Webbing Reality

Essays on the Interaction of Metaphysics, Logic and Language

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Abstract

In this thesis, I am going to delve into the intersection of metaphysics, logic and language. I divided my work into two distinct parts. In Part I, I deal with Nathan Salmon's modal paradox (originally called by him *The Four World Paradox*). In Part II, I deal with ontological realism and formal languages, paying particular attention to the formal language of standard first-order predicate logic. Chapters 1 (*Salmon's Modal Paradox*), 2 (*Solving Salmon's Modal Paradox*) and 3 (*The Revenge of Salmon's Modal Paradox*) tackle a modal paradox raised by Salmon, which is a paradox about *origin essentialism* in modal contexts. In Chapters 4 (*Ontological Realism and the Linguistic View*), 4 (*Ontological Realism and the Language-first Methodology*), and 5 (*Ontological Realism and First-order Predicate Logic*) I analyze ontological realism and the methodological role that logic and formal languages should play within this metaontological perspective.

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Introduction

> Here it is difficult as it were to keep our heads up, — to see that we must stick to the subjects of our everyday thinking, and not go astray and imagine that we have to describe extreme subtleties, which in turn we are after all quite unable to describe with the means at our disposal. We feel as if we had to repair a torn spider's web with our fingers.
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> L. Wittgenstein, *Philosophical Investigations*

In this thesis, I am going to delve into the intersection of metaphysics, logic and language. What makes this intersection interesting is the peculiar way it leaves us without a clear understanding of the boundaries separating these three aspects of our cognition of reality. What I offer is a cluster of analyses that can enhance our understanding of these boundaries. Out of metaphor, my aim is to distinguish the different imports that metaphysics, logic and language have in describing reality.

I divided my work into two distinct parts. In Part I, I deal with Nathan Salmon's modal paradox (originally called by him *The Four World Paradox*). In Part II, I deal with ontological realism and formal languages, paying particular attention to the formal language of standard first-order predicate logic. For each part, there are three chapters and each chapter is (more or less) a self-standing essay. Still, each triplet of chapters is internally connected. Moreover, each chapter tries to reach its own conclusion about the problems it touches. This anticipates that there is no conclusive and unique conclusion of this thesis. Rather, I offer a cluster of precise points, each of which proposes original reflections on the problems I have faced. So, let me offer a map for the navigation of this work.

Chapters 1 (*Salmon's Modal Paradox*), 2 (*Solving Salmon's Modal Paradox*) and 3 (*The Revenge of Salmon's Modal Paradox*) tackle a modal paradox raised by Salmon, which is a paradox about *origin essentialism* in modal contexts. Origin essentialism is the thesis that the original constitution of a material entity is essential to the very identity of the entity. The consequence is that the identity conditions of a material entity are necessarily set by its original constitution. According to origin essentialism, when a material entity comes into existence, its identity is essentially determined by the matter that constitutes the entity. With his paradox, Salmon showed that we end up facing an undesirable contradiction when origin essen-

tialism is understood in *tolerant* terms. This tolerance is brought within the metaphysical picture via acceptance of a commonsensical idea: the idea that it might have been the case that an entity is originally constituted by a *slightly* different matter.

In Chapter 1, I offer a comprehensive analysis of Salmon's paradox. My main point is to give the most perspicuous understanding of the problem I can offer. I particularly focus on two aspects of the paradox: 1. The overall metaphysical picture at the basis of the paradox; 2. The logic through which the paradox is derived and how this is related to the metaphysics of origin essentialism. In particular, I pay as much attention as I can to the logical (and, so, formal) features of the paradox, for the past literature on Salmon's paradox to some extent has neglected the technicalities of this problem. I also focus on a different way of elaborating the paradox - a variant of the problem elaborated by Salmon himself that shows how the paradox can be derived with less metaphysical assumptions.

In Chapter 2, I analyze the solutions so far advanced, for they offer some important cases for understanding the boundaries of metaphysics, logic and language. I deal with the three major solutions in the literature. The first one is Salmon's own solution, according to which the paradox arises because we deploy the incorrect logic for metaphysical modality. The second solution is offered by Graeme Forbes, which I analyze in a twofold way. On the one hand, Forbes argues that we should solve the problem by modifying the semantics of our language for metaphysics. Precisely, we should switch from an identity-based semantics for metaphysics to a counterparthood-based one, where identity and counterparthood are two different ways of understanding how things are related to each other in modal contexts. I show that this diagnosis is incorrect, and so the subsequent solution is inadequate. On the other hand, I think that Forbes' solution can be useful when understood as a metaphysical, rather than linguistic, proposal. The third solution I examine is Sarah-Jane Leslie's one. This is a purely metaphysical proposal that demands a crucial change of perspective on essentialism.

In Chapter 3, I move to evaluate these solutions and their viability. I do this by developing a third alternative elaboration of Salmon's paradox, i.e. an alternative version of the paradox that is surprisingly able to resist the solutions so far advanced. As regards Salmon's original solution, the alternative development of the paradox shows that we cannot blame the endorsement of this or that logic for the presence of a paradox. Hence, Salmon's idea that we end up in contradiction because of logic is proved to be flawed. Forbes and Leslie's solutions, instead, both end up suffering a similar problem: their metaphysical proposals are shown to push us towards metaphysical absurdities. This happens because the alternative version of the paradox that I develop is based on a different scenario than Salmon's original one. This alternative scenario is metaphysically admissible by origin essentialism. However, the way in which Forbes and Leslie's metaphysical theories describe this alternative scenario leads to metaphysical oddities, and this argues against their being good solutions to the paradox, for they trade a metaphysical problem for another one.

Thus, I conclude that Salmon, Forbes and Leslie's solutions are inadequate. This is due to the fact that they are tailored on a specific version of the paradox, while they cannot solve the problem when facing an alternative but equivalent development of it. They seem *ad hoc* and unable to reach the heart of the problem. I suggest that there is an alternative

option that has not received enough attention, i.e. abandoning commonsense and being *intolerant* when accounting for origin essentialism. This means that it might *not* have been the case that a material entity is originally made from a *slightly* different hunk of matter. This concludes Part I of this work.

In Chapters 4 (*Ontological Realism and the Linguistic View*), 4 (*Ontological Realism and the Language-first Methodology*), and 5 (*Ontological Realism and First-order Predicate Logic*). I analyze ontological realism. Ontology is the branch of philosophy that mostly deals with existence, and this is embedded in its name. The word 'ontology', indeed, comes from the ancient greek matrix '*ontos*', which means 'existence' or 'being'. However, again, my interest is not purely in ontological problems, but in how they interact with logic and language. In particular, I am interested in how formal languages interact with the development of ontological theories that have a realist spirit - where this spirit consists in aiming at a true description of reality as it is independently of the way we speak about it, we perceive it and, in general, we know it.

In Chapter 4, I offer a framework for discussing ontological realism and how it should express descriptions of reality through formal languages, paying particular attention to syntax and logico-formal relations among sentences. I call this framework '*OR*-paradigm', and it depicts ontological realism as a framework that contains different ontological theories (which I call '*OR*-theories') that coexist and cooperate to fulfill the regulative aim of the paradigm, i.e. reaching a true description of reality in itself. *OR*-theories are understood as descriptive objects that describe reality through language. I offer a comparison of this framework with two different linguistic understandings of ontology, i.e. the metaontological views elaborated by Willard v.O. Quine and Rudolph Carnap. This comparison is crucial to understanding the core features of the *OR*-paradigm.

In Chapter 5, I show the incompatibility of the *OR*-paradigm with the language-first methodology, which is the main methodology deployed by the linguistic view. My general aim is to show that formal languages are not ontologically neutral, and so they can conflict with how *OR*-theories describe reality. In particular, I do this to defend the idea that the language-first methodology pushes the *OR*-paradigm against its regulative aim, according to which *OR*-theories should describe reality in a language-independent way.

In Chapter 6, I analyze the case of the formal language of standard first-order to predicate logic to show how it can impose expressive limitations on some *OR*-theories, as in the case of theories endorsing *tropes* as a category of being together with *substances* and *universals*. This analysis bolsters the point shown in the previous chapter. In particular, The conclusion I reach is that there is a bad methodological attitude that the *OR*-paradigm - an attitude that I have never found explicitly stated. According to this attitude, we are entitled to endorse a unique formal language for the *OR*-paradigm *prior to* the development of *OR*-theories. I argue that, instead, this fact pushes *OR* to violate its regulative aim, for it would let the language have evaluative power over the viability of *OR*-theories. This cannot be the case, exactly because *OR* aims at describing reality as it is independently of the language deployed for the description. Moreover, I will also show a benefit we gather when first-order predicate logic is not taken to be the best language for *OR*. I do this by showing how

we can develop axiomatization for *OR*-theories that allows a clear understanding of the logic of *OR*-theories.

All this being said, let me start delving into the intersection of metaphysics, logic and language. In doing this, I hope I can show the difficulties we face when we try to web reality with our descriptions and advance some interesting ways out from these philosophical challenges.

Part I

1. *Salmon's Modal Paradox*

§1 *Introduction*

In this essay, I am going to discuss a modal paradox firstly elaborated by Nathan Salmon. I will analyze the development of the paradox first, and then I will parse the major solutions so far advanced. The first aim of my paper is to give a general understanding of Salmon's modal paradox, which is part of a larger family of philosophical riddles about *de re* modality.[1]

Salmon's paradox raises a metaphysical challenge: is origin essentialism a solid and viable metaphysical view? Roughly, origin essentialism is the view that the original constitution of material objects is essential for them to be the objects they are. In other words, a material object is what it is in virtue of the matter that makes it come into existence. So, for example, every human being is essentially determined by the gametes that have been formed by her parents; and artifacts, like tables, chairs, or statues, are essentially determined by the specific matter that they originate from (a precise hunk of wood, or iron, or marble, and so on).[2] Salmon's paradox shows that this metaphysical view leads to a contradiction. Hence, to save the viability of the view, we must be able to dissolve this logical difficulty.

The paradox emerges when origin essentialism is considered within a broader metaphysical account in modal contexts, i.e. within the realm of what is possibly and necessarily the case. This is metaphysically problematic, for metaphysics mostly aims to account for how things can and must be, and not only to describe how things are. Namely, metaphysics has modal ambitions. So, a metaphysical view generating difficulties in modal contexts is highly problematic.

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[1] See MACKIE 2006 for a comprehensive treatment of these issues.

[2] Origin essentialism has been firstly formulated in informal terms by Saul Kripke in KRIPKE 1980, pp. 112-114. This thesis is usually taken to hold for every material entity. Still, material things can be divided in at least two different kinds: natural (or biologic al) things and artifacts. In this paper I focus my attention on artifacts, setting aside the case of natural (or biological) things. I do this simply to avoid the need of specifying the differences and the similarities between these kinds of things, which could distract from the main point I intend to advance.

To get the difficulty we face with Salmon's paradox, let us focus on a particular example. Consider a material object like a table made of a particular wood. According to origin essentialism, this table cannot be the table it is without being originated from that particular hunk of wood. In modal contexts, this means that the table is necessarily what it is in virtue of the hunk of matter from which it originates. So, it is not possible that there is a thing that is numerically identical to our table if this thing does not originate from the same hunk of wood.

Incidentally, let me mention a point that I will omit. When we claim that an artifact is essentially determined by the hunk of matter it originates from, we should not think that the artifact is *fully* determined by this hunk of matter. There can be other features of the object that are essential to it, e.g. the *design plan*, which gives the object a specific *functional* nature. So, for example, imagine a table made out of a specific hunk of matter. Now, consider that from the very same hunk of matter a craftsman could have created a chair instead. A table and a chair are not one and the same object, for they have two different functions. Functional differences are given by the design plan of the craftsman and it seems as essential as the hunk of matter to the resulting artifact. So, even if the chair and the table come from the very same hunk of matter, they are two different objects. In other words, the same hunk of matter can be used to bring two different objects into existence.

I will not take this specification into account during the discussion of the paradox, for it is superfluous in the context of Salmon's modal paradox. Still, it is important to consider that anytime I speak of an object coming from a specific hunk of matter, the object comes accordingly to a specific design plan.

Coming back to the main point, i.e. the material constitution of artifacts, there is an important intuition that interacts with origin essentialism - and it is on this interaction that Salmon's paradox is based. The intuition pushes us to think that even if we endorse origin essentialism, we can do this with some degree of *tolerance*. I refer to this idea as '*modal tolerance*'. Namely, we can accept the idea that a material object could be made of a different matter *if* this second hunk of matter is sufficiently similar to the original one.

