A Bundle Theory of Universals with Metaphysical Indeterminacy: How to Free the Bundle Theory of Universals from the Commitment to the Identity of Indiscernibles

By

Ludovica Medaglia

Submitted to

Central European University

Department of Philosophy

In partial fulfilment of the requirements for the degree of Master of Arts in Philosophy

Supervisor: Professor Michael Griffin

Vienna, Austria

2022

Abstract

The standard objection to the bundle theory of universals (BTU) is that it implies the principle of the identity of indiscernibles (IdIn). Given that IdIn is a controversial principle, the fact that BTU implies IdIn casts doubts on BTU, too. Indeed, given the premises that (i) BTU implies IdIn and that (ii) IdIn is false, one obtains the conclusion that BTU is false. My aim in this thesis is to defend BTU against this objection. To reach this aim, I choose to deny premise (i) above, namely that BTU implies IdIn. To deny (i), it is sufficient to show that there is a version of BTU that does not imply IdIn. I develop such a version and call it BTUMI. BTUMI receives this name because its combines BTU with metaphysical indeterminacy (MI), more precisely with MI explained in terms of Rosen and Smith's "fuzzy theory". BTUMI is a theory which, as far as its explanatory possibilities are concerned, has two strong advantages. On the one hand, BTUMI does not imply IdIn and therefore is not exposed to the main objection to BTU. On the other hand, BTUMI is able to explain MI. This is an important advantage because MI is a metaphysical fact and should not be left without an account. There is a further aspect which makes BTUMI a promising theory. MI has never attracted the attention of philosophers in relation to BTU and IdIn, so I aim to throw light on BTU from an entirely new perspective.

Acknowledgements

I would like to express my gratitude to the members of the Department of Philosophy of Central European University. During this year, I have had the possibility to broaden my perspectives in Philosophy, exploring new fields and acquiring new methods. I have always received generous and helpful advice from everyone and I think I have learnt much. I am grateful for the stimulating and at the same time friendly environment, too. Finally, a special thanks to my supervisor.

List of abbreviations

BTU	Bundle theory of universals
BTUMI	Bundle theory of universals with metaphysical indeterminacy
FT	Fuzzy theory
IdIn	Identity of indiscernibles
MI	Metaphysical indeterminacy

TABLE OF CONTENTS

INTRODUCTION

In his *Human Knowledge: Its Scope and Limits* (1948), Russell attributes to Leibniz the view that particulars are bundles of properties.[1] Although it is not clear that Leibniz held this view,[2] the bundle theory of particulars has enjoyed a good fortune among philosophers.[3] Its kernel is the idea that the constitution of individual substances is fully exhausted by properties, which according to some versions of the bundle theory are universals[4] and according to some others are tropes.[5]

The version of the bundle theory according to which the constituents of individual substances are universals (from now on "bundle theory of universals", abbreviated in BTU) is vulnerable to several difficulties, some of which have become standard objections against it.[6] The most serious one is that BTU implies the principle of the identity of indiscernibles (from now on IdIn). IdIn is the principle according to which if x and y are indiscernible, then they are numerically the same object. Formally,

(IdIn) $\forall x \forall y(\forall F(Fx \leftrightarrow Fy) \rightarrow x = y)$

The problem is that there are good reasons to consider IdIn false[7] and, if BTU implies IdIn, this results in BTU being false, too. Thus, the fact that BTU implies IdIn is usually believed to be a reason not to endorse BTU.

The aim of this thesis is to defend BTU against this objection. I will pursue this objective by developing a version of BTU that does not imply IdIn and therefore is not vulnerable to the objection. I will argue that this version not only has the advantage of not implying IdIn, but should be endorsed for independent reasons, too. Indeed, I will try to reconcile BTU with a

[1] Russell 1948, IV.8.
[2] Armstrong 1978, vol. 1, p. 89.
[3] E.g. Russell 1948, Hochberg 1965, Goodman 1966.
[4] O'Leary-Hawthorne, Cover 1998.
[5] E.g. Maurin 2002.
[6] Van Cleve 1985, p. 95.
[7] Armstrong 1978, vol. 1, p. 91.

neglected but important metaphysical phenomenon, namely metaphysical indeterminacy (from now on MI). In other words, I aim to obtain a version of BTU that has two main significant advantages. On the one hand, this version does not imply IdIn. On the other hand, this version is able to explain MI, which is a metaphysical fact and should not be left without an account. I will call this version BTUMI, since it is a version of BTU that takes MI into account. BTUMI is a theory worth exploring not only because of its ability to reconcile BTU with MI. Also, MI has never attracted the attention of philosophers in relation to BTU and IdIn, so I aim to throw light on BTU from an entirely new perspective.

The structure of the thesis is the following. In chapter 1 I set out the problem, that is, I explain how BTU implies IdIn. Chapter 2 and chapter 3 provide the foundations of my project, respectively in relation to BTU and to MI. Chapter 2 gives two definitions and one principle. The definitions are those of pure property and that of indiscernibility, whereas the principle, called (Ontology) and supported by two arguments, is related to the composition of the bundles. Chapter 3 introduces MI and argues that the best way to explain MI is the so-called "fuzzy theory" (FT). In chapter 4 I combine BTU and MI, that is, I develop BTUMI. Then, in chapter 5, I investigate the relation between BTUMI and IdIn. I argue that the first does not imply the second, thus reaching the aim of my thesis.

CHAPTER 1 – THE PROBLEM AND TWO EXISTING SOLUTIONS

1.1. The problem: objection-IdIn

The bundle theory of universals (BTU) is a theory about the constitution of individual substances which maintains that the only constituents of individual substances are universals. These universals are usually considered to be immanent rather than transcendent.[8] This means that whenever two distinct individuals have the same property, this property is a universal that enters the composition of each.[9] A *sui generis* relation, called "compresence" by Russell, is usually invoked by bundle theorists to explain how properties are wrapped together in a bundle.[10] Also, they maintain that the bundle is a categorically different object from its constituents, since its constituents are properties and the bundle is an object.[11]

As Zhang writes,[12] according to BTU an object is identical to its constituents. The consequence of this fact is that BTU implies IdIn. To see why, consider the argument in table 1.

Table 1.

Premise dependence	Argument	Justification
(1)	(1) Individual substances are identical to bundles.	Premise introduction
(2)	(2) The only constituents of bundles are universals.	Premise introduction
(2)	(3) If two bundles have all the same universals, they have all the same constituents.	From (2)
(4)	(4) A bundle is identical to its constituents.	Premise introduction

[8] Demirli 2010, p. 2.
[9] Demirli 2010, p. 2.
[10] Demirli 2010, p. 2.
[11] Demirli 2010, p. 2.
[12] Zhang 2018, p. 474.

(2), (4)	(5) If two bundles are constituted by all the same universals, then they are numerically identical.	From (3), (4) and the symmetry and transitivity of identity
	The notion of indiscernibility will be subjected to a more detailed inquiry below, but for now consider the following provisional definition: (Indiscernibility*) Two bundles are indiscernible if and only if they are constituted by all the same universals.	Definition
(2), (4)	(6) If two bundles are indiscernible, then they are numerically identical.	From (5) and (Indiscernibility*)
(1), (2), (4)	(7) If two individual substances are indiscernible, then they are numerically identical.	From (1) and (6)

The conclusion expressed by (7) corresponds to the principle of Identity of Indiscernibles (IdIn). If one considers the conjunction of (1), (2) and (4) to be the core of BTU, one can see how BTU implies IdIn.

IdIn, however, is an extremely controversial principle. Max Black, in his influential paper "The Identity of Indiscernibles",[13] offers what is usually taken to be a counterexample to IdIn. Black suggests that it is logically possible that the universe contains only two exactly similar spheres. He imagines that the spheres are made of the same material and have the same diameter, the same temperature, the same colour and so on, and that nothing else exists. In other words, the spheres share all the same monadic and relational properties. The thought experiment aims at showing that if it is logically possible that such a universe exists, then it is logically possible for two distinct objects to have all the same properties. If this is the case, IdIn is not valid.[14]

[13] Black 1952.
[14] Black 1952, p. 156.

If BTU implies IdIn and IdIn is false, then BTU is not a tenable theory.[15] This, which I will call "objection-IdIn", is the most serious objection against BTU:

(objection-IdIn) (a) BTU implies IdIn and
(b) IdIn is false, therefore
(c) BTU is false.

In objection-IdIn, premise (a) is motivated by the argument given above in table 1, whereas premise (b) expresses the outcome of Black's discussion. The conclusion follows from the rule governing the truth-value of conditionals.

In the following chapters I would like to argue against objection-IdIn. Before starting my argument, however, I would like to consider two other attempts that have been made to defend BTU against objection-IdIn. My aim is to show that neither of them is entirely successful and that therefore a new line of defense of BTU against objection-IdIn is needed.

