determine the specific features of the objects characterized by these modes at some definite moments of time.

4. Instantiation

The formal ontological relation of instantiation seems to bring *less* complexity to Four-Category Ontology than the relation(s) of characterization. The reasons for this are two-fold. First, instantiation has a determinate "grounding" in the essences of particulars (substances and modes). Second, the holding of the instantiation relations entails a uniform pattern of the relations of existential dependence. Since kinds/attributes are necessary to their instances (substances or modes), every instance is rigidly dependent on the kind/attribute it actually instantiates. In Lowe's terms, the existential dependence between particulars and kinds/attributes the former instantiate is a case of *essential rigid dependence*: every particular is because of its essence rigidly dependent on the kind(s) which it instantiates.[7] Hence, for instance, redness modes are essentially rigidly dependent on the attribute of redness and horses are essentially rigidly dependent on the kind horse.

[6] Lowe (1998, 142-143) proposes the identification of a substance and its essential modes, which comes close to the elimination of necessary modes in Lowe's neo-Aristotelian ontology. Later, he rejects the modes necessary to objects (Lowe 2006, 116-117; 2012, 244).

[7] Cf. Lowe (2006, 200-201) for the distinction between rigid dependence and essential rigid dependence.

As we have argued elsewhere (Keinänen & Hakkarainen 2017), Lowe's earlier doctrine on the determination of the identity conditions of objects as members of the most specific categories entails that the relation of instantiation between an object and a kind is (at least in many cases) *metaphysically contingent* relative to existence its relata. Similarly, if an advocate of Four-Category Ontology wants to allow for the metaphysical possibility of kind change, she ought to consider instantiation metaphysically contingent. Nevertheless, this kind of contingency of instantiation contradicts the central claim that instantiation is a basic formal ontological relation, and therefore, holds necessarily if the relata of this relation of exist. Taking instantiation as a basic formal ontological relation is included in the most basic assumptions of Lowe's Four-Category Ontology (*op. cit*. 151). Therefore, it is the best remaining alternative for an advocate of this category system to bite the bullet and reject Lowe's earlier doctrine on the determination of the identity conditions of objects. As a major drawback, an advocate of Four-Category Ontology is also obliged to reject the metaphysical possibility of kind change: that an object is first a member of some specific natural kind K, but later ceases to be a member of K and becomes to be a member of some distinct natural kind (*op. cit*. 161-162).

There are *prima facie* plausible cases of kind change, that is, events in which an object remains the same but changes the natural kind to which it belongs. One possible example is the β^- decay of a carbon-14 atom into a nitrogen-14 atom. It would be a very attractive option to leave open the possibility that an object has certain identity conditions as a member of a general kind but can change the specific natural kind to which it belongs. The fact that Four-Category Ontology must deny the possibility of kind change is a serious limitation to this category system (cf. Keinänen & Hakkarainen 2017, 152ff.).

The second major problem with Lowe's conception of instantiation is that it is not consonant with certain general intuitions about ontological priority of particulars associated immanent realism on universals. Lowe himself expresses these intuitions as follows:

> Furthermore, it is part of the over-all picture offered by the four-category ontology that universals are *ontologically posterior* to particulars – which is why it takes universals to be incapable of existing uninstantiated. (Lowe 2012, 245)

However, the construction of Four-Category Ontology does not support this over-all picture. Lowe is an immanent realist with respect to universals: according to him, every universal (kind or attribute) must have some instances in order to exist. Thus, according Lowe, universals are (by their essence) non-rigidly dependent (generically dependent) on their instances (substances or modes). By the same

token, however, every instance of a universal (kind/attribute) is essentially rigidly dependent on the universal. Consequently, particulars bear a stronger sort of dependence relation (essential rigid dependence) to universals than universals to particulars ((non-rigid) essential dependence). If one wants to put this in terms of "ontological priority", it rather seems that universals are prior to particulars.

Lowe continues the above passage as follows:

> On this view, although universals are perfectly *real*, they are perhaps best seen as being *abstractions from*, or *invariants across*, particulars. That being so, the particulars from which they are 'abstractions' should not be seen as containing those universals as 'ingredients' in their ontological make-up (*ibid*).

Consistently with Four-Category Ontology, Lowe rejects the claim that universals could be considered as parts of their instances. Nevertheless, Lowe's claim that universals "abstractions from particulars" does not fit with the rest of the system. Rather, kinds are entities *distinct* from substances, whose one of the main functions is to provide the identity conditions of substances. Similarly, as we saw above, attributes are entities distinct from substances/modes, which provide the essential properties of natural kinds and the essential properties of certain kinds of substances. There is no *fixed group particular entities* from which these universals are abstractions in every "possible world". Rather, in every "possible world" in which certain particulars exist, certain determinate universals exist – the particulars are essentially rigidly dependent on these universals.

Finally, one may ask whether there are attributes which need not have *any* instances in order to exist. Consider an empirically discovered attribute, -e charge characterizing the natural kind electron. Electrons have -e charge because they instantiate the kind electron, which is characterized by the attribute of –e charge. Moreover, assume that –e charge occurs *only* as an essential property of certain natural kinds. In addition to the attribute of –e charge, Lowe (2006, 169-170) introduces modes of –e charge to account for the fact that a particular electron possesses –e charge. Nevertheless, one may ask whether such modes would only bring redundancy to the category system: could we account for the fact that a particular electron has –e charge by means of its instantiating the kind electron, by its being a certain kind of particle?[8]

It is clear that uninstantiated attributes of the just mentioned kind (if there are any) cannot exist without being exemplified by some objects. There cannot be uninstantiated substantial

[8] Another way to put this question is as follows: is Lowe's distinction between dispositional and occurrent predication (Lowe 2006, 124-126) well-motivated in this particular case?

universals: kinds (such as electron) must have some instances in order to exist and the above kind of attributes must characterize some kind in order to exist. Nevertheless, the scenario given in the previous paragraph is apt to show that the advocate of Four-Category Ontology is driven to introduce a fairly independent realm of abstract universals. This realm, which contains kinds characterized by different attributes, is linked to the realm of concrete entities only by (non-rigid) essential dependencies.

5. Conclusion

In this article, I have argued that Lowe's Four-Category Ontology introduces two distinct formal ontological relations of characterization, one for universals (kinds, attributes), and another for particulars (objects, modes). Whereas characterization is comparatively well-understood in the case of universals, there are important open issues concerning the characterization of objects by modes. First, characterization entails identity dependence but it seems to be an open question whether it could be analyzed by means of identity dependence. Second, if characterization entails necessary co-location of its relata (as it seems), one is entitled to ask whether characterization is an internal relation. Therefore, it is an open question whether an advocate of Four-Category Ontology is entitled to maintain that characterization holds by virtue of the existence of its relata.

By contrast, the status of instantiation as a basic formal ontological relation is comparatively transparent. Nevertheless, contrary to the powerful immanent realist intuitions, there is no reason to suppose that universals would be ontologically posterior to particulars. Rather, in Four-Category Ontology, abstract universals and concrete particulars seem to constitute different but mutually dependent realms. The essential rigid dependence of particulars on universals is a stronger sort of dependence relation than non-rigid existential dependence, which universals bear to particulars. Moreover, I argued that Lowe's analysis of necessary exemplification gives us, contrary to immanent realism, reasons to suspect that some attributes may not need to have any instances in order to exist.[9]

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[9] Acknowledgements

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