Consider again the table in the above example, which has been produced by our favorite carpenter. Imagine that during the process of producing the table, the carpenter breaks a leg of the table under development. To solve the problem, the carpenter makes a new leg, and then she goes on with the work until the table is done. The question is: before breaking the leg, the carpenter was producing a table; after having broken the leg and having replaced the leg, is the carpenter working on the very same table? In front of this question, we seem ready to answer in a very commonsensical way: yes, the carpenter is still working on the same table, for a different leg does not affect the identity of the table. If you accept this idea, you are most probably ready to accept '*modal tolerance*'. Roughly, the idea is that there is an admitted amount of change in material origin that an artifact can undergo and still remain the very same artifact. I will soon explain it more in-depth.

When origin essentialism and the intuition of modal tolerance are both endorsed, together with further assumptions that I will soon explain, we end up facing Salmon's mo-

dal paradox.[3] The first part of this essay is devoted to a comprehensive explanation of the paradox. I will pay the highest attention to its logic, for this is essential to understand Salmon's own solution to the paradox. Indeed, Salmon takes the paradox to arise because we misunderstand the logic of origin essentialism (and metaphysics in general).

To explain Salmon's paradox I will proceed as follows. First, in §2, I outline the metaphysical picture that generates the paradox through some precise and formal definitions of the metaphysical principle at play. Then, in §3, I outline some crucial premises about the interaction between modal logic and the overall metaphysical picture. In this way, I want to offer all the tools needed for a clear and comprehensive grasp of how the paradox arises. I proceed to show this in §4, where I outline a step-by-step formal derivation of the contradiction at the heart of the paradox. Then, in §5, I consider an alternative formulation of Salmon's paradox that has been developed by Salmon himself. This alternative version of the paradox will turn out to be important for the evaluation of solutions to the paradox. In the end, I give a brief recap at §6.

§2 *Metaphysical Principles*

In his *Modal Paradox*, Salmon elaborates his paradox on the basis of three metaphysical principles: origin essentialism (*NC*); modal tolerance (*MT*); and a sufficiency condition on identity (*SC*) (See SALMON 1986). These are all principles that tell us something about the original constitution of tables (and artifacts in general). Together with them, Salmon also assumes the necessity of identity and distinctness and the axiom *S*4, which is the characteristic axiom of the modal system called *S*4. I will speak of these further assumptions in due course. For now, in this section, let us have a look at the first three metaphysical principles and outline the metaphysical picture they push forward when they are embraced all together.

Let us start with an overview of the metaphysical principles at play and how to make them formally precise. From now onwards, I will focus only on artifacts, setting aside living beings and other natural things. So, let me focus on the case of a table made from a specific hunk of matter (it can be made of wood, marble, and so on) and let me use this example to regiment the metaphysical idea disclosed by origin essentialism and the commonsense intuition of modal tolerance. The formalization is delivered through standard first-order predicate logic with modal operators of necessity and possibility. In this way, we get a comprehensive (though schematic) understanding of origin essentialism, which gives us the metaphysical basis to ignite Salmon's modal paradox.

The intuitive picture I am going to specify is the following one. Consider a table, and call it *t*. This table is made from a hunk of matter, which we call *m*. According to origin es-

[3] Salmon presented this paradox in a series of works. Originally, this paradox was called by Salmon *The Four World Paradox*. This name is due to the fact that Salmon's elaborated the original version of the paradox by deploying a logical model with four possible worlds (SALMON 1981). Later on, he developed the paradox using only three possible worlds (SALMON 1984) and elaborated further the point raised by the paradox in subsequent works (SALMON 1986, 1989, 1993, 2021). These Salmon's works are my main sources about the development of the paradox.

sentialism, being originated from *m* is an essential feature of *t*. Still, commonsense opens us to the following possibility. Consider a hunk of matter *m** that is extremely similar to *m* - e.g. they differ for a very small amount of wood. Then, *t* could have originated from *m** as well. This reflects the case shown above, in which the carpenter has to change a leg of the table before completing its work and bringing *t* into existence. The carpenter wants to build *t*, and this can be done both by modeling either *m* or *m**. Thus, an essential feature of *t* is that it originates either from *m* or from an extremely similar hunk of wood *m**.

This picture is enriched by an additional idea: *t* is the table it is in virtue of being made out of *m*. In other words, if a table is made out of *m*, then that table is *t*. This idea does not conflict with the intuition that *t* could have been made from a slightly different hunk of matter like *m**. Rather, if we allow that *t* might originate either from *m* or from *m**, then any table that is made out of *m* or *m** is table *t*. In other words, this idea tells us to be *tolerant* about the original constitution of a table, so that we can accept the idea that *t* might have been originally made by a slightly different hunk of matter.

Following Salmon, the picture just sketched emerges when three metaphysical principles are endorsed all together. First, there is a principle that captures the idea that the original constitution of a table is a sufficient condition for its identity (*SC*). Second, there is a principle that captures the intuition that a table might have originated from a sufficiently similar hunk of wood (*MT*). Third, there is a principle that captures the fundamental idea of origin essentialism, i.e. that the original constitution of a table is a necessary feature of that table (*NC*).

These principles can ben phrased in the following way:

SC If a wooden table *t* is such that it might have been the only table originally formed from a hunk of matter *m*, then there could not be a table that is distinct from *t* and the only table formed from hunk *m*.

MT Let *m* and *m** be any two hunks of matter that have the same mass, volume, and chemical composition and that sufficiently overlap. If a wooden table *t* is the only table originally formed from *m*, then *t* is such that it might have been the only table originally formed from *m**.

NC Let *m* and *n* be any two hunks of matter that have the same mass, volume, and chemical composition and that do *not* sufficiently overlap. If a wooden table *t* is the only table originally formed from a hunk of matter *m*, then *t* is such that it could not have been the only table originally formed from *n*.

Taken all together, these principles generates a metaphysical view that is the starting point of Salmon's elaboration of his modal paradox in his 1986 essay.

Notice: *SC*, *MT* and *NC* are *modal* principles, i.e. they deploy the modal concepts of *possibility* and *necessity*, which are expressed by expressions like 'It is possible that', 'It is necessary that', 'It might have been', 'It could not have been', and so on. By deploying these expressions, the principles specify the sense in which there are features of tables - like their

original material constitution - that are essential to them.[4] In what follows, I rely on the so-called *possible world semantics* to specify the meaning of modal expressions. The core idea of this semantics is that meanings of modal vocabulary can be set through possible worlds, which represents ways reality can be.[5] Let us use '◇' to formalize 'It is possible that' (and cognate possibility-expressions) and '□' to formalize 'It is necessary that' (and cognate necessity-expressions). We can then phrase the two fundamental conditions of possible world semantics in this way:

◇*p* is true iff$_{def}$ *p* is true in some accessible possible world

□*p* is true iff$_{def}$ *p* is true in every accessible possible world

According to these definition, a sentence of the form '◇*p*' ('It is possible that *p*) - where *p* stands for a sentence whatsoever - is true if and only if there are *some* accessible possible worlds where *p* is true, and a sentence of the form '□*p*' is true if and only if *p* is true in *every* accessible possible world.

Possible worlds have to be *accessible* to the *actual* world, where the actual world is the world where a sentence is asserted. Accessibility is a particular relation holding among worlds that I will analyze more in-depth in §3.2, together with more informations about possible worlds and their features. For now, it is sufficient to consider it a special relation that connects possible worlds and makes us possible to analyze the semantics of modal claims through this particular framework.

Consider an example: suppose that *p* is 'Table *t* is originally made out of *m*'. If it is true in the actual world that □*p*, then in every possible world accessible to the actual world it is the case that *t* is originally made out of *m*. Thus, there is no possible world where *p* is false. If, instead, in the actual world it is true that ◇*p*, then in some - but not in every - possible world it is the case that *t* is originally made out of *m*. In this second case, the fact that *p* it is not the case in every possible world opens to the possibility of worlds where *p* is false. In these worlds, for example, it could be the case that *t* is originally made out of a different hunk of matter.

Given the way in which *SC*, *MT* and *NC* are phrased, it is useful to consider also the fact that □ and ◇ are *interdefinable*. Namely, □ and ◇ can be defined the one in terms of the other together with negation. Consider for example the sentence 'It is necessary that *p*', which means that *p* is true in every possible world. If this is true in every possible world, then there is *no* possible world where *p* is *false*. Then, it is impossible - i.e. it is *not* possible - that *p* is false. The same happens with possibility-claims. Consider the claim 'It is possible

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[4] I set aside the discussion of how the concepts of essence and modality are related to each other, for this discussion would not have an impact on the overall problem that I discuss in this work. For a useful overview on this debate see WILDMAN 2013.

[5] I am using the framework of possible worlds as nothing more than a useful descriptive tool, and I remain silent on their ontological nature (treated, for example, in Lewis 1986).

that *p*', which means that *p* is true in some possible world. Since *p* is true in some possible worlds, it is *not* necessarily the case that *p* is false.

Using the semantics just sketched, *SC*, *MT* and *NC* can be formalized in a precise way and be better understood. Before doing this, let me set the following stipulation. Let us use the following relational predicate to express the idea that a table whatsoever is the only table originally made out of a hunk of matter whatsoever:

$Or(—, —)$

This predicate can have two arguments, where the first one is a table and the second one is a hunk of matter. For example,

$Or(t, m)$

means that *t* is the only table originally made out of *m*. More precisely, let us stipulate that this predicates embeds the uniqueness condition of *being the only table*, to the effect that we can avoid to explicitly formalize this condition through the standard strategy deploying quantification. Suppose the the above predicate does not embed the uniqueness condition. Then, If we want capture the idea that *t* is the only table originally made out of *m* we should write the following more complex sentence:

$Or(t, m) \ \& \ (\neg \exists y \ (Or(y, m) \ \& \ y \neq t))$

Literally, this means that 'there is no other table *y* that originates from *m* and that is different from *t*'. To avoid too much complex formulas, let us stipulate that the uniqueness condition is contained in the definition of the predicate, so that anytime we use $Or(—, —)$ we by default mean 'To be the only table originally made out of a specific hunk of matter'. Now that a formal machinery is in place, let us use ti to examine the different imports given to the overall metaphysical picture by principles *SC*, *MT* and *NC*.

First, principle *SC* expresses a sufficient condition for the identity of tables: if a table *t* is such that it might have been the only table originally formed from the hunk of matter *m*, then it is necessary that any table *t** that is the only table originally formed from *m* is *identical* to *t*. In the language of possible worlds, *SC* claims that for any possible world *w* where *t* is the only table originally made from *m*, and for any possible world *w** where *t** is the only table originally made from *m*, it is the case at *w** that $t = t^*$. This means that at *w** the fact that *t** is originally formed from *m* is a sufficient condition for the numerical identity of *t** with *t*. So, *SC* can be formalized in the following way:

SC $\quad \Diamond Or(t, m) \longrightarrow \Box \forall x(Or(x, m) \longrightarrow x = t)$

Second, principle *MT* claims that a certain degree of variation in the original constitution of a table is possible, and this is why it is called a principle of *modal tolerance*. So, *MT* says that it is possible for the very same table *t* to originate from a hunk of matter different

from the one from which it actually originates. Call the alternative hunk of matter 'm^*' and the actual one 'm'. What is crucial is that m^* must satisfy two precise conditions:

Overlapping Condition: m^* must sufficiently overlap m.

Qualitative Condition: m^* must have the same mass, volume and chemical composition as m.

The *Overlapping Condition* imposes a *quantitative* limitation on m^*, and it claims that a table that is originally made from m can originate from m^* as long as m^* is sufficiently similar to m. The two hunks are sufficiently similar when they share a certain amount of matter. This ensures the following intuition: a table t can originate from m^* as long as m^* is *not* composed of a *radically* distinct amount of matter if compared to m. This idea implies that there is a limit point within which m and m^* sufficiently overlap, and after which they do not overlap anymore. I will come back to this point. With possible-worlds talk, *SC* asserts that if the *Overlap* and the *Qualitative Conditions* are satisfied, then there are some possible worlds where exactly the same table t is the only table originally made from m^*. I formalize *MT* as

MT $\quad \forall x(Or(x, m) \longrightarrow \Diamond Or(x, m^*))$

In the end, *NC* captures the very idea of origin essentialism, according to which the original material constitution of a table is an essential feature of it. The key idea behind this principle is that while *MT* allows a certain degree of variation in the original constitution of a table, *NC* claims that it cannot the case that the same table t is originally made from a *radically different* hunk of matter. Namely, it claims that if the *Overlapping Condition* is not satisfied, then the alternative hunk of matter is so radically different from the one from which t is originally formed that it cannot be such that it allows the production of the very same table t. Under this respect, *NC* can be understood as a principle of *modal intolerance*, for it impose a limit on *MT*, i.e. on how much variation in the original constitution of a table we can admit. For example, consider the case in which the alternative hunk has no matter in common with the actual one. Deploying the framework of possible worlds, *NC* claims that for any possible world w where a table t is originally made from m, and for any possible world w', there is a table t' is originally made from m', which does not extensively substantially overlaps m, it is the case at w' that $t' \neq t$. The principle can be formalized as

NC $\quad Or(t, m) \longrightarrow \Box \forall x(Or(x, m') \longrightarrow x \neq t)$

Now, let me move to explain how Salmon's paradox arises from the metaphysical picture pushed forward by *SC*, *MT* and *NC* when they are accepted all together. My understanding of Salmon's paradox is that it arises because the above three principles constitute an inconsistent set of claims.