1.2. Two existing solutions: O'Leary-Hawthorne's and Rodriguez-Pereyra's answers to objection-IdIn and their problems

Two proposals to counter objection-IdIn have been made respectively by O'Leary-Hawthorne and Rodriguez-Pereyra. They avoid the conclusion (c) in the objection-IdIn above in different ways. While Hawthorne denies (b), Rodriguez-Pereyra denies (a). In any case, the outcome is the same: it is wrong to consider BTU an untenable theory.

In "The bundle theory of substance and the identity of indiscernibles",[16] Hawthorne claims that Black's universe is not a counterexample to BTU. He supports his claim with the following argument. First, BTU is plausible only if one adopts an immanent conception of universals, that is, if one acknowledges that universals are in space and time.[17] Another important feature of immanent universals is that they can be wholly present in different places

[15] Armstrong 1978, vol. 1, p. 91.
[16] Hawthorne 1995.
[17] Hawthorne 1995, p. 191.

at the same time.[18] For instance, if a raven is black and a singer's hair is black, the universal blackness is wholly present both in the raven and in the singer's hair. This has the consequence that one immanent universal can be at a spatial distance from itself. If one is committed to the idea that one immanent universal can be at a spatial distance from itself, one will be committed also to acknowledging that a bundle of universals can be present at different places at the same time.[19] Therefore Black's universe can be reinterpreted as a universe in which one sphere is bilocated, that is, present in two places at the same time.[20] If interpreted in this way, Black's universe does not refute IdIn. Therefore, BTU can be used to salvage IdIn.[21]

Hawthorne's argument is not an effective answer to objection-IdIn. The reasons are several. The first one is that the very argument is vulnerable to a serious objection. Vallicella[22] argues that Hawthorne's inference from the claim that a universal can be in different places at the same time to the claim that a bundle of universals can be in different places at the same time is unwarranted. Vallicella justifies this objection with the following argument:

> "(i) No particular can be wholly present at many places at one time. (ii) Every bundle of universals is a particular. Therefore, (iii) no bundle of universals can be wholly present at many places at one time".
> (Vallicella 1997, 92)

Nevertheless, there are other reasons for not considering Hawthorne's argument an effective defense of BTU against objection-IdIn. Indeed, even supposing that Hawthorne's argument is not exposed to the difficulty highlighted by Vallicella, that is, even supposing that Hawthorne's argument is sound, it does not seem to threaten objection-IdIn. As Rodriguez-Pereyra points out,[23] what is incompatible with BTU is a universe with two indiscernible particulars and Hawthorne "shows neither that this is not a genuine possibility nor that the Bundle Theory can

[18] Hawthorne 1995, p. 191.
[19] Hawthorne 1995, p. 193.
[20] Hawthorne 1995, p. 194.
[21] Hawthorne 1995, p. 191.
[22] Vallicella 1997, p. 92.
[23] Rodriguez-Pereyra 2004, p. 73.

accommodate this possibility". Also, Hawthorne takes for granted that his redescription of Black's universe is the correct one, but he does not show why a description in which there are two indiscernible spheres and a description in which there is a single bilocated sphere cannot be descriptions of two distinct possibilities.[24] Actually, they do seem two different possibilities, for it is conceivable that a universe consists only of two almost indiscernible spheres, which differ slightly in colour. It is sensible to think that, if the universe with two almost indiscernible spheres is possible, the universe with two indiscernible spheres is possible, too.[25] Therefore, Hawthorne's defense of IdIn is not successful.

If Hawthorne denies (b) in objection-IdIn, Rodriguez-Pereyra denies (a). In other words, in "The Bundle Theory Is Compatible with Distinct but Indiscernible Particulars"[26] he maintains that BTU does not imply IdIn.[27] Since (a) is supported by the argument expressed in table 1 above, to deny (a) Rodriguez-Pereyra must reject a premise of that argument. The premise of the argument in table 1 that he does not accept is (1), namely that a particular is identical to a bundle.[28] This allows him to maintain that, although a bundle is identical to its constituents, a particular is not. Now, the conclusion of the argument in table 1, namely that BTU implies IdIn, which means that there cannot be numerically distinct indiscernible particulars, depends on premises (1), (2) and (4). Thus, if Rodriguez-Pereyra does not accept (1) he can reject the conclusion of the argument of table 1. Given that the conclusion of the argument in table 1 is conjunct (a) in objection-IdIn, Rodriguez-Pereyra can deny (a). Therefore, he can reject the conclusion (c) of objection-IdIn.

What are Rodriguez-Pereyra's grounds to deny (1), that is, to deny that particulars are identical to bundles of universals? He illustrates his reason with the introduction of a distinction

[24] Cf. Zhang 2018, p. 477.
[25] Rodriguez-Pereyra 2004, p. 74.
[26] Rodriguez-Pereyra 2004.
[27] Rodriguez-Pereyra 2004, p. 75.
[28] Rodriguez-Pereyra 2004, p. 78.

between bundles and instances of bundles. In the same place as that in which a bundle is there is an instance, too. Although the instance is "entirely constituted by the universals of the bundle", "the instance and the bundle are two distinct entities".[29] Indeed, while the bundle can be in different places at the same time, the instance cannot. This means that a universal has different instances and is in the same place as each of them, but each instance is not in the same place as the other instances. After introducing the distinction between instances and bundles, Rodriguez-Pereyra says that particulars are instances of bundles.[30] Therefore, particulars are not identical to bundles: "particulars are entirely constituted by universals without being identical to bundles of universals".[31] Thus, given that instances of the same bundle of universals have the same constituents yet are numerically different and that particulars are instances, there can be different particulars with the same constituents. Given (Indiscernibility*), there are indiscernible particulars that are numerically distinct, against objection-IdIn.

The main problem of Rodriguez-Pereyra's proposal is highlighted by Curtis.[32] It is best expressed with Curtis' own words:

> "Consider a multiply located bundle of universals Bun and one of its instances Ins. Bun has the property of existing at more than one place, but Ins does not. But Bun and Ins are by hypothesis constituted by exactly the same universals. So how can they differ in their properties in this way? What is it that grounds this difference between Bun and Ins?" (Curtis 2014, 302)

The answer to the latter question seems to be "nothing". Therefore, the distinction between universals and instances does not seem to be sufficiently motivated. Given that this is the basis of Rodriguez-Pereyra's argument against objection-IdIn, Rodriguez-Pereyra's solution does not appear to be entirely satisfactory.

[29] Rodriguez-Pereyra 2004, p. 78.
[30] Rodriguez-Pereyra 2004, p. 78.
[31] Rodriguez-Pereyra 2004, p. 78.
[32] Curtis 2014, p. 302.

Hawthorne and Rodriguez-Pereyra employ two different strategies to counter objection-IdIn. However, neither seems effective. Therefore, another argument against objection-IdIn should be put forward. This is the objective of the following chapters of this thesis.

CHAPTER 2 – DEFINITIONS AND PRINCIPLES RELATED TO THE BTU-PART OF BTUMI

The aim of this chapter and of the following one is to introduce the notions which I will use in the argument developed in chapters 4 and 5. BTUMI is a theory that results from the integration of MI into BTU. Thus, while chapter 3 focuses on MI, this chapter provides two definitions and a principle to build the part of BTUMI that is not related to MI.

For the sake of clarity, in what follows the abbreviation "BTU" will refer to the bundle theory of universals in general. Along with "BTU" I will introduce and use the abbreviation "BTU-part". The motivation and the meaning of the latter abbreviation are the following. BTUMI is the outcome of the union of BTU and MI. Therefore, developing BTUMI means developing a BTU-part and a MI-part. Thus, BTU-part is the version of BTU that serves as a basis for the construction of BTUMI. However, it is important to observe that BTU-part is selected among the various possible versions of BTU not because it is the most appropriate to serve as a basis for BTUMI, but because I think that it is the most consistent version of BTU and therefore I choose to adopt it as a basis. In other words, the abbreviation "BTU-part" means "best version of BTU (that I therefore adopt as a basis for BTUMI)". Since my aim is to develop BTU-part as far as it is useful for BTUMI, I do not claim to be giving a complete characterization of BTU-part.

This chapter deals with BTU-part. The two definitions provided in this chapter are that of pure property and that of indiscernibility, whereas the principle is about the composition of the bundles in BTU-part.

2.1. First definition: pure properties

Rodriguez-Pereyra[33] defines pure properties by contrasting them with impure properties. Impure properties are the properties that depend on the identity of a relatum, while pure

[33] Rodriguez-Pereyra 2006, p. 92.

properties are those that do not depend on the identity of a relatum. In the phrase "identity of a relatum" the term "identity" should be understood as indicating primitive identity, identity that cannot be reduced to a qualitative description. Indeed, if the identity of an individual is indicated in the property through a qualitative description, the property is pure. Thus, an example of impure property is "being a less talented soprano than Angela Gheorghiu", since this property depends on the primitive identity of Angela Gheorghiu. In contrast, "being a less talented soprano than a famous black-haired singer" is a pure property because it does not depend on the primitive identity of anybody.