§3 *Some Premises to the Paradox*

Salmon's paradox relies on there being a model that shows how origin essentialism can lead to a contradictory conclusion. Such a model is built through the framework of possible worlds, which is a useful representational way to highlight the modal consequences of origin essentialism. Salmon's model exploits a simple and intuitive scenario, which I will expose in a conceptual and informal way first (§3.1), and later on in a formal fashion (§§4.1-4.2). In this way, it should result clear why the fact that Salmon's paradox pushes us towards a contradiction is problematic. To show this, I will also give some details about the logical assumptions needed to derive the contradiction at the heart of the paradox (§3.2).

§3.1 *Tables, Hunks of Matter and Alternative Scenarios*

Let us have a look at tables and their original constitution, which is regulated by the interplay of principles *SC*, *MT* and *NC*. More specifically, let us focus on *MT*, according to which a table could have been originally made by a different hunk of matter as long as the two hunks of matter sufficiently overlap each other. The key to understanding Salmon's paradox is to have a clear grasp on there being such a possibility, for the paradox pushes us to the unwelcome conclusion that there is at least a case in which this possibility leads to contradiction.

Consider an example: there is a craftsman at work creating a table. She produces table *a* from a hunk of wood α. Let us stipulate that is identified by four parts, and let us call them L_1, L_2, L_3, L_4 (I call each part '*L*' as it were a future leg plus a section of the top of the table). This specification does not want to analyze the hunk into parts or determine its identity conditions in mereological terms. It is simply a quantitative method to understand what α is and how it can be compared to other hunks of wood. Now let us consider that things could have been different. Namely, it could have been the case that the craftsman selected a different hunk of wood to build a table. For example, she could have selected a hunk of wood that differs from α for its parts. Suppose that this hunk of matter is made of L_1, L_2, L_5, L_6 and call it β. Then, call *b* the table originally made from β. In this alternative scenario, is the craftsman still working on table *a*? Or is she working on a numerically different table? In other words, are *a* and *b* numerically identical?

The answer to the above question depends on the nature of the hunks of wood under examination. Namely, it depends on how we specify the *Overlapping Condition* contained in *MT* (assuming that the *Qualitative Condition* is satisfied by simply considering two hunks of the same type of wood). If β sufficiently overlaps α, then, even in the alternative scenario, the craftsman is still realizing the very same table *a* from β. If β does not sufficiently overlap α, then, in the alternative scenario, the craftsman deploys β to realize a table that is different from *a*. Hence, the answer to our question depends on how we stipulate when a hunk of wood sufficiently overlaps another hunk of wood. So, let us stipulate this condition in a precise way. For example, let us stipulate that a hunk of matter sufficiently overlaps another hunk of matter if they differ for only *one* of their parts.

Given our stipulation, β does not sufficiently overlap α. It follows, according to *NC*, that *a* and *b* are not one and the same table. Indeed, according to *NC*, any two tables originating from two insufficiently overlapping hunks of matter must be different tables. Thus, in the two scenarios, the craftsman is realizing two numerically distinct tables. In the original scenario, she is realizing *a*, while, in the alternative scenario, she is realizing *b*, which is numerically distinct from *a*.

At this point, let us focus on the craftsman working on table *b*. Let us ask, from the perspective of this craftsman, what would have happened had things been different. Namely, let us consider that it could have been the case that this craftsman selected a different hunk of wood to build a table. So - if you concede me the wordplay - let us consider an alternative scenario to the already alternative one. In this second alternative scenario, there is a hunk of matter that differs from β for only one part. Call γ this hunk of matter and call *c* the table originating from it. Imagine that γ is formed by the parts L_1, L_2, L_3, L_5. In this case, we ought to conclude, through *MT*, that *b* and *c* are one and the same table. Indeed, β and γ sufficiently overlap each other, and so it follows that *b* and *c* are numerically identical.

All this considered, we are ready to face the crux of Salmon's paradox. Indeed, we could now ask how tables *a* and *c* are related to each other. Table *a* originates from α, which is composed of parts L_1, L_2, L_3, L_4, and table *c* originates from γ, which is composed of parts L_1, L_2, L_3, L_5. This means that α and γ are sufficiently overlapping hunks of wood, for they differ for only one part. So, if we ask: had things been different and had the craftsman used γ to produce a table, would have she produced a table identical to *a*? The answer is: yes, *a* and *c* are numerically identical, for they come into existence through two sufficiently overlapping hunks of matter. However, once this fact is acknowledged, we end up facing a contradictory situation.

On the one hand, table *a* is different from *b*, but it is identical to *c*. On the other hand, table *b* is different from *a*, but it is identical to *c*. As regards *a*, it is different from *b* because it originates from the hunk α, which does not sufficiently overlap β. However, *a* is numerically identical to *c*, for α sufficiently overlaps γ. As regards *b*, it is different from *a* because it originates from the hunk β, which does not sufficiently overlap α. However, *b* is numerically identical to *c*, for β sufficiently overlaps γ. Here we face a problem with numerical identity. Indeed, because of the transitivity of identity, if both *a* and *b* are identical to *c*, it must be the case that *a* and *b* are identical to each other. However, assuming the truth of origin essentialism, we must conclude that *a* and *b* are distinct tables. This is contradictory.

Thus, the core of Salmon's paradox is that we end up facing a contradiction. This contradiction is derived when we endorse origin essentialism plus modal tolerance and, together with them, some widely accepted ideas about numerical identity. As regards identity, we are endorsing: the *necessity* of identity (and distinctness), according to which if something is numerically identical to something else, then this holds in every possible world (i.e. across every alternative scenario); the *transitivity* of identity, according to which if a thing x is identical to a thing y, and y is identical to z, then x is identical to z. Let us call, from now onwards, this account of identity *NI*.

The philosophical problem raised by this contradiction is a metaphysical problem. Indeed, the contradiction highlighted by Salmon's paradox is problematic for those who endorse origin essentialism (and accept the two above assumptions on identity). The paradox makes us think that there is a problem of *consistency* in the picture advanced by origin essentialism plus modal tolerance. So, defenders of origin essentialism are left with the challenge of solving the paradox and making origin essentialism a consistent and viable metaphysical account.

With all of this in mind, let us now move to consider the logico-formal apparatus through which Salmon's modal paradox is developed. Namely, let us have a look at the tools we need to rigorously describe the scenario just sketched.

§3.2 *Models and Modal Systems*

To develop Salmon's paradox in a more formal way, I will rely on the framework of possible worlds, and so it is vital to introduce all the essential features of the framework. In particular, it is necessary to focus on the structural aspects of the framework and how they are related to the choice of the modal logic system we endorse, where a system of this kind is understood as a specific set of axioms we commit to. In turn, the choice of a system has an impact on the metaphysical picture of reality we are pushing forwards. In particular, it determines the logic of metaphysical modality, and so what forms of reasoning are valid in metaphysical contexts, as in the case of origin essentialism, which is the point I want to focus on.

Possible worlds can be understood in various ways. I will not take a stance on their nature, but I will simply take them as ways things can be. To offer a less general characterization, possible worlds are possible and complete scenarios. They are possible in a broad sense of the term, and they are complete in the sense that every relevant feature is specified. So, for example, in our case, possible worlds are possible scenarios where every feature of the origin of tables is taken into account. This means that it is clearly specified: which table comes from which hunk of matter; what is the composition of the hunks of matter; and what are the parts composing each table. These are intra-worlds features, i.e. they are specific to each possible world. There are also features that are inter-worlds: the relation of numerical identity holds for tables across possible worlds so that a table in a possible world is (or is not) identical to a table in a different possible world; the relation of overlapping holds for hunks of matter across possible worlds, i.e. a hunk of matter sufficiently (or insufficiently) overlaps another hunk of matter in a different possible world.

The presence of inter-worlds features requires explaining how possible worlds are connected to each other. This connection is ensured by the so-called *accessibility relation*. This relation plays a crucial semantic role. Let me explain this by considering two worlds - call them w_1 and w_2. Let us suppose that w_2 is accessible to w_1. If so, it follows that what is the case at w_2 is possibly the case at w_1. So, imagine that at w_2 it is the case that a table t originates from a hunk of matter m. This means that at w_2 the following sentence is true:

w_2: $Or(t, m)$

Namely, it is true that *t* originates from *m*. Given that w_2 is accessible to w_1, it follows that at w_1 a different sentence is true:

w_1: $\Diamond Or(t, m)$

Namely, it is true that it is possible that *t* originates from *m*.

Now suppose that the two worlds are not connected through the accessibility relation, i.e. suppose that w_2 is not accessible to w_1. In this case, '$Or(t, m)$' is still true at w_2. Indeed, it is still the case that *t* originates from *m* at w_2. However, given that w_2 is not accessible to w_1, it is no more the case that '$\Diamond Or(t, m)$' is true at w_1. From the point of view of w_1, we are not entitled to express that it is possibly the case that *t* originates from *m*. Thus, the accessibility relation captures the idea of a possible world being an *alternative* way things can be *relative to* another possible world. If the accessibility relation holds, then w_2 is an alternative scenario to w_1, otherwise, it is not.

The accessibility relation can have different properties: *seriality*, *reflexivity*, *symmetry* and *transitivity*. Different combinations of these features characterize different ways in which the accessibility relation can work. It can have no properties at all, it can have only two of them, or it can be characterized by all of them. Depending on the properties we assign to this relation, we obtain different ways in which possible worlds are related to each other. Imagine that the accessibility relations is serial. If so, for any possible world there is at least another possible world accessible to it. Suppose, instead, that the accessibility relation is reflexive. If so, it follows that every possible world is reflexively accessible to itself. Or suppose further that the accessibility relation is symmetric. This means that if a world w_2 is accessible to w_1 then w_1 is accessible to w_2. In the end, suppose that the accessibility relation is transitive. It follows that, if a world w_2 is accessible to a world w_1 and a world w_3 is accessible to w_2, then w_3 is accessible to w_1.

Different ways of characterizing the accessibility relation have crucial implications on our understanding of modal discourse, for different properties of the accessibility relations determine different modal systems. A modal system is mainly determined by a specific set of axioms that allow us to validate a specific set of formulas - i.e. logical sentences. Different sets of axioms determine different ways of understanding what counts as logically valid or invalid. So, according to this or that system, there are different logical principles that we must accept as universally true in our reasonings.

Going through all the correspondences between accessibility relations with different features and axioms of modal systems would be quite distracting in this context, so let me just focus on the case of transitivity, for it is crucial to understand Salmon's development, interpretation and resolution of his paradox. First, let me explain how the transitivity of the accessibility relation is connected to a specific axiom, i.e. axiom *S*4. Second, let me give you an overview of the most important modal systems and explain why endorsing this or that system is crucial in a metaphysical context like the one of origin essentialism. These points are essential to understanding Salmon's paradox and its metaphysical relevance.

Let us focus on the transitivity of the accessibility relation. Recall that when the accessibility relation is transitive, then, if a world w_2 is accessible to a world w_1 and a world w_3 is accessible to w_2, it follows that w_3 is accessible to w_1. This feature of the accessibility relation corresponds to the following axiom:

$S4 \quad \Box q \longrightarrow \Box\Box q$

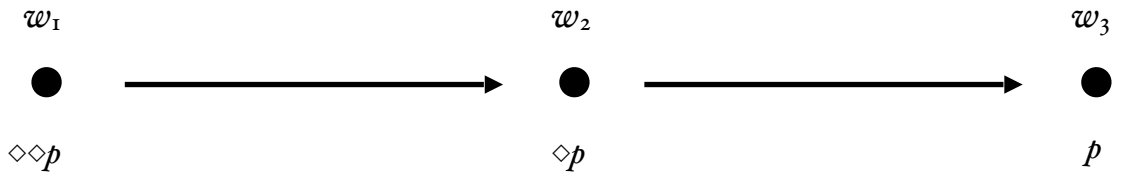
Namely, by endorsing this axiom we endorse the so-called *S*4 *modal system* and the accessibility relation among worlds is unavoidably transitive. As I will show, the *S*4 axiom is crucial to developing Salmon's modal paradox. In particular, what is crucial is the possibility-version of the axiom, i.e. the axiom spelt out in terms of possibility instead of necessity.[6] The possibility-version of the axiom is the following one:

$S4 \quad \Diamond\Diamond q \longrightarrow \Diamond q$

As the necessity-version, this axiom captures the idea of the transitivity of the accessibility relation between worlds. What is crucial is that from a logical point of view, the necessity and the possibility-version are *equivalent*. The difference is that the necessity-version regulates the semantics of necessary claims, while the possibility-version regulates the semantics of claims of possibility. So, let us have a look more in-depth at this. Moreover, notice: from now onwards I will only speak about this version of the axiom. So, when I mention the axiom *S*4, I always refer to its possibility-version.

When axiom *S*4 is endorsed, we find ourselves within the following situation: given that w_2 is accessible to w_1, what is the case at w_2 is possibly the case at w_1; in the same way, given that w_3 is accessible to w_2, it follows that what is the case at w_3 is possibly the case at w_2; given the transitivity of the accessibility relation, we obtain that what is the case at w_3 is possibly the case at w_1. This means that transitivity allows us to "bypass" the fact that w_3 is accessible to w_1 via w_2. Let us look at this in detail.

First, let us examine the effect of axiom *S*4 through the help of the following diagram:



[6] Recall what I said in §1: modal operators are interdefinable, and, so, sentences containing the *necessity* operator can be translated in sentences containing the *possibility* operator. The same happens with axioms. Thus, axiom *S*4 can be written by deploying the necessity operator as well as by deploying the possibility operator. These two forms of the axioms are equivalent.

The dots in the paradigm are possible worlds, while the sentences above them are true sentences according to each possible world. Arrows represent the accessibility relations between possible worlds. So, w_3 is accessible to w_2, and w_2 is, in turn, accessible to w_1. Now, let me explain what happens at w_1 when the accessibility relation is transitive, which makes w_3 also accessible to w_1.

Suppose that at w_3 it is the case that

w_3: p

Where 'p' stands for any fact whatsoever - it can be the fact that a table is originally made from a hunk of wood or the fact that I play rugby. So, at w_3 it is the case that p. Given that w_3 is accessible to w_2, at w_2 it is the case that

w_2: $\Diamond p$

Moreover, w_2 is accessible to w_1. So, what is the case at w_2 is possibly the case at w_1. At w_2 it is the case that $\Diamond p$ - and this is already a modal fact, for it includes the concept of something being possibly the case. It follows that, at w_1, it is this modal fact that is *possibly* the case, and so it is true that

w_1: $\Diamond\Diamond p$

Namely, at w_1 we cannot immediately infer that what is the case at w_3 is simply possible. Rather, we must take into account the fact that w_1 is accessible to w_3 thanks to w_2, which acts as a mediator. What happens when the accessibility relation is transitive is exactly that we are entitled to infer that at w_1, as it happens at w_2, it is the case that

w_1: $\Diamond p$

Thanks to transitivity, w_1 is directly accessible to w_3, and, so, what is the case at w_3 is possible at w_1. If the accessibility relation is not transitive, at w_1 we cannot infer '$\Diamond p$' from '$\Diamond\Diamond p$'.

The fact that *S*4 is an axiom, means that it holds in every possible world with no exception at all. So, any time we have a sentence of the form '$\Diamond\Diamond p$' that is true in a given world, we can infer with logical validity that '$\Diamond p$'. In the above example, this is exactly what happens at w_1. This fact can be easily shown thanks to a simple application of *modus ponens* (indicated as '*MP*'):

a.	w_1:	$\Diamond\Diamond q \longrightarrow \Diamond q$	(*S*4)
b.	w_1:	$\Diamond\Diamond q$	(*Assumption*)
c.	w_1:	$\Diamond q$	(*MP*: *a*, *b*)

This reasoning is logically valid, i.e. it is impossible that given the truth of premises (*a*, *b*) the conclusion (*c*) does not follow. In other words, and more intuitively, there is no fact holding in any possible world that can offer a counterexample to this line of reasoning.

Why is this so relevant? There are three crucial reasons. First, Salmon's paradox derives a contradiction when axiom *S*4 is endorsed together with *SC*, *MT*, *NC* and *NI*. So, following Salmon's reasoning, if the axiom *S*4 is not endorsed, the contradiction should not be derivable. Hence, having clear in mind that the modal system we endorse determines the possibility of making some derivations and of excluding others, is vital. In the next chapter, I will argue that Salmon's diagnosis is incorrect, for the paradox can be derived also in systems that do not endorse the transitivity of the accessibility relation. The lesson I draw from this result is that the paradox does not depend on the endorsement of this or that system for metaphysical modality.

Second, focusing on the modal system we endorse is crucial to understanding the logic of metaphysics. Indeed, the fact that we can have different properties of the accessibility relation and different axioms for modal logic, leaves us with the task of understanding what is the logic of metaphysics. Let us focus on origin essentialism and ask ourselves: what is the logic of origin essentialism? If Salmon's reasoning is correct, and the paradox arises because of the axiom *S*4, it follows that the modal system *S*4 is not the system that captures the logic of this metaphysical theory. Then, we must select a different set of axioms to capture the logic of origin essentialism. Hence, if Salmon's diagnosis is correct, it could offer a basis to argue that the modal system *S*4 does not describe the logic of origin essentialism, for it leads us to contradiction.

Third, the idea that the modal system *S*5, which is an *extension* of the modal system *S*4, is the correct modal system for metaphysical modality is widely shared among philosophers. System *S*5 is an extension of system *S*4 because it endorses one more axiom:

$$S5 \quad \Diamond q \longrightarrow \Box \Diamond q$$

Namely, if something is possibly the case in a world, then it is necessarily possible. In other words, and roughly, the idea is that if *q* is possibly the case in a world, then *q* is possibly the case in every possible world. Without entering into details, the axiom describes the accessibility relation as an *equivalence* relation, i.e. as a serial, reflexive, symmetric and transitive relation. The overall effect of endorsing this modal system for metaphysics is that every possible world is accessible to every other possible world - unlimitedly.

Now, if Salmon's diagnosis is correct and his modal paradox is due to the fact that the modal system *S*4 is not a good modal system for metaphysics, it would follow that Salmon can offer also an argument against system *S*5 being suitable to describe metaphysical modality (unless you are ready to drop origin essentialism in the first place, of course). This is due to the fact that system *S*5 is an extension of the modal system *S*4, and so it endorses the *S*4 axiom as well. So, if Salmon is correct we have a powerful argument against system *S*5 being the best modal system for metaphysics, for it would push us towards a contradiction when used in metaphysical contexts.

So far so good. Let me now move to consider Salmon's paradox in detail.

§4 *Salmon's Paradox*

At this point, we possess all the relevant information to analyze Salmon's modal paradox in detail. The goal of this section is to show the formal nature of the paradox and what is the contradiction that it highlights. To reach this goal, the section is split into a first part where I expose the model (or scenario) that the paradox exploits (§4.1) and a second part where I deal with its logic (§4.2).

§4.1 *The Model*

Let us look at Salmon's model. First of all, assume that a table *a* is such that it might have been the only table originally formed from the hunk of matter α. Table *a* is formed in such a way that it originates from α with four parts L_1, L_2, L_3, L_4, which are (constituted by) proper parts of α. Now, consider a possible world w_1 where *a* is the only table originally formed from α.

Suppose that any other table *x* that is formed by a hunk of matter that differs from α only in virtue of one leg must be identical to *a*, while if *x* is formed by a hunk of matter that differs from α in virtue of two legs, then *x* is not identical to *a*. With this supposition we are just specifying the *Overlapping Condition* contained in *MT* and *NC* in a particular way, i.e. we are setting the threshold that specifies when the condition is satisfied or not. Namely, we endorse a particular criterion for specifying when a hunk of matter different from α extensively sufficiently overlaps α or not. Salmon emphasises that this limit could be covered by a region of vagueness or indeterminacy. He is not committed to where exactly the limit lies, but only that there is such a limit. This makes vagueness unproblematic in the scenario he is building. Thus the particular assumption on the threshold does not affect in any way his overall argument (SALMON 1986).[7]

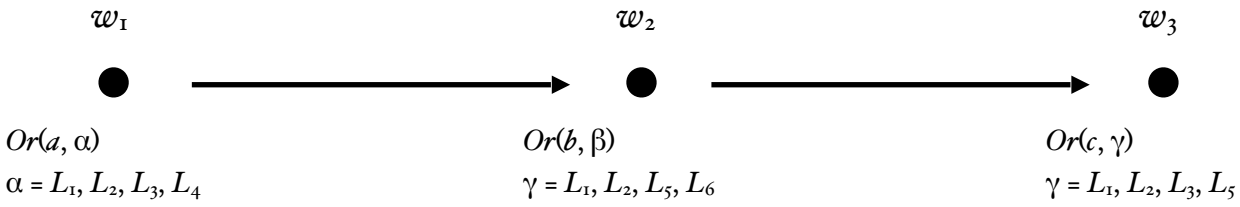
Given this, let us follow Salmon's specification of the *Overlapping Condition* and suppose that it might have been the case that the artisan who constructed *a* has produced a table *b* using the hunk of matter L_1, L_2, L_5, L_6 – where L_5 and L_6 are qualitatively like L_3 and L_4 even though they come from a different block of wood. Call β this second hunk of matter from where *b* is created by the artisan. Then we obtain that there is a possible world w_2 here it is the case that *b* is the only table originally made from β. Moreover, *b* is different from *a*, and given the necessity of identity and distinctness, it cannot be the case that *a* and *b* are identical – namely, there is no possible world where *a* and *b* are identical.

However, consider this further point: it might also have been the case that the artisan who made *b* has produced another table *c* from the hunk of matter γ that is constituted by the parts L_1, L_2, L_3, L_5. So, given its composition, γ sufficiently overlaps both α and β. In-

[7] This feature of Salmon's paradox - i.e. specifying the overlapping condition - is crucial, for it distinguishes this paradox from a different family of paradoxes about vagueness. I am not going to examine these paradoxes. Still, it is important to specify this point, for authors like Forbes have analyzed Salmon's paradox depending on the problem of vagueness, but this does not seem to be the case (see FORBES 1983 and WILLIAMSON 1990).

deed, γ differs from both α and β for only one leg – respectively L_4 and L_5. This means that *c* is identical to both *a* and *b*. But it is also the case that *a* and *b* cannot be identical. And this is the crux of the model.

The following diagram can help in visualizing the scenario:



The diagram represents the model in the following way. First, at w_1, there is a table *a* originating from the hunk of matter α (L_1, L_2, L_3, L_4); at w_2, table *b* originates from β (L_1, L_2, L_5, L_6); at w_3, instead, there is a table *c* that originates from γ (L_1, L_2, L_3, L_5). Given that γ sufficiently overlaps both α and β, it follows that *a* and *b* are both identical to *c*. However, given that α and β does *not* sufficiently overlap, *a* and *b* are distinct.

This is all about the model exploited by Salmon's paradox. Now it is time to analyze what is the problem raised by this model. In simple words, the problem we face is given by the conjunction of two modal facts about tables in the modal space and how they are related to each other through the relation of numerical identity.

The first fact to be considered is that it is impossible that there exists a table that originates from γ and that is distinct from *a*. Indeed, this is the conclusion towards which we are pushed by *MT* and *SC*: for any table that originates from a hunk of matter that sufficiently overlaps α, it results that this table is identical to *a*, and so it is impossible that it is different from *a*. Thus *c* must be identical to *a*.

The second fact to be taken into account is that it is also possible that there exists a table that originates from γ and that is different from *a*. This is due to *MT* and *NC*: for any table that originates from a hunk of matter that does *not* sufficiently overlap α it is the case that it is different from *a*. Thus, given that *c* originates from a hunk of matter that sufficiently overlaps β, it must be identical to *b*, which is distinct from *a*, hence *c* must be distinct from *a*.

In intuitive terms, the overall problematic conclusion is that *c* is numerically identical to both *a* and *b*, but *a* and *b* are numerically distinct. This runs against our understanding of numerical identity, for two things (*a* and *b*) cannot be identical to a third thing (*c*) and be numerically distinct from each other. Let us have a look at this problem more in-depth and clarify its logical nature.

§4.2 *Deriving the Paradox*

Now, let us have a look at the problem from a formal point of view in order to show how a contradiction can be derived from the above model. This model is allowed by *SC*, *MT*, *NC* together with *NI* when *S*4 is endorsed as the logic of origin essentialism. So, the presence of a contradiction generates a problem of consistency between the principles endorsed. Avoiding this contradiction from the set of assumptions {*SC*, *MT*, *NC*, *NI*, *S*4} is the challenge raised by the paradox.