Thus, in what follows I will call "pure properties" those of which the following definition is true:

(Pure property) A pure property is a property that does not depend on the primitive identity of an individual.

2.2. Principle: ontology

To determine the ontology of BTU-part, one must answer two questions:

(i) Are there only universal properties in the ontology of BTU-part?

(ii) What kind of universal properties are there in the ontology of BTU-part?

The two questions must be considered separately. What is at stake in question (i) is whether BTU-part postulates a one-category ontology or not. As L. A. Paul defines it, a one category ontology is "an ontology that denies that we need more than one fundamental category to support the ontological structure of the world".[34] The reason why question (i) is connected to whether BTU-part has a one-category ontology or not is the following.

If one answers question (i) affirmatively, then BTU-part has a one-category ontology. Indeed, one who affirms that there are only universal properties in the ontology of BTU-part

[34] Paul 2017, p. 32.

maintains that any individual in the world is a bundle of universals which can be analyzed solely in terms of universals. Call the supporter of this position "Philosopher-one" because of her sympathy for the option that BTU-part is a one-category ontology. In contrast, if one answers question (i) negatively, the possibility is open to make BTU-part a two-category ontology. A supporter of this latter answer – call her "Philosopher-two" because she argues that BTU-part is a two-category ontology – is likely to emphasize the role played in the bundles by the compresence relation.

The compresence relation, Philosopher-two argues, cannot be a universal itself, since otherwise another compresence relation would be needed to bind it together with the other universals and a regress would arise.[35] Hence, in Philosopher-two's view, the compresence relation is an entity in BTU-part over and above the universals. Therefore, Philosopher-two concludes, BTU-part does not recognize only universals but also the compresence relation and is not a one-category ontology.[36]

What can Philosopher-one answer? They can observe that for a bundle theorist it is not necessary to endorse such a "strong" conception of the compresence relation. A "lighter" conception can be advanced. According to this "light" conception, compresence results just from the coincidence in space-time of the universals and is not an additional entity in the ontology of BTU-part. This is, for example, Campbell's conception.[37]

To build BTU-part I will follow Philosopher-one and adopt a "light" conception of the compresence relation. My choice has two main reasons. First, as Campbell writes,[38] two-category ontologies have to face a significant problem, namely that it is extremely difficult to

[35] Benovski 2008, p. 178.
[36] This view emerges, for instance, from Benovski 2008, whose aim is to show that the bundle theory and the substratum theory are equivalent under many respects.
[37] Campbell 1990, p. 19. Campbell (Campbell 1990, p. 19 n.18) attributes this view to Russell, too, although the identification is less evident than it might seem because according to Russell compresence applies not just to the physical world, but also to the world of mind (Russell 1948, p. 265).
[38] Campbell 1990, p. 17.

specify the nature of the non-relational tie between the two categories. The second reason is the Ockhamist principle according to which it is preferable to postulate as few entities as possible.[39] A BTU-part with a "light" conception of the compresence relation is therefore a simpler and less problematic theory.

My answer to question (i), therefore, is affirmative. The only entities in BTU-part are universal properties.

As for question (ii), the issue is whether both pure and impure properties should be considered as being in the ontology of BTU or not. An argument can be offered in support of the answer that in the ontology of BTU-part there are only pure properties, more precisely pure universals.

The argument is the following. It can be easily noticed that, if in bundles there can be impure universals, that is, universals depending on the primitive identity of an individual, the account of how individuals are constituted is circular. Indeed, if there are impure universals in the bundle, on the one hand individuals depend on universals because they are bundles of universals and on the other hand some universals, namely the impure ones, depend on individuals.

The argument can be best understood by looking at a particular case. Suppose, for the sake of a *reductio ad absurdum*, that there are impure universals in the bundle of universals *a*. If this is the case, the property K = "being identical to *a*" will be in the bundle *a*. Suppose also that the other properties in the bundle *a* are the properties F, G, H. Thus, *a* will be the bundle of universals F, G, H, K:

(1) $a = \{F, G, H, K\}$.[40]

[39] Cf. Maurin 2002, p. 5.

[40] This notation is appropriate if bundles are sets. This is something to which I would not like to commit myself now, but for the sake of convenience I employ the notation which I would use if I had this commitment.

Given that K = "being identical to *a*", one obtains that

(2) a = {F, G, H, being identical to a}.

Now substitute what according to (1) is the same as *a* for the second occurrence of *a* in (2):

(3) a = {F, G, H, being identical to {F, G, H, K}}

Given that K = "being identical to *a*", one obtains that

(4) a = {F, G, H, being identical to {F, G, H, being identical to a}}.

Now substitute what according to (1) is the same as *a* for the second occurrence of *a* in (4):

(5) a = {F, G, H, being identical to {F, G, H, being identical to {F, G, H, K}}.

One can repeat the last two steps infinitely many times. Accordingly, if impure properties are accepted in the ontology of BTU and therefore in bundles of universals, one will never obtain an analysis of a particular that cannot be further analyzed, because impure properties depend on individuals and individuals are bundles of pure and impure properties. Since in the example *a* is an arbitrarily chosen bundle, the same applies to any other bundle.

If one joins the answer to question (i) and the answer to question (ii), one obtains the following principle:

(Ontology) In the ontology of BTU there are only pure universal properties.

2.3. Second definition: indiscernibility.

Although the etymology of the adjective "discernible" and of its opposite "indiscernible" makes reference to the capacity of being perceptually discriminated, in dealing with discernibility and indiscernibility I will be interested only in the logical notions. These logical notions can be articulated in several ways, so it is important to understand which of these ways are compatible

with a bundle theory of universals in which the principle (Ontology) holds, that is, in which only pure universals are in the bundles. This is the aim of the present section.

In their article "On Kinds of Indiscernibility in Logic and Metaphysics",[41] Caulton and Butterfield present four kinds of discernibility:

1. The first kind of discernibility is "intrinsic discernibility". Two objects are intrinsically discernible if they do not share some monadic formula, that is, if one but not the other belongs to the extension of some monadic predicate. Formally, *a* and *b* are intrinsically discernible if *a* satisfies and *b* does not satisfy the open formula Fx or vice versa.

2. The second kind of discernibility is "extrinsic discernibility". Two objects are extrinsically discernible if one is and the other is not in a relation with a relatum specified by a bound variable. Formally, if Q is a variable for a quantifier, *a* and *b* are extrinsically discernible if *a* satisfies and *b* does not satisfy the open formula Qy(Rxy) or vice versa.

3. The third kind of discernibility is relative discernibility. Two objects are relatively discernible if they satisfy a formula with two free variables in one order but not in another. Formally, *a* and *b* are relatively discernible if <*a*, *b*> satisfies the open formula Rxy but <*b*, *a*> does not or vice versa.

4. The fourth kind of discernibility is weak discernibility. Two objects *a* and *b* are weakly discernible if there is a formula with two free variables that is satisfied by the two objects considered in either order, but not by same object considered twice. Formally, *a* and *b* are weakly discernible if <*a*, *b*> or <*b*, *a*> satisfies the open formula Rxy but <*a*, *a*> and <*b*, *b*> do not.

After introducing these four kinds of discernibility according to Caulton and Butterfield's account, it is necessary to understand whether they can all be employed in BTU-part as I have

[41] Caulton, Butterfield 2012, pp. 47-50.

developed it up to now. The criterion to answer this question is best established in the following way: the properties which are able to make two bundles discernible must be properties present in one of the bundles. Indeed, if they were present in both the bundles, the bundles would not be discernible. If, in contrast, they were not present in any of the two bundles, it would be difficult to characterize them as properties of the bundles at all and therefore to consider them relevant to assess the discernibility or indiscernibility of the bundles. Properties in the bundle must obviously be properties in the ontology. For this reason, given the principle (Ontology) above, the properties relevant to assess the discernibility or indiscernibility of the bundles are pure properties. The consequence is that in considering which one or ones of the four kinds of discernibility presented by Caulton and Butterfield are appropriate in the context of BTU-part one must rule out those in which the properties which make the objects discernible make reference to the primitive identity of a relatum. This is what happens in the case of the third and the fourth kind of discernibility – respectively relative and weak discernibility. Indeed, in assessing whether two objects are relatively discernible one must consider the order in which they satisfy a formula with two free variables, whereas to understand whether two objects are weakly discernible one must see whether any of them taken twice does not satisfy a formula with two free variables which is satisfied by the two objects in either order. In contrast, the properties which make two objects discernible according to the first two kinds of discernibility – intrinsic discernibility and extrinsic discernibility – do not depend on the primitive identity of a relatum. The first kind of properties meets this requirement because it is represented by monadic properties, whereas the second kind of properties meets the requirement because although it is true that the properties which belong to the second kind depend on a relatum, this relatum is expressed by a bound variable and not by an individual constant and thus is specified qualitatively. Accordingly, the notion of discernibility (and of indiscernibility) that is relevant for BTU-part as I have developed it up to now is based only on the first and the second kind of

discernibility specified by Caulton and Butterfield. More precisely, in BTU-part two objects will be discernible if they are either intrinsically or extrinsically discernible and will be indiscernible if they are neither intrinsically nor extrinsically discernible.