First of all, assume that table *a* is such that it might have been the only table originally formed from the hunk of matter α. Table *a* is formed in such a way that it originates from α with four legs L_1, L_2, L_3, L_4 which are constituted by proper parts of α. Then, the assumption tells us that:

1. w_1: $Or(a, \alpha)$

Namely, there is a possible world w_1 where it is the case that *a* is the only table originally formed from α.

As already explained, we are supposing that any other table *x* that is formed by a hunk of matter that differs from α only in virtue of one leg must be identical to *a*, while if *x* is formed by a hunk of matter that differs from α in virtue of two legs, then *x* cannot be *a*. Salmon's model contains such a table, i.e. *b*, which originates from a hunk of matter β. Table *b* comes with parts L_1, L_2, L_5, L_6 - where L_5 and L_6 are qualitatively like L_3 and L_4 even though they come from a different block of wood. Then we obtain that:

2. w_2: $Or(b, \beta)$

In other words, there is a possible world w_2 where it is the case that *b* is the only table originally made from β.

Moreover, it might also have been the case that the artisan who made *b* has produced another table *c* from the hunk of matter γ that is constituted by the parts L_1, L_2, L_3, L_6. This means that:

3. w_3: $Or(c, \gamma)$

Since γ is composed of L_1, L_2, L_3, L_6 it follows that γ sufficiently overlaps both α and β. Indeed, γ differs from both α and β for only one leg – respectively L_4 and L_5. This is the kernel point of the paradox. Indeed, once we apply the metaphysical principles for *origin essentialism* to this scenario we derive the following contradiction:

C w_1: $\Diamond\exists x\,(Or(x, \gamma) \,\&\, x \neq a) \,\&\, \neg\Diamond\exists x\,(Or(x, \gamma) \,\&\, x \neq a)$

Namely, it is both possible and impossible that the same table *a* is the only table originally made from γ. In order, I will outline how the right conjunct and the left one are derived.

From 1 we know that at w_1 it is the case that $Or(a, \alpha)$. Moreover, according to *MT* we know that since γ sufficiently overlaps α, it is possible that the very same table *a* is the only table originally formed from γ according to *a*:

4. w_1: $Or(a, \alpha) \longrightarrow \Diamond Or(a, \gamma)$

In addition, according to *SC*, if table *a* is such that it might have been the only table originally formed from the hunk of matter γ, then necessarily any table *x* that is the only table originally formed from γ is identical to *a*. So:

5. w_1: $\Diamond Or(a, \gamma) \longrightarrow \Box \forall x(Or(x, \gamma) \longrightarrow x = a))$

At this point, from 4 and 5 (thanks to transitivity) we obtain that:

6. w_1: $Or(a, \alpha) \longrightarrow \Box \forall x(Or(x, \gamma) \longrightarrow x = a))$

Then, through an application of *modus ponens* to 1 and 6, we get

7. w_1: $\Box \forall x(Or(x, \gamma) \longrightarrow x = a))$

According to which, in every possible world, if a table whatsoever originates from γ, then that table is identical to *a*.

From 7, we immediately obtain the first conjunct of *C*:

C_1 w_1: $\neg\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)$

Namely, at w_1, it is impossible that there exists a table that is the only table originally formed from γ and that this table is different from *a*. So, there is no possible world where a table that originates from γ is distinct from *a*. In the scenario under examination, this means that it cannot be the case that *a* is different from *c*. If the artisan who produced *a* might have produced a table *c* from the matter γ, then *c* must be identical to *a*.

On the other side, the metaphysical principles at play lead us to a different conclusion about the identity of table *b* with table *c*, and this leads to deriving the second conjunct of *C*. First of all, consider that it cannot be the case that *b* is identical to *a*. This is due to *NC*:

8. w_1: $Or(a, \alpha) \longrightarrow \Box \forall x(Or(x, \beta) \longrightarrow x \neq a))$

8 claims that it is necessary for every table x that if x is the only table originally formed from β, then x is different from a. From this, it follows that it cannot be the case that table a is the only table originally formed from β. From this, it follows that it cannot be the case that a is identical to b. Hence:

9. w_1: $\Box (a \neq b)$

There is no possible world where a and b are identical, or, in other words, in every possible world, a and b are distinct.

Now, it is important to focus on w_2, where b is the only table originally formed from β. By applying *MT* we obtain that:

10. w_2: $\Diamond Or(b, \gamma)$

This is due to the fact that β sufficiently overlaps γ. But given 10, it follows by an application of *SC* that any table x that is the only table originally formed from γ is identical to b. So, given that at w_3 table c satisfies this sufficient condition, it follows that b is identical to c. This means that:

11. w_3: $\exists x (Or(x, \gamma) \& x = b))$

Given what 9 claims, it cannot be the case that this table is a. Hence:

12. w_3: $\exists x (Or(x, \gamma) \& x \neq a))$

Within our model, if what 12 claims is the case at w_3, then at w_2 it must be the case that this is possible. Namely:

13. w_2: $\Diamond\exists x (Or(x, \gamma) \& x \neq a))$

In turn, if at w_2 it is possible that exists a table x originally formed from γ, then this is (at least) possibly possible at w_1 – so that:

14. w_1: $\Diamond\Diamond\exists x (Or(x, \gamma) \& x \neq a))$

But given that the model is by assumption developed within the system *S*4, it is a logical truth that:

*S*4 $\forall w_n$: $\Diamond\Diamond q \longrightarrow \Diamond q$

where '*q*' stands for any proposition whatsoever. According to this axiom of *S*4, if it is possibly possible that something is the case, then it is simply possible that something is the case. So, 14 tells us that something is possibly possible at w_1, and given the axiom of *S*4, this fact implies that what is possibly possible at w_1 is also *simply* possible. Let us apply this axiom, and we obtain:

15. w_1: $\Diamond\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)) \longrightarrow \Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a))$

In conclusion, by a simple application of *modus ponens* between 14 and 15, we infer the second conjunct of *C*:

C_2 w_1: $\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)$

And the conjunction of C_1 and C_2 gives us *C*, which is the problematic contradictory conclusion:

C w_1: $\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)\ \&\ \neg\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)$

Again, the problem raised by this conclusion is that is contradiction based on the ideas composing origin essentialism. According to *C*, it is both the case that *it is possible* that it exists a table that originates from γ and that is different from *a*, *and it is not possible* that it exists a table that originates from γ and that is different from *a*. So, the existence of the table under examination (the one who originates from γ and that is identical to *a*) is both possible and impossible.

§5 *An Alternative Derivation of the Paradox*

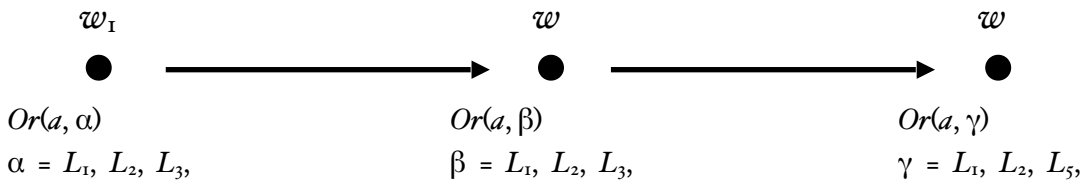
There is an alternative elaboration of Salmon's modal paradox that is presented in SALMON 1984, 1989, 1993. This alternative version is derived by assuming only *MT*, *NC*, and the axiom *S*4 and it leads to the same contradictory conclusion of the original one.[8] This point is crucial for the overall understanding of the problem under examination. Indeed, given that the paradox can be developed without endorsing *SC* and *NI*, it follows that these principles should not be blamed for the rising of the paradoxical situation highlighted by the paradox. As we will see, this matters when developing and evaluating solutions to the paradox.

A terminological standpoint could help at this point: from now onwards let us call *MP*1 the elaboration of Salmon's paradox ran from the set of assumptions {*SC*, *MT*, *NC*,

[8] To be precise, in these case, Salmon endorses the unrestricted necessitation of the conjunction of *MT* and *NC*. Namely, he phrases a single metaphysical principle that is obtained through the conjunction of principles *MT* and *NC*. This single principle is taken to be necessarily true without any restriction.

NI, *S*4}; instead, let us call *MP*2 the version of the paradox ran from the smaller set of assumptions {*MT*, *NC*, *S*4}. Following this stipulation, let us now examine *MP*2.

This alternative elaboration of the paradox under examination exploits a slightly different model:



This model describes the following scenario. At w_1 there is a table *a* that is originally made from α, at w_2 there is again table *a*, but this time it is originally made from β, and at w_3 table *a* is originally made from γ. The three hunks of matter are related in the following way: β sufficiently overlaps α; γ sufficiently overlaps β; γ does not sufficiently overlaps α. This is due again under the stipulation that a hunk of matter sufficiently substantially overlaps another one if they have at least three of four parts in common. This means that the *Overlapping Condition* of *MT* is again stipulated to be equal to the 75% of matter - or, in other words, that two hunks of matter sufficiently substantially overlap when they have three of four parts in common.

Following principle *NC* and considered how we specified the *Overlapping Condition*, table *a* might have been originally made of β, but not out of γ. However, for a different line of reasoning, it rather seems that *a* might have been originally made of γ. Indeed, given that *a* might have been originally made of β, and that β sufficiently overlaps γ, then it is possible that *a* is made out of γ. This happens because of principle *MT* together with the logic of modal system *S*4. If so, it is possible that *a* is originally made out of γ and it is impossible that is originally made out of γ, which is contradictory. Let us have a closer look at this.

First, at w_1 it is the case that:

1. w_1: $Or(a, \alpha)$

Given that γ, i.e. the hunk of matter at w_3, does not sufficiently overlaps α - for they only have two of four parts in common - it follows that *a* might *not* have been originally made from γ. This is true in virtue of *NC*:

2. w_1: $Or(a, \alpha) \longrightarrow \neg\Diamond Or(a, \gamma)$

By *modus ponens*, applied to 1 and 2, it follows that

3. w_1: $\neg\Diamond Or(a, \gamma)$

Namely, it is impossible that *a* is originally made out of γ.

However, given that β, i.e. the hunk of matter at w_2, sufficiently overlaps α - for they have three of four parts in common - it follows that *a* might have been originally made out of β. This is true in virtue of principle *MT*:

4. w_1: $Or(a, \alpha) \longrightarrow \Diamond Or(a, \beta)$

By applying *modus ponens* to 1 and 2 it follows that

5. w_1: $\Diamond Or(a, \beta)$

Now let us focus on the fact that γ sufficiently overlaps β and β sufficiently overlaps α. In virtue of *MT*, it is the case that

6. w_1: $\Diamond Or(a, \beta) \longrightarrow \Diamond\Diamond Or(a, \gamma)$

Namely, if it is possible that *a* is originally made out of β, then it is possibly possible that *a* might have been originally made out of γ. Then, if we apply *modus ponens* to 5 and 6, it follows that

7. w_1: $\Diamond\Diamond Or(a, \gamma)$

Since we are endorsing modal system *S*4, it is also the case that if something is possibly possibly the case, then it is simply possibly the case. Thus:

8. w_1: $\Diamond\Diamond Or(a, \gamma) \longrightarrow \Diamond Or(a, \gamma)$

And, again, by *modus ponens* - applied to 7 and 8 - it is the case that

9. w_1: $\Diamond Or(a, \gamma)$

So, it is possible that *a* is originally made out of γ.

However, if we conjoin 3 and 9, we end up in contradiction:

10. w_1: $\Diamond Or(a, \gamma) \,\&\, \neg\Diamond Or(a, \gamma)$

In other words, it is both possible and impossible that *a* is originally made out of γ.

Let us make a comparison between *MP*1 and *MP*2. First of all, let us visualize the structure of these two version of the paradox:

*MP*1: $MT, NC, SC, S4, NI \vDash \bot$

*MP*2: $MT, NC, S4 \vDash \bot$

Namely, the crucial difference between the two elaborations of the paradox is that they are derived from two different sets of assumptions. Still, in both cases we derive a contradiction ($\bot$).

Despite it looks different, the contradiction just derived in *MP*2 has the core features of the one derived in *MP*1, i.e. in both cases it is possible and impossible that the very same table originates from a particular hunk of matter. What is important is that, in both the versions of the paradox, $\bot$ has the same *form*, i.e.

$\bot$: $\Diamond P \,\&\, \neg\Diamond P$

and they partially share the content of sentences to be substituted to the metavariable *P*, for in both cases it contains the predicate

Or (—, —)

Thus, in both cases, $\bot$ is a modal contradiction about the original material constitution of tables.

Sure, there are also differences at play. Indeed, in *MP*1, $\bot$ contains also the concepts of identity, and distinctness, together with existential quantifiers and variables bonded to them ('$\Diamond\exists x\,(Or(x, \gamma) \,\&\, x \neq a) \,\&\, \neg\Diamond\exists x\,(Or(x, \gamma) \,\&\, x \neq a)$'), while in *MP*2 these concepts are not deployed. This fact also makes highlight that *MP*2 is more *intuitive* then the original one. What I mean with 'intuitive' is that it uses less elaborated metaphysical concepts. Indeed, the very same principle *NC* is not here intended as a principle about the identity of tables. It simply tells us something about a specific table, named '*a*', without recurring to quantification and identity. So, in a sense, this version of the paradox is less general then the original one, for it focuses only on a specific table and it avoids the deployment of metaphysical general concepts like identity and distinctness.

Much more will be said about alternative elaborations of Salmon's modal paradox (see Ch. 2 and Ch. 3); a third version of the paradox will be also outlined. What matters at the moment, is to remark the possibility of developing Salmon's paradox without deploying principles *SC* and *NI*. This matters because, if you believe that the problem is due to the inconsistency of the assumed metaphysical principles, then you should not consider rejecting either *SC* or *NI* as a good uniform solution, for they are not needed to develop *MP*2.

§6 *Conclusion*

In this chapter, I offered an exposition of Salmon's modal paradox mainly as it appears in his 1986 essay *Modal Paradox* (*MP*1). I did this by outlining all its theoretical assumptions.

On the one hand, the paradox is rooted in the metaphysical picture promoted by principles *SC*, *NC* and *MT*. On the other hand, the paradox is generated when we endorse a precise perspective on metaphysical modality. Namely, to be developed, the paradox requires the endorsement of the modal system *S*4 (or, if you prefer, *S*5, which is an extension of *S*4). On top of this, we also need to endorse *NI*, i.e. a metaphysical account of the necessity of identity (and distinctness) - namely, the idea that numerical identity claims are true in every possible world - and its transitivity.

I also illustrated an alternative version of the paradox, i.e. a simpler version of it presented by Salmon in his 1984, 1989 and 1993 essays (*MP*2). This alternative version of the paradox shows that to reach a contradictory modal claim about the original constitution of tables it is sufficient to endorse *NC*, *MT* and the axiom *S*4.

The conclusion of this exposition is that the problem raised by Salmon's modal paradox is a problem of consistency: one of the assumptions must go if we want to dissolve the contradiction and save the metaphysics of origin essentialism. This is the starting point for a more specific analysis of Salmon's modal paradox. I outline this analysis in the following two chapters.

Chapter 2 is devoted to solutions already advanced, i.e. Salmon's own solution, and the solutions offered by Graham Forbes and Sarah-Jane Leslie. Salmon's solution is to drop the modal system *S*4, so his diagnosis of the paradox is that it arises because we misconceive the logic of metaphysical modality. Forbes and Leslie, instead, offer an alternative diagnosis, according to which the logic of metaphysics should not be blamed. Rather, they sustain that the paradox arises because we are misunderstanding the very metaphysical picture that we are endorsing. So, if we refine some metaphysical ideas, the paradox does not arise.

In Chapter 3, I will give my response to these solutions. I will argue that they are not able to solve Salmon's modal paradox, and this is due to the fact that we can outline the paradox in a third different way. I call this third alternative paradox *the revenge* of Salmon's modal paradox, but for clarity, it will be called *MP*3. This alternative development of the paradox leads to the same contradictory conclusions as Salmon's 1986 development of it. However, the revenge of the paradox deploys a different model, and this fact can be used to show that the above solutions are based on a misconception of the paradox itself. I will use this result to motivate a different solution to the paradox, i.e. rejecting *MT*.

2. *Solving Salmon's Modal Paradox*

§1 *Introduction*

In this chapter, I analyze the solution to Salmon's modal paradox so far advanced. There are three major options on the table. The first one is Salmon's solution, according to which the paradox arises because we misconceive the (modal) logic of metaphysics. So, solving the paradox amounts to correctly interpreting the logic underlying origin essentialism (§2). The second option is Forbes' idea that we should get rid of the concept of identity when articulating *origin essentialism* (and metaphysical ideas in general) and replace it with the notion of *counterparthood* (§3). The third solution is offered by Leslie, who argues that only under a more adequate conception of essentialism we can dissolve the paradox (§4).

Let me go through these solutions and explain how they intend to solve Salmon's paradox. I will mainly focus on *MP*1, but I will also explain how the solutions deal with *MP*2. As anticipated, I am going to develop the paradox through a third different model and show that the solutions advanced to Salmon's original paradox are useless in this case. Given this, it is instructive to look at the way in which Salmon's paradox is (allegedly) solved, so it will be clearer why these solutions fail in the case of the revenge of the paradox that will be elaborated in chapter 3.

To anticipate the results of the following analysis, it will turn out that Salmon and Leslie's solutions looks like they can solve both *MP*1 and *MP*2. Forbes' case is different, instead. First, the solution he envisages has to be separated from his wrong diagnosis of the paradox and further elaborated. Still, while this Forbes-style solution works for *MP*1, it does not work for *MP*2.

§2 *Salmon's own Solution: Rejecting S*4

Salmon's diagnosis of the paradox is that it arises because we deploy a system of modal logic that is fallacious in the context of metaphysical modality, i.e. the system *S*4. With his words:

> In the *Four World Paradox*, though it might have been that it might have been that some table distinct from *a* is formed from hunk [γ], it is fallacious to infer that it might have been that some table distinct from *a* is formed from [γ].
>
> SALMON 1986, p. 82

So, it is clear from these words that Salmon's diagnosis of the paradox is that it arises because of *S*4 characteristic axiom. Within the framework of possible worlds, this axiom makes the accessibility relation among possible worlds a transitive relation. In the above scenario, this means that if w_3 is accessible to w_2 and w_2 is accessible to w_1, then w_3 is accessible to w_1 - and this is the reason why we can conclude that at w_1 it is possible that there exists a table that originates from γ and that is different from *a*. From a formal point of view, the axiom *S*4 allows us to infer that something might have been the case from the fact that it might have been that something might have been the case. Let us look at more details of this solution focusing on how it deals with *MP*1. The way *MP*2 is solved by Salmon's idea proceeds analogously.

Once we declare that *S*4 is not a good axiom for metaphysical modality, it follows that we drop the idea that, in metaphysical contexts, the accessibility relation between possible worlds is transitive. Namely, if a world w_3 is accessible by a world w_2 that is, in turn, accessible from a world w_1, then it does *not* follow that w_3 is accessible from w_2. Once this is the case, *S*4 is no more the logical system we deploy.

From this, it follows that we can accept without contradiction the following two facts. First, at w_3 it is the case that there exists a table *c* that is originally formed from γ that is identical to *b*, and hence distinct from *a*. Second, at w_1 it is *possibly possible* that there exists a table *c* that is originally formed from γ and that is different from *a*. The crucial point is that, since w_3 is not accessible from w_1, it is *not* the case that at w_1 it is *possible* that there exists a table *c* that is originally formed from γ and that is different from *a*. So, at w_1, on the one hand, it might *not* have been the case that a table identical to *a* is formed from γ; on the other hand, it might have been that it might have been that a table identical to *a* is formed from γ. These two possibilities are not contradictory.

From a formal point of view, this problem leads to the derivation of a contradiction:

C $\quad w_1$: $\quad \Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)\ \&\ \neg\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)$

However, when the accessibility relation is not transitive, *C* cannot be derived.

Following Salmon, rejecting the axiom *S*4 invalidates step 15 of the derivation, and so it prevents the further step that leads to C_2, i.e.

C_2 $\quad w_1$: $\quad \Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a))$

Once this conjunct cannot be derived, the entire contradiction cannot be derived, for C_2 is one of the conjuncts of the problematic contradiction. At most, once *S*4 is not our logic anymore, we can derive the following conclusion in place of C_2:

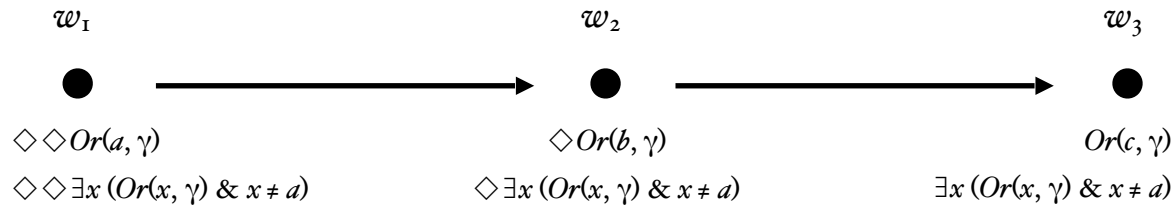
$C_2^{\#}$ w_1: $\Diamond\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a))$

If we conjunct $C_2^{\#}$ with C_1 we obtain the following general conclusion

$C^{\#}$ w_1: $\Diamond\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)\ \&\ \neg\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)$

And this is not contradictory. $C^{\#}$ simply expresses the idea that while it is impossible that there is a table that is originally made from γ and that is different from *a*, it is possibly possible that such a table exists.

Let us look again at the diagram, but without the transitivity of the accessibility relation in place:



Look at w_3: there is a table *c* originating from γ. From the perspective of w_2, it is possible that *c* originates from γ, for w_3 is accessible to w_2. Given this, from the perspective of w_2, *b* is identical to *c*. Indeed, γ and β sufficiently overlap, and so it is possible that *b* originates from γ. But if it is possible that *b* originates from γ, then any table originating from γ is identical to *b*. Thus *c* is identical to *b*. This is the standard reasoning scheme allowed by origin essentialism. Is this reasoning allowed at w_1? No, at w_1 it is not the case that it is possible that there is a table that originates from γ and that is different from *a*. Rather, it is possibly possible that such a table is generated from γ.

Now think about *MP*2. Salmon's idea is to get rid of a common assumption between the two versions of the paradox, i.e. the axiom *S*4. Thus, the way *MP*2 is solved by this strategy is exactly the same, for we block the step of the derivation where the axiom *S*4 is applied, i.e.

7. w_1: $\Diamond\Diamond Or(a, \gamma)$

8. w_1: $\Diamond\Diamond Or(a, \gamma) \longrightarrow \Diamond Or(a, \gamma)$

9. w_1: $\Diamond Or(a, \gamma)$

To the effect it is not possible that *a* is originally made of γ, but it is only possibly possible that this is the case.

Thus Salmon's strategy seems to solve both *MP*1 and *MP*2 in a uniform way, for in both cases it advices to drop a common assumption. If Salmon is right, then the paradox arises because we are adopting a modal system allowing us to make an inference that it is actually fallacious in the context of metaphysical modality. Namely, the crux of the problem is the logic we deploy when we reflect on how things might have been different in metaphysical contexts that involve the original constitution of artifacts.

§3 *Forbes' Interpretation and a Forbes-style Solution: Counterpart Theory*

A different solution to the paradox is to embrace the *counterpart theory*, as suggested by Forbes. Roughly, Forbes' idea is to replace numerical identity with counterparthood, which is a transworld relation of *similarity*.[9] This replacement is contextual, in the sense that Forbes does not want to get rid of numerical identity once and for all in every metaphysical context; rather, Forbes argues that endorsing counterparthood is the best choice to make sense of origin essentialism and the metaphysics of original constitution of tables. If we accept this idea, it follows that tables across the modal space are related through the relation of counterparthood, and not through numerical identity, but through counterparthood.

Forbes proposed this solution on the basis of a specific interpretation of Salmon's paradox. This interpretation comes within a more general analysis of paradoxes about vagueness (see FORBES 1986). In what follows, I am not criticizing Forbes' interpretation of this family of paradoxes. Rather, I simply would like to point out that Salmon's paradox cannot be interpreted as a paradox belonging to this family. I do this in (§3.1). In particular, I would like to show this by focusing on the inferential scheme that Forbes believes to be at the bottom of Salmon's paradox. My aim is to show that this inferential scheme does not play the role envisaged by Forbes.

Still, I want to take seriously Forbes' suggestion that counterparthood can help us to solve Salmon's paradox, but for a different reason than the one pushed forward by him. In this way, we can outline a *prima facie* genuine competitor solution to Salmon's one (§3.2). Nonetheless, even this *prima facie* alternative faces a problem when it comes to solve the alternative and simpler elaboration of Salmon's paradox. Indeed, in this variant of the paradox we do not rely on *SC* and *NI*, and thus we do not reason in terms of numerical identity. Hence, substituting counterparthood in place of numerical identity does not seem a good way to solve the paradox (§3.3).

Before beginning the analysis of Forbes' solution, let me recall what will happen in the next chapter: as I have already claimed, I will show that there is a third different way to develop Salmon's paradox that resists the solutions I am considering in this section. This

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[9] Counterparthood has been firstly introduce by David K. Lewis (see LEWIS 1968; the counterpart theory is further developed in LEWIS 1986). Of course if we accept counterparthood we should rewrite *SC*, *MT* and *NC* in terms of counterparthood.

holds also for the endorsement of counterparthood: it will not solve this third way of developing Salmon's modal paradox.