The principle can now be stated explicitly.

(Indiscernibility) Two objects *a* and *b* are indiscernible iff there is no monadic property such that *a* has it and *b* does not have it or vice versa and there is no relatum specified by a bound variable with which *a* is in relation and *b* is not in relation or vice versa.

CHAPTER 3 – METAPHYSICAL INDETERMINACY (MI)

3.1. Indeterminate objects

This chapter is devoted to metaphysical indeterminacy (from now on abbreviated as MI). I will introduce MI and consider some possible approaches to account for it. My aim is to choose what I will call "MI-part". As in chapter 2 BTU-part was what I considered to be the best version of BTU and therefore the basis of BTUMI, so in this chapter MI-part is the account of MI which I argue to be the best one and which therefore I choose to develop BTUMI. I will argue that MI-part is the account developed by Rosen and Smith in their paper "Worldly Indeterminacy: a Rough Guide".[42]

Some objects appear to be vague. One could legitimately wonder where exactly the border of Mount Everest is, or whether a person with exactly one thousand hairs on their head is bald or not. There are three main strategies to deal with this indeterminacy.[43] According to the first one, indeterminacy is representational, that is, belongs to the way in which we represent the world. In other words, reality is precise and indeterminacy results from our use of words. Some terms do not have exact meanings and for this reason there are more candidates for their referents, so that it is indeterminate to which entity these terms refer.[44] The second strategy considers indeterminacy to be epistemic. The world is thought to be precise as well as the terms of our language. It is our knowledge which is unable to discover which precisifications of the terms are the correct ones.[45] The third option is to recognize that, although sometimes our terms might be vague, sometimes it happens that our terms are precise and what is vague is objects in the world. When this is the case, indeterminacy is metaphysical.

[42] Rosen, Smith 2004.
[43] Wilson 2013, p. 360.
[44] Belohrad 2020, p. 25.
[45] Belohrad 2020, p. 25.

This last alternative, to which this chapter is devoted, is the most controversial one.[46] Two influential critics of metaphysical indeterminacy (MI) are Russell and Dummett. Russell, who believes that indeterminacy belongs only to representations, argues that accepting MI means having incurred in the fallacy of verbalism, that is in erroneously taking the properties of words to be properties of things.[47] According to Dummett, MI is not even completely intelligible.[48] A full-fledged *reductio ad absurdum* of MI was presented by Evans in his article "Can There Be Vague Objects?".[49] However, since Evans' refutation is shown to be invalid by Priest,[50] in what follows I will treat MI as a genuine possibility.

3.2. Meta-level accounts of MI and their problems

Philosophers have developed many different accounts of MI. A useful tool to understand the relations among the various approaches is employed by Wilson and consists in the distinction between "meta-level accounts" and "object-level accounts".[51] Meta-level accounts suppose that "what it is for there to be MI is for it to be indeterminate which of various determinate (precise) states of affairs (SOAs), typically involving an object's having some property, obtain". In contrast, object-level accounts suppose that "what it is for there to be MI is for it to be determinate (or just plain true) that an indeterminate (imprecise) SOA obtains". An example might clarify this distinction. An account which Wilson classifies as meta-level is Parsons and Woodruff's one, according to which MI consists in the fact that it is indeterminate to which determinate candidate an object is identical. For instance, there are many determinate aggregates of matter in the vicinity of Mount Everest and it is indeterminate to which of them Mount Everest is identical. An example of object-level account, in contrast, is Wilson's own. She defends a determinable-based approach to MI. This means that "what it is for an SOA to

[46] Keil 2013, p. 150.
[47] Russell 1923, p. 85.
[48] Dummett 1975, p. 111.
[49] Evans 1978.
[50] Priest 2021, p. 96.
[51] Wilson 2013, p. 360.

be MI in a given respect R at a time t is for the SOA to constitutively involve an object (more generally, entity) O such that (i) O has a determinable property P at t, and (ii) for some level L of determination of P, O does not have a unique level-L determinate of P at t".[52] It is not the case that Mount Everest is indeterminately identical to one of the many aggregates of matter, but it is determinately the case that Mount Everest has an indeterminate border, that is, a determinable border but not a determinate one.

As Wilson points out,[53] meta-level accounts face a significant challenge, call it "objection A". Indeed, it is difficult to explain in what sense there are many candidate aggregates of matter for being identical to an object. It is clear in which sense the term "border" has different candidate meanings and none of them is the correct one with the exclusion of others, but how can one say that the world itself has not decided which of the many aggregates of earth and rocks around Mount Everest is identical to this mountain? To account for MI in this way seems to be equivalent to treating a semantic approach as metaphysical. A partial confirmation of this point is the fact that semantic approaches are developed in meta-level terms.[54]

Another objection to meta-level accounts – objection B – is that their supporters must face a dilemma. Suppose, for example, that a partridge with 1,000 feathers is changing its plumage. In this moment two feathers are falling and so one cannot say exactly whether the partridge has 998, 999 or 1,000 feathers. Some philosophers sympathetic with meta-level accounts will say that there are three determinate aggregates of matter with which the partridge is indeterminately identical. There is an aggregate with 998 feathers, an aggregate with 999 feathers and an aggregate with 1,000 feathers. Here is the dilemma. Should one recognize the partridge as an object over and above the aggregates or not? (i) If one answers affirmatively, one will have to explain what the need is of such an object. Indeed, the partridge does not

[52] Wilson 2013, 366.
[53] Wilson 2013, 364.
[54] Wilson 2013, 364.

occupy some further portion of reality that the aggregates do not already occupy, and so it is unclear what are the metaphysical reasons for recognizing in one's ontology the additional object, the partridge. If one recognizes it as an object, the resulting ontology seems redundant. Call this problem "Redundant Ontology". (ii) On the other hand, if one does not recognize the partridge as an object over and above the aggregates of matter, one will have to explain how it is that our intuition that we are dealing with something unitary is so strong. If one tries to justify this last point by appealing to the fact that is epistemically convenient to pretend to be dealing with a single object and unify in our thought the aggregates, one does not make a plausible point. If recognizing a partridge over and above the aggregates were simply an epistemic matter, why don't our conventions in this respect undergo diachronic change and depend on context, as all the other conventions? The intuition that the partridge is one single object does not present such a variation but seems stable across space and time. So to consider the partridge just an epistemic fact means underestimating its unitarity as an object. Call this problem "Ontological Underestimation". Given that both Redundant Ontology and Ontological Underestimation are equally to be avoided, meta-level approaches do not seem an adequate strategy to explain MI.

A third objection – objection C – is that a meta-level approach to MI treats all the aggregates of matter in the vicinity of the peak as equal candidates for being Mount Everest. But obviously, an aggregate of matter that includes the peak and the whole sides of the mountain until 100 meters in the valley – call it "aggregate 1" – is a slightly more appropriate candidate than an aggregate of matter that includes the peak and the whole sides of the mountain until 500 meters in the valley – call it "aggregate 2". However, a meta-level approach to MI does not make a distinction between aggregate 1 and aggregate 2 in the grade in which each is indeterminately identical to Mount Everest but considers Mount Everest to be simply indeterminately identical to both.

If the three objections are reasonable, a meta-level approach to MI should be avoided in the selection of MI-part. Therefore, an object-level approach to MI should be preferred.

3.3. Which object-level account of MI should be chosen as MI-part?

Object-level approaches seem to have been less explored than meta-level approaches. The object-level account which has been developed more fully is Wilson's determinable-based account. As stated more precisely in section 3.2, in her view indeterminate states of affairs constitutively involve an object that has a determinable property and, for some level of determination of that property, does not have a unique determinate of that property at that level.

This proposal, however, does not solve the problem expressed by objection C. According to Wilson, there are cases in which objects have a determinable property and more than one determinate property – this is the case of a mountain that has a determinable border but no determinate border.[55] However, Wilson does not seem to acknowledge any difference in how relevant are the different determinate properties, whereas, as objection C shows, acknowledging a difference would be appropriate at least in cases such as that of the mountain.