§3.1 *Salmon's Paradox is not about Vagueness*

Forbes' general argument in favor of endorsing counterparthood to solve Salmon's paradox can be outlined in the following (and very general) way:

1. Salmon's paradox is rooted in a problem of vagueness;
2. By replacing transworld identity with counterparthood we solve the problem of vagueness;
3. Hence, Salmon's paradox is solved by replacing transworld identity with counterparthood.

This is the general argument motivating Forbes' solution. As I anticipated, I believe that this approach to Salmon's paradox is flawed, for premise 1 of Forbes's argument is false: Salmon's paradox is not rooted in a problem of vagueness. Rather, I believe that Salmon's paradox arises to warn us that, even under the assumption that the problem of vagueness is solved, we still face a problem of consistency due to the conjunction of inconsistent principles.

Forbes believes that Salmon's paradox is not an isolated phenomenon, but it belongs to a more general family of paradoxes about vagueness. I disagree with this diagnosis of the paradox, for I believe that Salmon's paradox arises under the assumption that vagueness can be managed in the context of origin essentialism. This happens because we are assuming that *MT* and *NC* embed a specification of the *Overlapping Condition*, i.e. the condition that tells us when two hunks of matter sufficiently overlap. Let me explain my point in two steps. First, let me expose the heart of Forbes' diagnosis. Second, let me argue why this diagnosis does not fit Salmon's paradox.

Let me begin by briefly and intuitively presentation of the problem of vagueness. The best way to do this is by introducing the so-called *Sorites paradox*.[10] Imagine you have a heap of stones that is formed by, say, ten stones. Then ask yourself: "If I get rid of one stone, do I still have a heap?". The answer seems straightforward: "Yes, I have a heap of nine stones". Now, iterate this question each time you get rid of a stone. Eventually, you will be in front of a heap of two stones, and you will ask yourself: "If I get rid of one stone, do I still have a heap?". Now the question is less straightforward, for if you get rid of one stone you will be left with a heap of one stone; but one stone is not enough to make a heap.

The situation just sketched should raise the following general question: "Where is the limit after which I cannot get rid of one stone without destroying the heap?". This que-

[10] This paradox was firstly developed by Eubulides of Miletus, during the IV century BC. A great overview of the debate of this paradox in Ancient Greek can be found in WILLIAMSON 1994, ch.1.

stion is subtler than it *prima facie* seems. Indeed, you could easily think that the limit is related to the number of stones. So, when you have two stones you cannot get rid of one stone and still have a heap. However, things are not so easy, for you can always ask: "*Why* is getting rid of one stone so influent when I have two stones but not when I have ten stones?". The root of the sorites paradox is giving an answer to this why-question. The point is not simply to individuate a limit point; we have to explain what makes this point so different from others.

This kind of reasoning can be applied also to the case of material constitution of tables. Let us use a temporal example, before delving into the more complex modal case. Consider table *a*, which is made up of L_1, L_2, L_3, L_4. Now, it seems intuitive to believe that if we replace one part of table's *a* matter, *a* is still the same table - it only has something different. This idea is analogous to principle *MT*: we can tolerate small differences. So, suppose that after the replacement, *a* is made up of L_1, L_2, L_3, L_5. Now, this reasoning can be iterated. Let us replace another part of *a*'s matter, and we obtain that *a* is now made up of L_1, L_2, L_5, L_6. However, by accepting the idea that replacing one part of *a*'s matter does not make the difference for *a*'s identity, we end up facing a hard conclusion: *a* can be made of entirely different parts. Indeed, eventually, we will reach a point where we will replace the *last* part of *a*'s original matter, and since we are tolerant about this replacement, we will end up having *a* made of a radically different set of parts as it originally was. In this situation, we are pushed towards the same questions as the case of the heap and the bald man: "Where is the limit point after which *a* is no more the same table?", "Why do we isolate this or that limit point, if any?".

The problem of vagueness exposed in the case of the heap and temporal change of tables can be outlined also in modal terms, i.e. when it comes to understanding how things might have been different or how they can possibly be. If you follow Forbes' idea is that Salmon's paradox is a case like this. Indeed, the paradox assumes, among other things, that origin essentialism accepts the principle *MT*, and so we accept a form of tolerance that resembles the one endorsed in cases of vagueness. However, I think this interpretation is misguided.

My point against interpreting Salmon's modal paradox as a paradox of vagueness is that there is a crucial difference that overcomes any similarity: Salmon's paradox *assumes* that there is a clear limit point after which a table is no more the same table. What I believe is the most salient feature of this paradox is that it shows that there is a much more radical problem than vagueness when it comes to origin essentialism. To show this, let me explain how Forbes interprets Salmon's modal paradox and then explain how the assumption of there being a clear limit point runs against this interpretation.

According to Forbes, there is a precise inferential pattern behind Salmon's paradox, when understood as a paradox about vagueness. This pattern is described by an inferential scheme, i.e. a formal structure that depicts a particular way of deriving a conclusion from a set of premises. The inferential scheme is this:[11]

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[11] I offer a formalization of the scheme according to the vocabulary so far defined. Forbes' uses a different syntax, and it would be uselessly complex to expose the scheme with his syntax first and then translate it with my dictionary. For the original Forbes' articulation of the scheme see FORBES 1983, p. 3.

$\Diamond Or(t, m_1)$

$\Diamond Or(t, m_1) \longrightarrow \Diamond Or(t, m_2)$

.

.

.

$\Diamond Or(t, m_{n-1}) \longrightarrow \Diamond Or(t, m_n)$

$\Diamond Or(t, m_n)$

To get what the scheme is telling us, let us look at its syntax first. As usual, I am using '*Or*' as a predicate for *being originally made from*, '*t*' as a name for a table whatsoever, and '*m*' as a name for hunks of matter. However, *m* is indexed in such a way that 'm_1' stands for a hunk of matter as it is in the actual world, while 'm_n' stands for an entirely different hunk of matter. Each index from '1' to '*n*' represent a small change in the constitution of the hunk. So, suppose that 'm_1' is composed of parts L_1, L_2, L_3, L_4, L_5, L_6. Under this supposition, m_2 in the scheme is a hunk of matter that differs from m_1 only for one part, e.g. L_1, L_2, L_3, L_4, L_5, L_7 (where L_7 replaces L_6). Along these lines, m_{n-1} is a table that has only *one* part in common with m_n (e.g. L_1, L_7, L_8, L_9, L_{10}, L_{11}) and m_n is a hunk of matter that does not have *any* part in common with m_1 (e.g. L_7, L_8, L_9, L_{10}, L_{11}, L_{12}).

Under these specifications, we can read the schema as follows. Suppose it is possible that *t* is originally made from m_1. According to the intuition of modal tolerance, it might have been the case that *t* - the very same table - is originally made from m_2, which is a hunk of matter extremely similar to m_1, for they differ only for one part. If so, it might also have been the case that *t* is originally made from m_3, which differs from m_2 for only one part. But if we proceed along these lines, we will end up concluding that it might have been the case that *t* is originally made from m_n, which is *completely* different from m_1. This happens because at each stage we admit the possibility that *t* is originally formed from a hunk of matter that differs for only a single part from the hunk of matter of the previous stage. When we reach the stage where it is possible that *t* originates from m_{n-1} by admitting again the possibility of a change of one part, we end up admitting the possibility that *t* could have been originally made from a hunk of matter that has no parts in common with m_1. By accepting this conclusion, we contradict the very idea of origin essentialism, i.e. the idea that the original material constitution of an artifact is essential to the artifact.

The idea of the inferential scheme can be shaped in a more intuitive fashion through the framework of possible worlds. It is sufficient to assign a possible world at every stage, i.e. a possible world w_1 where *t* originates from m_1, a possible world w_2 where *t* originates from m_2, …, a possible world w_{n-1} where *t* originates from m_{n-1} and possible world w_n where *t* originates from m_n. Once we accept that w_n is accessible to w_1, we end up facing the unappealing idea that it is possibly the case that *t* originates from a hunk of matter that is completely different from m_1.

This is a way of describing the problem of vagueness in a modal context. The problem is that there is a way to build a succession of concatenated possibilities, each of which is admittedly possible on the basis of the smallest degree of changes in the conditions of the original constitution of an artifact. In this way, we start from what we take to be solid metaphysical ideas and we end up accepting the truth of ideas that clash with their metaphysical starting point.

This interpretation underestimates the fact that Salmon's modal paradox assumes a precise specification of the *Overlapping Condition* that is contained in *MT* and *NC*. Recall the idea behind these principles by focusing on the example we are discussing in this section. *MT* claims that if a table is originally made by a hunk of matter, then it might have been the case that the table is originally made by a sufficiently similar hunk of matter. So, if t is originally made from m_1, then it might have been the case that t is originally made from a different hunk of matter, say, from m_2, as long as m_2 sufficiently overlaps m_1. This is crucial also for *NC*, according to which if a table, call it 't^*', is originally made from a hunk of matter that does *not* sufficiently overlap m_1, then t^* is not the same table as t.

Salmon, as already said, recognizes the possibility that a region of vagueness surrounds the *Overlapping Condition*, in the sense that it is extremely hard, if not undoable, to understand exactly what counts as a truly sufficiently overlapping hunk of matter. Still, he wants to show a different point through his paradox, and the point is this: even *assuming* that we can stipulate a specification of the *Overlapping Condition*, we nonetheless face a problem that does not depend on this or that specific stipulation. This can be paraphrased along the following lines: let us assume that the region of vagueness surrounding the *Overlapping Condition* is set aside; still, we face a problem of consistency.

This assumption of Salmon's paradox is now crucial to evaluating Forbes' diagnosis. Indeed, under the assumption of this or that specification of the *Overlapping Condition*, Salmon is exactly imposing a limitation on the role played by vagueness. Following the picture advanced by Forbes, Salmon's assumption can be interpreted as setting a threshold that locks the inferential scheme of vague reasoning in modal contexts. This threshold, according to the assumption, must lie somewhere in between the series of possible worlds w_1, w_2, …, w_{n-1}, w_n.

To get the point, consider that the series of possible worlds follows the list of conditional sentences of the inferential scheme so that

w_1: $\Diamond Or(t, m_1) \longrightarrow \Diamond Or(t, m_2)$

w_2: $\Diamond Or(t, m_2) \longrightarrow \Diamond Or(t, m_3)$

…

w_{n-1}: $\Diamond Or(t, m_{n-1}) \longrightarrow \Diamond Or(t, m_n)$

Salmon's assumption postulate the presence of a world w_i that lies within the series of possible worlds w_2 , …, w_{n-1} (where w_i can coincide with w_2 or w_{n-1}) and according to which there is a false conditional that blocks the inference. This world is a world where a hunk of

matter m_i does *not* sufficiently overlap m_1, and according to which the following conditional holds

$$\Diamond Or(t, m_1) \longrightarrow \neg\Diamond\exists x\,(Or(x, m_i) \,\&\, x = t)$$

Namely, once the *Overlapping Condition* is specified, and w_i postulated, we stipulate that the series of possible worlds leading to w_n can be interrupted at a certain point. Indeed, once the threshold is set, there must be a point where the differences between hunks of matter are declared to be so drastic that the hunks do not sufficiently overlap. Namely, there is no world in which it is possible that a table is identical to *t*, if it originates from a hunk of matter that does not sufficiently overlap m_1.

Once this fact is recognized, it should result clear that Forbes's diagnosis is incorrect. Indeed, Salmon's paradox is not a particular case of a more general class of paradoxes about vagueness. Rather, it is a paradox that arises exactly under the assumption that we can get rid of the region of vagueness surrounding the *Overlapping Condition*, which is a constitutive part of two principles (i.e. *MT* and *NC*) that are deployed to derive a contradiction that undermines the viability of origin essentialism. What I have shown so far does not concede to Forbes the crucial motivation of the solution he advances.

§3.2 *Replacing Numerical Identity with Counterparthood*

Despite Forbes' diagnosis being imprecise to fit the present context, he nonetheless proposes an interesting treatment for Salmon's paradox, i.e. replacing the transworld relation of numerical identity with the transworld relation of counterpart theory. A proposal with a Lewisian flavor, since Lewis was the first one to advance the idea that modal contexts have to be analyzed by adopting counterparthood instead of numerical identity. Let me expose how Forbes' solution works in the case of *MP*1.

The crucial feature of the counterpart theory is that it replaces transworld identity with a different relation linking individuals in different possible worlds. This is a relation of similarity, and this fact is a good reason to motivate Forbes' solution (instead of motivating it through the problem of vagueness). Indeed, when origin essentialism is rephrased through counterparthood, we block the derivation of a contradiction assuming the principles of origin essentialism. To get this point, let me explain what rephrasing origin essentialism through counterparthood amounts to and then why this blocks the derivation of a contradiction.