A second problem of Wilson's proposal is that the fact that it is an object-level account is not as clear as the author maintains. Indeed, Belohrad's observations contribute to challenge the classification of Wilson's proposal as an object-level account.[56] He describes Wilson's example of Mount Everest with the following words:

> "Bracketing the property talk, we come to the simple idea that Mt. Everest is a vague object in that it has an unspecified boundary, and the boundary is unspecified because there are too many candidate boundaries that could be Mt. Everest's boundary".
> (Belohrad 2020, 30)

The superimposability between this paraphrase, which is faithful to the sense of the original, and the defining feature of meta-level accounts is complete. Belohrad infers from this fact that

[55] Wilson 2013, p. 373.
[56] Belohrad 2020, p. 30.

the very distinction between meta-level accounts and object-level accounts is questionable, it might even be "merely verbal".[57] I would prefer to be more cautious and do not generalize a doubt concerning Wilson's account to all possible object-level accounts. Accordingly, rather than challenging the distinction between meta-level accounts and object-level accounts, I would infer from Belohrad's paraphrase that Wilson's account is not an object-level account, but a meta-level one.

Thus, Wilson's determinable based account has two problems. First, even assuming that it is an object-level account, it does not overcome objection C. Second, it is not clear that it is an object-level account at all and, if this is the case, it is vulnerable to objections A and B, too. Hence, Wilson's account should not be selected as MI-part, that is, as the best account of MI and as the basis for BTUMI.

Which approach to MI should be chosen, then? The requirements it must respect are that (a) it must be an object-level approach, so as not to be exposed to objections A and B, and (b) it must overcome objection C. I would like to suggest that the account proposed by Rosen and Smith in their paper "Worldly Indeterminacy: A Rough Guide"[58] meets these conditions and should therefore be adopted as the right approach to MI, namely as MI-part.

Rosen and Smith endorse the so-called "fuzzy theory", which they oppose to the "standard supervaluationist theory".[59] The difference is the following. In the supervaluationist theory each n-place predicate is associated with many n-place functions from the set of n-tuples of the members of the domain to the set of truth-values {0, 1}. This means that each interpretation is classical, but there are many candidate interpretations for each predicate. This happens because it is indeterminate which of these interpretations is the correct one. For example, the predicate "being Mount Everest's border" is associated to many properties, such

[57] Belohrad 2020, p. 34.
[58] Rosen, Smith 2004.
[59] Rosen, Smith 2004, p. 186.

that each of them is either possessed or not possessed by an object but it is not determinate which of them is the correct interpretation of the predicate. In contrast, in the fuzzy theory each n-place predicate is associated to a single n-place function from the set of n-tuples of the members of the domain to the interval [0, 1]. In other words, according to the fuzzy theory indeterminacy arises not from the fact that there are many candidate interpretations, as in the standard supervaluationist view, but because a single interpretation gives an output which does not need to be either 0 or 1 but can be any real number in this interval. Thus, the predicate "being Mount Everest's border" can be true of an object at degree 0.5, for example, or 0.75 or 0.999 according to how appropriate it is to describe that object as Mount Everest's border.

Wilson classifies Rosen and Smith's fuzzy theory (from now on abbreviated as FT) as a meta-level account.[60] She motivates this classification by connecting FT with the general definition of meta-level accounts: according to FT, "for an object to be MI is for it to indeterminately instantiate a determinate (precise) property". However, in my view this classification hinges on a verbal rather than substantial point. Meta-level accounts are defined by their feature of seeing MI as generated by the fact that it is indeterminate which determinate state of affairs obtains. Thus, the definition of meta-level accounts makes reference to the indeterminate obtaining of determinate states of affairs, not to the indeterminate instantiation of a determinate property. The difference is significant, because the indeterminate instantiation of a determinate property results in the determinate obtaining of an indeterminate state of affairs, that is in a determinate state of affairs, not in the indeterminate obtaining of a determinate state of affairs, that is in an indeterminate state of affairs, as Wilson wishes. Therefore, there is no reason to classify FT as a meta-level account. Rather, it would be more correct to describe it as an object-level account, because according to FT it is determinate that

[60] Wilson 2013, 362.

an indeterminate state of affairs obtains, that is, it is determinate that there is an indeterminate instantiation of a property in an object.

Since it is an object-level account, FT overcomes objections A and B. Consider first objection A. The point was that it is difficult to make sense of the idea that the world has not decided to which of many aggregates a given object is identical. FT allows to answer this objection effectively, because the determinate obtaining of an indeterminate instantiation is a determinate state of affairs. The belonging of a property to an object should be conceived as the belonging of an element to a fuzzy set.[61] As Stojakovic explains,[62] a fuzzy set is defined in the following way. Consider the subset A of a given non-fuzzy set X. Each element *a* of A is associated to a value *f*(a) belonging to the interval [0,1]. *f*(a) expresses at what degree each *a* belongs to A and is 0 if *a* does not belong to A, 1 if *a* completely belongs to A. In this way, in FT a certain property F is associated to a value *f*(F) belonging to the interval [0,1]. If *f*(F) = 1, F determinately belongs to the object and if *f*(F) = 0, F determinately does not belong to the object. If, in contrast, 0 < F < 1, F indeterminately belongs to the object. However, whatever value *f*(F) has, it is determinate that *f*(F) has that value. Therefore, if one adopts FT one is not exposed to the objection according to which it is not entirely intelligible to say that the world shows signs of indecision.

Consider now objection B, which consisted in a dilemma. The dilemma was that a supporter of meta-level accounts could choose either (i) to recognize in his ontology an object over and above the aggregates of matter that are candidates for being the object or (ii) not to recognize it. But opting for (i) led to Redundant Ontology, whereas choosing (ii) led to Ontological Underestimation and both the outcomes should be avoided. Thus, the dilemma indicates the path to follow. Given the need to avoid both Redundant Ontology and Ontological Underestimation, one should not recognize both the object and the aggregates but just one of

[61] Rosen, Smith 2004, 186.
[62] Stojakovic 1981, 22.

these two, so as not to be exposed to Redundant Ontology, and between these two – the object and the aggregates – one should not recognize the aggregates but the object, so as not to be exposed to Ontological Underestimation. This is precisely what FT does. It does not acknowledge in its ontology many candidates for being the object whose indeterminacy is to be explained, but just the object.

Also, FT overcomes objection C. To understand this, recall the example of Mount Everest. Aggregate 1 – an aggregate of matter that includes the peak and the whole sides of the mountain until 100 meters in the valley – will possess the property "being Mount Everest's border" at degree 0.9, whereas aggregate 2 – an aggregate of matter that includes the peak and the whole sides of the mountain until 500 meters in the valley – will possess the same property at degree 0.7. The two numbers are arbitrarily chosen, for the sake of the example, but they show that it is possible to express through FT that aggregate 1 is more a border of Mount Everest than aggregate 2 is.

The discussion in this section shows that FT is not vulnerable to objections A, B and C. Therefore, I propose to adopt it as the right account to explain MI, that is, as I explained in section 3.1, as MI-part. In what follows, accordingly, I will suppose that FT is MI-part, namely the right account for MI and the basis for the development of BTUMI. In the next chapter I will try to reconcile MI-part with BTU-part and explore the implications of such an attempt.

CHAPTER 4 – BTUMI: HOW TO RECONCILE THE BUNDLE THEORY OF UNIVERSALS (BTU-PART) WITH METAPHYSICAL INDETERMINACY (MI-PART).

4.1. Advantages of BTUMI

The aim of this chapter is to develop BTUMI, a bundle theory of universals (BTU) that incorporates metaphysical indeterminacy (MI) understood in terms of the fuzzy theory (FT). In other words, I propose to integrate FT in a bundle theory of universals. The main positive aspects of such a strategy are two. On the one hand, this proposal is advantageous for BTU, because, as I will show in chapter 5, accepting BTUMI frees supporters of BTU from the unwelcome commitment to IdIn. On the other hand, BTUMI is advantageous from the perspective of MI, too. Indeed, it shows the feasibility of integrating a MI explained in terms of FT in a respectable metaphysical theory as BTU is. Thus, BTUMI manages both to take account of MI, which is a wrongly neglected metaphysical phenomenon which should be considered in any satisfactory metaphysical theory, and to give possible insights to a supporter of FT as far as the metaphysical background of FT is concerned.

I will develop BTUMI on the basis of the notions – principles and definitions – accepted in chapters 2 and 3. They should be considered the foundations of BTUMI and therefore incorporated in it. BTUMI, in other words, results from the conjunction of BTU-part, developed in chapter 2, and MI-part, developed in chapter 3.

4.2. Constructing BTUMI: principles related to BTU-part of BTUMI

The first important aspect of BTUMI is that the only entities it recognizes are universal properties. These universals are held together by coinciding in space-time and this relation of coincidence is indicated by the name "compresence". Compresence organizes universals in the bundles in which each object consists. Since, as I explained in section 2.2, I adopt a "light" conception of the compresence relation, the first principle needed for the construction of BTUMI is the following:

(Principle 1: "universals") The only entities recognized by BTUMI are universal properties.

Before explaining how MI-part fits in this theory, it is appropriate to formulate further principles of BTUMI by showing how it can answer the standard objections to BTU.

In "Three Versions of the Bundle Theory", Van Cleve[63] expresses six problems of BTU, which have become standard objections against it. I will discuss each of these difficulties and build BTUMI in such a way that it may answer as many of them as possible. The objections to which BTUMI as built up to now is still exposed are the following:

> "*Objection 1*. If a thing were nothing more than a set of properties, any set of properties would fulfill the conditions of thinghood, and there would be a thing for every set. But in fact there are many sets without corresponding things - e.g., the set {being an alligator, being purple}.
>
> *Objection 2*. If a thing were a set of properties, it would be an eternal, indeed a necessary, being. For properties exist necessarily, and a set exists necessarily if all its members do.
>
> *Objection 3*. Exemplification cannot be analyzed simply as the converse of membership. Redness is a member of {redness, roundness}, but it would be absurd - a category mistake - to say that that set is red.
>
> *Objection 4*. If a thing were a set of properties, it would be incapable of change. For a thing could change its properties only if the set identical with it could change its members, but that is impossible; no set can change its members.
>
> *Objection 5*. Similarly, if a thing were a set of properties, all of its properties would be essential to it: not only could it not change its properties, but it could not have had different properties to start with. This is because it is essential to a set that it contains the very members it does.
>
> *Objection 6*. If a thing were a set of properties, it would be impossible for two things to have all the same properties, since it is impossible for two sets to have all the same members. Thus, the bundle theory requires the Principle of the Identity of Indiscernibles (PII for short) to be a necessary truth. But PII is not a necessary truth; exceptions to it are conceivable".
> (Van Cleve 1985, 95-6)

Before starting to deal with the objections, it is appropriate to note that, since IdIn (called "PII" by Van Cleve) is a metaphysical principle, which is either necessary or not true at all, objection

[63] Van Cleve 1985.

6 is equivalent to objection-IdIn. In what follows, therefore, I will treat them as being the same objection.

Objections 1, 2 and 3 can be avoided quite easily. As Van Cleve explains,[64] they arise only if one considers bundles just as sets of properties. If, in contrast, one introduces a relation of compresence among the properties, objections 1, 2 and 3 are not a threat to a bundle theory of universals. The presence of this relation among properties in a bundle allows to overcome objection 1. Indeed, if a relation of compresence among properties is necessary for them to belong to the same bundle, it is not the case that anything fulfills the conditions for thinghood. Rather, only the properties held together by this relation satisfy such conditions.

Another fundamental feature of the compresence relation is that it is contingent.[65] This means that compresent properties might not have been such. For instance, in a red delicate flower the properties "being red" and "being delicate" are compresent, but they might not have been such because the flower might have been violet or robust. The contingent nature of the compresence relation allows to overcome objection 2. Even if one agrees that properties exist necessarily, one is not for this reason committed to saying that bundles exist necessarily. Indeed, bundles are formed not just by properties, but by properties in a relation of compresence. And the compresence relation is contingent, so that properties can continue existing without being held together anymore if the relation ceases to exist.

The presence of the compresence relation is helpful to overcome objection 3, too. Simply, objection 3 is valid as long as bundles are considered as sets without a compresence relation. As soon as this is introduced, the difficulty disappears because the compresence relation is what makes it true that a bundle of property is categorically different from a property and is an object

[64] Van Cleve 1985, p. 97. Van Cleve adopts the denomination "co-instantiation" for the relation mentioned below, I prefer Russell's "compresence" and use this word even when I report Van Cleve's points.
[65] Van Cleve 1985, p. 98.

having properties. Also, I would not like to refer to bundles as sets. I will call them "collections" of properties in order to avoid difficulties that might arise from set theory.

These observations about the compresence relation can be summarized in the second principle of BTUMI:

> (Principle 2: "compresence") According to BTUMI, the properties are held together in bundles by a compresence relation.

BTUMI construed with principle 1 and principle 2 is still vulnerable to objection 4, objection 5 and objection 6. As for objection 4 and objection 5, I would like to tackle them together because, while Van Cleve considers them two different problems, I believe that the difficulties are intimately related. While Van Cleve does not suggest any viable way to answer objection 4, he considers and then discards a possible solution to objection 5:

> "A more promising way to avoid the objection would be to divide each complete bundle of mutually co-instantiated properties into two sub-bundles, an inner core and an outer fringe, and then to identify individuals with cores rather than with complete bundles. One could then say that an individual has essentially just those properties that belong to its core and accidentally just those properties that belong to its fringe. More formally, the suggestion would be that an individual X has a property F iff there is a complete bundle of mutually co-instantiated properties Y such that (i) X is a sub-bundle within Y and either (iia) F is an element of X (in which case X has F essentially) or (iib) F is not an element of X, but is an element of Y (in which case X has F accidentally)".
> (Van Cleve 1985, 99)

According to Van Cleve, this solution avoids objection 5 but has two difficulties of its own. (i) The first problem in his view is that the sub-bundle would be very small, perhaps in the case of a human being just {animality, rationality}. But no human being, he says, is identical with such a small sub-bundle. The problem, in short, is that it is difficult to identify a whole object just with the properties in the core. (ii) The second difficulty is that, if one identifies an individual with anything less than a complete bundle, one obtains the unwelcome result that individuals can have incompatible properties at the same time, because the same core can be completed by several fringes with mutually incompatible elements. Van Cleve's example

describes the core {animality, rationality} occurring in a fringe that contains wisdom and at the same time in another fringe containing foolishness. According to Van Cleve, this would mean that one and the same individual is both wise and foolish.

Problem (i) seems to rest on an unjustified assumption. Indeed, it is not clear why the core composed of essential properties should be so small. In contrast, it is reasonable to think that the core composed of essential properties is very large. For example, being red is an accidental property of a flower, but having a color cannot be an accidental property, because as long as a flower is a flower it has some color or other. Thus, it is plausible that the bundle has many determinable essential properties.

Problem (ii), in contrast, is serious. One could reformulate problem (ii) in the following way. Given that the core of a bundle is the set of its essential properties, what identifies a core is just these properties. Therefore, two cores having the same properties are numerically the same core. Since the identity of bundles is determined by the core, bundles having the same core are numerically identical, even if the fringe of one of them contains properties that are different from those of the fringe of the other. One could not try to counter this conclusion by saying that the two bundles are different because they have different fringes. The reason is that if the two bundles were different because they have different fringes, then what determines the identity of a bundle would not be its core, but the whole bundle. This would be incompatible with the very purpose of the distinction between core of essential properties and fringe of accidental ones suggested by Van Cleve.

Problem (ii), therefore, is not solved and the distinction between essential and accidental properties does not help to overcome objection 5. Consequently, it is not useful to introduce in BTUMI the distinction between essential and accidental properties.

This means that objection 4 is left unanswered, too. The distinction between essential and accidental properties, indeed, would have been a useful instrument to answer objection 4. One

could conceive a bundle in such a way that it cannot change its essential properties without becoming a different individual, but it can change accidental properties and still remain the same bundle. However, since problem (ii) above seems a too hard challenge to the distinction between essential and accidental properties, I will not adopt this distinction and therefore acknowledge the difficulty presented by objection 4.

Thus, objections 4 and 5 remain a challenge. However, they are a challenge not just for BTUMI, but for any version of BTU. Now I will focus on objection 6, which corresponds to objection-IdIn and is the real topic of this thesis. As construed up to now, indeed, BTUMI is still vulnerable to objection 6. To overcome it, the introduction of MI is needed. This is the aim of the next section.

4.3. Constructing BTUMI: principle related to the MI-part of BTUMI

As explained in section 3.3, I will adopt Rosen and Smith's "Fuzzy theory" (FT) as the best approach to deal with MI. In their paper "Worldly Indeterminacy: A Rough Guide", Rosen and Smith do not apply the fuzzy theory (FT) to a bundle theory of universals (BTU). Rather, they adopt a metaphysical context in which there can be "instances" of properties that can be "possessed" by objects.[66] Since I am applying their results about FT to a bundle theory of universals, that is, since in chapter 3 I chose their FT as my MI-part and now I am applying it to my BTU-part, I will not speak of "degree of instantiation" of properties in *objects* but of "degree of belonging" of properties to *collections*. Thus, the collections of compresent universal properties in which the bundles consist are in all respects fuzzy collections, to which the properties can belong at different degrees:

> (Principle 3: "fuzzy collections") According to BTUMI, bundles of universals are fuzzy collections whose members, namely universal properties, are held together by a relation

[66] Rosen, Smith 2004, p. 190.

of compresence. Each property may belong to the collection at a degree in the interval [0,1]. If a property belongs to the collection at degree 0, it does not belong to the collection, whereas it belongs to the collection in all the other cases. If a property belongs to a collection at degree 1, it determinately belongs to the collection.

The fact that properties belonging to the collection at degree 0 do not belong to the collection entails that the relata of the relation of compresence are only those properties that belong to the collection at a degree $w > 0$.

CHAPTER 5 – BTUMI DOES NOT IMPLY IDIN

5.1. The principles with which BTUMI may overcome objection-IdIn

Now that MI-part has begun to be integrated into BTU-part, it is possible to show how BTUMI as developed up to now overcomes objection 6, that is, objection-IdIn. Before starting, consider the resources available to the demonstration. They can be divided in two groups. First, there are the principles and definitions presented in chapters 2 and 3, which apply to BTU-part and are therefore incorporated in BTUMI. Second, there are principles 1-3 of BTUMI, presented in sections 4.2 and 4.3. I will briefly recall here the title of all the definitions and principles at my disposal for the sake of clarity:

1.1. Definition of BTU-part incorporated in BTUMI: "Pure Properties";

1.2. Definition of BTU-part incorporated in BTUMI: "Indiscernibility";

2.1. Principle 1 of BTUMI: "Universals";

2.2. Principle 2 of BTUMI: "Compresence";

2.3. Principle 3 of BTUMI: "Fuzzy Collections".

I did not report here the principle "Ontology" of BTU-part presented in section 1.2 because it is the same as Principle 1 of BTUMI.

One could ask whether now that I have developed BTUMI I should update the principle "Indiscernibility". The point of doing this would be to take degrees of belonging of properties into collections into account. In this way, I would define as indiscernible two bundles not just with the same properties but with the same properties at the same degree.

Actually, the choice depends on which notion of indiscernibility one wishes to adopt. As anticipated in section 1.3, I am interested here in the logical notion, not in any other definition connected to perceptual discriminability. The logical notion of indiscernibility is connected to

the logical parts of an object,[67] not to its material parts or to any kind of thing that is not a part. This is an assumption I share with my opponents, the proponents of the argument in table 1 of chapter 1. Indeed, from the claim that a bundle is identical to its constituents they can infer that two indiscernible bundles are identical only if they take indiscernibility to be sameness of constituents, i.e. of logical parts. Now, in the context of BTUMI, the degree of belonging of a property to a bundle is not a logical part of the object that consists in the bundle. Indeed, the degree of belonging of a property to a bundle comes into play as far as the state of affairs that the property belongs to the bundle at a certain degree is concerned, but this does not mean that the degree of belonging is a logical part of the bundle.

An analogy might clarify the last point. Imagine a team of research in psychiatry whose aim is to obtain a better understanding of comorbidities with anorexia nervosa. One of the members, Barbara,[68] is also an active doctor in a psychiatric hospital and spends half of her working time in the hospital. Her belonging to the research group has, as it were, degree 0.5. But this is not relevant to the constitution of the group, nor to Barbara's role in the group. If the fact that she is actually there for half of the time were of some importance for the constitution of the group, the group would not be constituted only by people, but also by the number of hours they spend in research. This last possibility is absurd, for groups of people are constituted only by people and not by the time they spend in the group. Analogously, bundles of universals are constituted just by universals and not by their degree of belonging.

5.2. How BTUMI overcomes objection-IdIn: a thought experiment

In this section I will propose a thought experiment inspired by that of Black.[69] Imagine a smooth red sphere with a diameter of 1 meter. According to BTUMI, this sphere consists in a bundle of universal properties. The bundle is a fuzzy collection whose members are connected by a

[67] I employ the phrase "logical parts" as in Paul 2002.
[68] In memory of Barbara Capovani.
[69] Black 1952.

compresence relation. Call this bundle "Sphere A". The properties which belong to Sphere A belong to it at different degrees. Suppose, for example, that the property of being smooth belongs to Sphere A at degree 0.9, that the property of being red belongs to Sphere A at degree 0.9, the property of being spherical belongs to Sphere A at degree 1, the property of having a diameter of 1 meter belongs to Sphere A at degree 1. Another sphere is at some distance from Sphere A and is the only other constituent of the universe imagined.[70] This second sphere is smooth, red and has a diameter of 1 meter, just as the first one. According to BTUMI, this second sphere is a bundle of universals. Call this bundle "Sphere B". The property of being smooth belongs to Sphere B at degree 0.9, the property of being red belongs to Sphere B at degree 0.8, the property of being spherical belongs to Sphere B at degree 1, the property of having a diameter of 1 meter belongs to Sphere A at degree 1. As for all the other monadic and relational properties, the two spheres have all the same properties at the same degree. As it is possible to see, the only difference between the spheres is that Sphere A has the property of being red at degree 0.9 and Sphere B has the property of being red at degree 0.8. The thought experiment ends with two questions. The first one is: are Sphere A and Sphere B indiscernible? The second one is: are Sphere A and Sphere B identical?

The criterion to answer the first question is the definition of indiscernibility given above:

(Indiscernibility) Two objects *a* and *b* are indiscernible iff there is no monadic property such that *a* has it and *b* does not have it or vice versa and there is no relatum specified by a bound variable with which *a* is in relation and *b* is not in relation or vice versa.

Given (Indiscernibility), Sphere A and Sphere B are indiscernible.

[70] I do not need co-located spheres to overcome an objection appealing to weak discernibility because in BTUMI there is no way to appeal to weak discernibility, as explained in section 2.3. Cf. Shumener 2016, p. 5.

As for the second question, to evaluate whether Sphere A and Sphere B are identical one cannot appeal to primitive identity, as in Black's experiment, because in BTUMI there is no primitive identity, as explained in section 2.1. However, since the notion of identity is not connected in itself to logical parts, as indiscernibility is, in this case one can appeal to the degree of belonging to notice that Sphere A is different from Sphere B.

Thus, Sphere A and Sphere B are indiscernible but not identical. In other words, they are a counterexample to IdIn. This means that BTUMI has the resources to contain indiscernible but distinct particulars. Objection-IdIn, which is the same as objection 6, namely that BTUMI necessarily implies IdIn, is overcome.

5.3. Objections to the thought experiment

Two main objections could be raised against the claim that the thought experiment shows that BTUMI does not imply IdIn. First, one could object that Sphere A and Sphere B are in fact discernible. Indeed, it is not merely the case that Sphere A has the property "being red" at degree 0.9 and Sphere B has the property "being red" at degree 0.8, that is, the same property at different degrees. Rather, if one incorporates the degree in the property, they also have different properties. Sphere A has the property "being red at degree 0.9" and Sphere B does not have it. Also, Sphere B has the property "being red at degree 0.8" and Sphere A does not have it. My reply is that "being red at degree 0.9" and "being red at degree 0.8" are not properties. Therefore, they are not in the bundles in which Sphere A and Sphere B consist. How can I support my claim that "being red at degree 0.9" and "being red at degree 0.8" are not properties? I have two arguments.

The first one is the following. Recall that in section 4.3 it had been stipulated that if a property belongs to a bundle at degree $w < 0$ then it belongs to the bundle, whereas if it belongs at degree $w = 0$ then it does not belong to the bundle. Thus, if a third sphere, Sphere C, has the property "being red" at degree 0, it does not have the property. In other words, the property

"being red" will not be an element in the fuzzy collection in which Sphere C consists. Now consider the following question: will Sphere C have the property "being red at degree 0"? If the objector of this section is consistent in her ideas, she should answer "yes, it will". But that Sphere C has the property "being red at degree 0" is not reasonable at all. For any property something lacks, will it have the property of having that property at degree 0? This means inflating ontology in an absolutely redundant way. And will it have also the property of having the property of having that property at degree 0? This regress is a commitment of my objector that it would be better to avoid.

The second argument consists in comparing the property "being red" possessed at degree 0.9 with the property "being red at degree 0.9". What contribution does the second give that has not already been given by the first one? Armstrong[71] writes that it is natural to make a link between the properties of things and the causal powers of things. If "being red at degree 0.9" were a property, it would add to the bundle to which it belongs no causal power that the property "being red" possessed at degree 0.9 has not already added. Therefore, "being red at degree 0.9" is redundant.

Even if they accept my reply to the first objection, the objector could pose a second challenge. "All right", they could say, "but how will you deny that being red at a certain degree does not imply being, say, of a particular shade of orange? Suppose, for example, that being red at degree 0.9 means being dark orange and that being red at degree 0.8 means being of a slightly less dark orange. Then the two spheres will be discernible, after all". The objector raises an important issue for MI conceived in terms of FT. Is it possible just to be red at degree 0.9 without being also of some other colour? To answer this question unwaveringly one would have to develop FT more in detail than it is possible here. Therefore, consider both the possible answers. Concentrate first on the affirmative answer. If it is possible just to be red at degree 0.9

[71] Armstrong 1978, vol. 2, p. 25.

without being also of some other colour, the problem expressed by the objector simply does not arise. If, in contrast, the answer is negative, then being red at degree 0.9 will imply being also of some other colour. Let us concede to the objector that being red at degree 0.9 means being dark orange and that being red at degree 0.8 means being of a slightly less dark orange. But what does being dark orange mean? Plausibly, it means being orange at some degree. And being of a slightly less dark orange means being orange at some different degree. Suppose, for the sake of the example, that being dark orange is being orange at degree 0.6 and being of a slightly less dark orange is being orange at degree 0.7. Then Sphere A will be red at degree 0.9 and orange at degree 0.6 and Sphere B will be red at degree 0.8 and orange at degree 0.7. Both have the same properties, hence they are indiscernible. But they have these properties at different degrees, hence they are not identical. If these considerations are plausible, the second challenge of the objector is not a real threat. It seems possible to affirm again that BTUMI allows to overcome objection-IdIn, which is identical to objection 6.

5.4. Outcomes of the thought experiment

The outcome of the thought-experiment is that BTUMI allows to overcome objection-IdIn. Recall objection-IdIn:

(Objection-IdIn)	(a) BTU implies IdIn	and
	(b) IdIn is false,	therefore
	(c) BTU is false.	

As seen in chapter 1, both Hawthorne and Rodriguez-Pereyra reject conclusion (c). They adopt different strategies: Hawthorne denies (b), while Rodriguez-Pereyra denies (a). My aim was the same as theirs: to reject conclusion (c) and affirm that there is a plausible version of BTU. However, I could not employ the same strategy as those adopted by these two philosophers because, as I hope to have shown in chapter 1, their arguments are not entirely satisfactory. The

thought experiment described above suggests that, according to BTUMI, (b) is true and (a) is false. Therefore, I follow Rodriguez-Pereyra in denying (a), but for an entirely different reason. To see the difference, recall that conjunct (a) is identical to the conclusion of the argument of table 1 in section 1.1. Thus, to deny conjunct (a) Rodriguez-Pereyra needs to reject a premise of that argument. He rejects premise (1), namely that individual substances are identical to bundles. Indeed, he maintains that individual substances are identical to *instances* of bundles. In contrast, in BTUMI I do not consider the distinction between bundles and instances of bundles, and so I cannot reject premise (1), as Rodriguez-Pereyra does. Rather, among the premises of the argument of table 1 I deny premise (4), namely that a bundle is identical to its constituents. As shown in sections 5.2 and 5.3, the only constituents of the bundles in BTUMI are universal properties. However, while universal properties are all what is needed to assess the indiscernibility of the bundles, questions about identity need to take into account the degrees of belonging of the universal properties to the bundles, too. In other words, the integration of MI-part into BTU-part leads to reject premise (4). Since Rodriguez-Pereyra's distinction faced a serious problem, as shown in section 1.2, I believe that my strategy is preferable.

CONCLUSION

I hope to have shown that BTUMI, the bundle theory of universals (BTU) that incorporates metaphysical indeterminacy (MI) understood in terms of Rosen and Smith's fuzzy theory (FT), is a promising theory. There are three main reasons.

First, BTUMI is a version of BTU that is able to overcome what is commonly considered the most powerful objection to BTU, namely that (i) BTU implies IdIn, but (ii) IdIn is false and therefore (iii) BTU is false. This is a relevant advantage. Given that IdIn is a controversial principle, if one is not committed to accepting IdIn as true, one can support BTUMI much more easily.

The second reason why BTUMI is an interesting theory is that it widens the explanatory resources of BTU,[72] making it able to explain MI. This is an important aspect especially because MI, despite being an important metaphysical phenomenon, usually receives among philosophers less attention than it deserves.

BTUMI has a third advantage, too. It provides MI with a metaphysical basis, thus showing that this phenomenon can be easily integrated in a plausible and influential theory such as BTU. The hope is that this perhaps might contribute to making some philosophers less skeptical towards MI.

Several aspects of BTUMI can be refined through further investigation. For example, it would be helpful to understand whether all the properties can have a degree w of belonging to the bundle such that $0 < w < 1$ or this feature is not shared by all the properties. For now, I hope to have suggested a promising new line of research.

[72] For the importance of this criterion of evaluation, cf. Garcia 2014.

REFERENCES

Armstrong, D. M. (1978), *Universals and Scientific Realism. Volume I, Nominalism and Realism; Volume II, A Theory of Universals*, Cambridge: Cambridge University Press.

Belohrad, R. (2020) "The Determinable-Based Account of Metaphysical Indeterminacy and Vague Identity", *Kriterion* 34(3), pp. 23–50.

Benovsky, J. (2008) "The bundle theory and the substratum theory: deadly enemies or twin brothers?", *Philosophical Studies* 141, pp. 175-190.

Black, M. (1952) "The Identity of Indiscernibles", *Mind* 61(242), pp. 153-164.

Campbell, K. (1990) *Abstract Particulars*. Cambridge MA: Blackwell.

Caulton, A., Butterfield, J. (2012) "On Kinds of Indiscernibility in Logic and Metaphysics", *British Journal for the Philosophy of Science* 63, pp. 27–84.

Curtis, B. L. (2014) "The Rumble in the Bundle", *Noûs* 48(2), pp. 298-313.

Demirli, S. (2010) "Indiscernibility and bundles in a structure", *Philosophical Studies* 151(1), pp. 1-18.

Dummett, M. (1975) "Wang's Paradox", in R. Keefe and P. Smith (edd.), *Vagueness: A Reader*. Cambridge MA and London: MIT Press, pp. 99–118.

Evans, G. (1978) "Can There Be Vague Objects?", *Analysis* 38, p. 208.

Garcia, R. K. (2014) "Bundle Theory's Black Box: Gap Challenges for the Bundle Theory of Substance", *Philosophia* 42(1), pp. 115-26.

Goodman, N. (1966) *The Structure of Appearance*. Cambridge, MA: Harvard University Press.

Hochberg, H. (1965) "Universals, Particulars, and Predication", *The Review of Metaphysics* 19(1), pp. 87-102.

Keil, G. (2013) "Introduction: Vagueness and Ontology", *Metaphysica* 14(2), pp.149-164.

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

O'Leary-Hawthorne, J. (1995) "The Bundle Theory of Substance and the Identity of Indiscernibles", *Analysis* 55(3), pp. 191-196.

O'Leary-Hawthorne, J., Cover, J. A. (1998) "A world of universals", *Philosophical Studies*, 91(3), pp. 205–219.

Paul, L. A. (2002) "Logical Parts", *Nous* 36(4), pp. 578–596.

Paul, L. A. (2017) "A One Category Ontology", in John A. Keller (ed.), *Being, Freedom, and Method: Themes From the Philosophy of Peter van Inwagen*. Oxford: Oxford University Press, pp. 32-61.

Priest, G. (2021) "Evans' Argument and Vague Objects", *Australasian Journal of Logic* 18(3), pp. 93-105.

Rodriguez-Pereyra, G. (2004) "The Bundle Theory Is Compatible with Distinct but Indiscernible Particulars", *Analysis* 64(1), pp. 72-81.

Rodriguez-Pereyra, G. (2006) “How Not to Trivialize the Identity of Indiscernibles”, in Strawson. P. F., Chakrabarti, A. (edd.), *Universals, Concepts and Qualities. New Essays on the Meaning of Predicates*. Aldershot: Ashgate Publishing Limited, pp. 205-224.

Rosen, G. and Smith, N. J. J. (2004) “Worldly indeterminacy: a rough guide”, *Australasian Journal of Philosophy*, 82(1), pp. 185-198.

Russell, B. (1923) “Vagueness”, *Australasian Journal of Philosophy and Psychology* 1, pp. 84–92.

Russell, B. (1948) *Human Knowledge: Its Scope and Limits*, London: Allen & Unwin.

Shumener, E. (2017) “The Metaphysics of Identity: Is Identity Fundamental?”, *Philosophy Compass* 12, pp. 1-13.

Stojakovic, M. (1981) “Fuzzy Sets”, *Bulletin* 11, pp. 21-32.

Van Cleve, J. (1985) “Three Versions of the Bundle Theory”, *Philosophical Studies: An International Journal for Philosophy in the Analytic Tradition* 47(1), pp. 95-107.

Wilson, J. (2013) “A Determinable-Based Account of Metaphysical Indeterminacy”, *Inquiry*, 56(4), pp. 359–385.

Zhang, R. (2018) “A new universal bundle theory”, *Philosophia*, 46(2), pp. 473-486.