When counterparthood is endorsed in place of the relation of numerical identity, *de re* modality behaves differently. If we claim that something is possibly the case about an object *x*, this possibility does not hold in virtue of *x* being so-and-so in this or that possible world. So, if at a world w_1 it is possibly the case that *Fx*, this is not true because there is a possible world w_2 where *x* is *F*. Instead, if it is possibly the case that *Fx*, this is true in virtue of a counterpart of *x* that is *F* at w_2. So, for example, if we claim that, at w_1, table *t* could be red, this claim is true if a counterpart of *a*, call it *t**, is red at a different possible

world accessible to w_1. What is crucial is that it is not *a* (or something numerically identical to *a*) that is red at some possible world.

This fact has an impact on how origin essentialism has to be understood. Indeed, once the relation of counterparthood is endorsed, modal facts about the original constitution of a table are made true or false by its counterparts in different possible worlds. So, consider that it is essential for a table *t* that is originally made from *m*. This fact is represented in the modal space by the fact that every counterpart of *t* is originally made from *m* in every possible world. Or, more specifically, every counterpart of *t* is originally made from counterparts of hunks of matter of *m*. Indeed, once counterparthood replaces identity, also hunks of matter have to be related across possible worlds to their counterparts.

Once origin essentialism is rephrased along these lines, the model exploited by Salmon's paradox has to be understood in a different way. Look again at it. We now face the following situation: at w_1, table *a* originates from α; at w_2, table *b* originates from β; at w_3, table *c* originates from γ. Given that β does not sufficiently overlap α, *b* is not a counterpart of *a*. Given that γ sufficiently overlaps both α and β, *c* is a counterpart of both *a* and *b*.

This that *c* is the counterpart of both *a* and *b* is not as problematic as it was the idea that *c* is numerically identical to both *a* and *b*. Indeed, while identity is a transitive relation, counterparthood is a non-transitive one. This is due to the fact that counterparthood is a similarity relation, and similarity relations are non-transitive. Recall the intuitive formulation of Salmon's original problem: at w_3, table *c* is identical to both *a* and *b*; so, *b* must be identical to *a*; but origin essentialism denies this identification, for *b* comes from a hunk of matter that does not sufficiently overlap α, which is the hunk of matter constituting *a*. When counterparthood is endorsed, and given that it is a relation of similarity, we are not pushed towards the identification of *b* and *a*. Indeed, from the fact that *c* is a counterpart of both *a* and *b*, it does not follow that *b* has to be counterpart of *a*.[12]

Consider this through an example about similar things. Take three objects: a red pen, a blue shirt and a red shirt. The red pen is similar to the red shirt, for they both share a feature, i.e. they are both red. In the same way, the blue shirt is similar to the red shirt, for they are both shirts. We find ourselves in the same situation as the one described by the model (but in a non-modal context): the red shirt is similar to both the blue shirt and the red pen, for it shares a feature with both of them. However, from this fact, we cannot conclude that the red pen and the blue shirt are similar, for they do not have common features. In the same way, *c* share something about its original constitution with both *a* and *b*, but *a* and *b* does not share anything about their original constitution.

From a formal point of view, when origin essentialism is phrased in terms of counterparthood, the contradiction of Salmon's paradox is no more derivable. In particular, one of its conjuncts is not derivable anymore. To show this, however, it is crucial to consider that Salmon's paradox should be completely rephrased if counterparthood is endorsed. Indeed, we are no more endorsing numerical identity, and so any modal claim involving this relation has to be replaced by a claim about counterparthood. This means that if it *were*

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[12] This point is examined both in FORBES 1984 and WILLIAMSON 1990.

possible to derive Salmon's contradiction by assuming origin essentialism rephrased in terms of counterparthood, this contradiction *would* be the following one:

C^+ w_1: $\Diamond\exists x\,(Or(x, \gamma) \,\&\, \neg(x \approx a)) \,\&\, \neg\Diamond\exists x\,(Or(x, \gamma) \,\&\, \neg(x \approx a))$

Taking '$x \approx a$' to mean 'x is counterpart of a', C^+ express the following fact: it is possible that a table x originates from γ and it is not a counterpart of a *and* it is impossible that a table x originates from γ and it is not a counterpart of a.

If you compare C and C^+, you will notice that there is a crucial difference between the two contradictions: where C deploys numerical identity, C^+ deploys counterparthood. This difference is given by the fact that while Salmon's original paradox assumes the principles of origin essentialism formulated through numerical identity, C^+ assumes the same principles formulated through counterparthood.

With this in mind, my point is that C^+ cannot be actually derived, for the first conjunct of C^+ does not follow from the principles of origin essentialism phrased with counterparthood. The first conjunct of C^+ claims that

w_1: $\Diamond\exists x\,(Or(x, \gamma) \,\&\, \neg(x \approx a))$

Namely, it claims that is possible that exists a table x that is originally made from γ and that is not a counterpart of a. But this is actually impossible with counterparthood in place. Indeed, there is no such possibility in the model. Namely, there is no table in any possible world that is originally made from γ and that is *not* a counterpart of a. This can be proved by looking at the worlds of the model. At w_2, there is a table that is not a counterpart of a, i.e. table b. However, b does not originate from γ. Instead, at w_3, there is a table that originates from γ, i.e. c. However, c *is* a counterpart of a. Hence, there is no table in any possible world that satisfies the condition

$Or(t, \gamma) \,\&\, \neg(t \approx a)$

Given that there is no such table, the conjunct is not derivable, and this means that we cannot prove the overall conclusion C^+.

§3.3 *A Weak Strategy for a Simpler Paradox*

Despite Forbes' replacement of identity with counterparthood seems to be a viable solution for *MP*1, it fails to provide a solution for *MP*2. Indeed, this second version of the paradox does not endorse *NI*, i.e. the metaphysical account of identity originally endorsed in the more complex version of the modal paradox. Given that Forbes' proposes to replace identity with counterparthood, in this case the replacement is useless, for there are no identity relations to be replaced by counterparthood. Indeed, *MP*2, does not involve any identi-

ty claim; it is developed by simply focusing on single table *a* and its modal features. Let us examine some details of this fact.

If we follow Forbes' strategy, claims about what is possible about *a*'s original constitution are made true by the presence of counterparthood at the possible world where the possibility under account is actually the case. So, the claim

w_1: $\Diamond Or(a, \beta)$

Is made true by there being a table - call it *d* - at w_2 that is actually made out β and that it is a counterpart of *a*. The same holds for the claim that it is possible for *a* to be originally made out of γ. In this third case we should imagine a third table - call it *k* - that is a counterpart of *d*. Hence, the following claims would be true

w_2: $Or(d, \beta)$

w_3: $Or(k, \gamma)$

It is in virtue of this facts that further modal claims about *a* are true - i.e. that it can possibly be made out β and that it is possibly possible that *a* is made out of γ.

However, given that *MP*2 does not assume *NI*, and so no explicit identity claim is made, Forbes' proposal is unable to block the derivation of the contradiction of the paradox. At most, through this strategy we could give a different semantics for the modal sentence involved in the derivation. This, in turns, depicts the metaphysical scenario in a different way. But what is crucial is that this change of perspective is insufficient to avoid a modal contradiction about *a*. Namely, following this strategy we are not able to falsify any claim or invalidate any step of the derivation.

Recall how Forbes' suggestion deals with *MP*1: it makes us think that the contradiction we derive is only apparently a modal contradictory claim. This does not happen in the case of *MP*2. To see this, consider the contradiction we reach in this second case:

w_1: $\Diamond Or(a, \gamma) \ \& \ \neg\Diamond Or(a, \gamma)$

Following Forbes's suggestion, we know that this contradiction depicts a scenario where are involved counterparts of *a* - i.e. *d* and *k*. However, this semantic adjustment does not dissolve the contradiction, but it simply gives it a different meaning. The contradiction is still there and it is a truly contradictory modal claim about *a*. No matter that its meaning is due to there being two counterpart-tables *d* and *k* at, respectively, w_2 and w_3.

This means that a Forbes-style solution of Salmon's modal paradox is not a good uniform solution, for it does not work for all the possible versions of the paradox. Indeed, when it comes to *MP*2 this solution does not work, for there are no trans-world identity claims to be re-interpreted through counterparthood. As I will show in Chapter 3, a For-

bes'-style solution does not efficiently work also in the case of a third elaboration of the paradox.

§4 *Leslie's Essentialism: Plenitude and Tolerance*

Another solution that aims to solve the paradox and save origin essentialism has been advanced by S.J. Leslie (LESLIE 2011). The core of her idea is twofold. On the one hand, Leslie believes that the paradox arises because we *misconceive* – at least partially – the very idea of *essentialism*, i.e. the idea that some properties are essential to individuals while others are accidental. Indeed, she firmly holds that it is difficult and perhaps impossible to accept essentialism without accepting the existence of a *plenitude* of entities. Once this view is endorsed, we are also pushed to believe that co-location of entities is metaphysically possible and unproblematic, if we can clearly discriminates co-located entities.

On the other hand, Leslie thinks that when we accept modal tolerance in the context of origin essentialism, we must be ready to accept the idea that the very essence of entities is tolerant. This means that essences are not determined by a single property or relation, but by a *set* of possible properties and relations. Leslie argues that once these two points are taken into account, the paradox vanishes. So, let me illustrate these ideas and how they should dissolve Salmon's modal paradox.

Let us begin with the idea of plenitude, which can be intuitively sketched by the following example. Let us consider Socrates and accept the idea that he has some essential properties, e.g. *being a person*. He also has accidental properties, e.g. *being sitting*. This means that Socrates is the very entity it is as long as he possesses the property of *being a person* – without which he does not exist. The same does not hold for his accidental features: Socrates can stand up, losing the property of *being sitting*, but without going out of existence. However, if you accept the existence of a plenitude of entities, you would accept that, while Socrates is sitting, a *further* entity exists. This additional entity is the one that possesses the property of *being sitting* as an essential property. As a result, while Socrates is sitting there are more entities than common sense is ready to accept: there is Socrates, who will still be existent when he will stand up, and there is something that we could call "*Sitting-Socrates*", which is an entity that goes out of the existence at the same time in which Socrates stands up.

The pivotal point of this account is that essences have some kind of *priority* as regards what exists. Another way to put this is in extensional terms. Consider a set of three properties $\{A, B, C\}$ at a given time *t*. Following the idea of plenitude, from this set, we obtain that there exist at least seven entities at *t*, and each is determined by a subset of essential properties taken from the set. So there exists an entity *a* that has only A as an essential property; an entity *b* the essence of which is given by B alone; an entity *c* essentially determined only by C; an entity *d* the essence of which is given by the conjunction of B

and *C*; and so on, until we have unpacked all the possible combinations of essential properties.[13]

According to Leslie, this is the first crucial idea we ought to endorse to solve the paradox.[14] This is because across the *modal space* in our scenario there are more entities than we usually recognize, and this leads us to misconceive the *identity* relations involved in the model of the paradox. Basically, according to Leslie's account, there are a lot of different entities that have as essence different amounts of matter. So, for example, focusing on the model of *MP*1, at w_1 there are more entities than we are ready to expect: there is an entity that is essentially originated from L_1; one which is essentially originated from L_2, and so on. Among these entities, only one of them is *a*, i.e. the table that is essentially originated from L_1, L_2, L_3, L_4. According to *MT* (and the transitivity of the accessibility relation), this means that this entity somehow "*persists*" through the modal space from w_1 to w_3.[15] Table *b*, instead, exists both at w_2 and w_3; table *c*, instead, exists at w_3 alone.

This idea of "modal persistence" leads to the second point of Leslie's understanding of origin essentialism, and, so, of her solution to Salmon's paradox. This expression is useful, though somehow metaphorical. To be precise, this concept is taken from a precise understanding of *MT* together with the doctrine of plenitude. What Leslie has in mind is that once plenitude is accepted, *MT* has to be reinterpreted in a slightly different way. To get Leslie's idea, let us focus on *b*, which exists both at w_2 and w_3. According to origin essentialism, *b*'s essence is given by its original constitution, which is given by the hunk of matter made of parts L_1, L_2, L_5, L_6.

According to Leslie, *MT* makes us understand the essence of *b* relatively to the specification of the *Overlapping Condition*. Namely, the specification of this condition has to be integrated within the very essence of tables. We specified the condition in the following way: hunks of matter are sufficiently overlapped if they differ for only one part. Leslie believes that this specification has a direct effect on the essence of *b*, which can be described as a *subset* of parts originally constituting *b*. Take the set of parts of which *b* is originally made at w_2: $\{L_1, L_2, L_5, L_6\}$. The essence of *b* is not given by *all four* elements, but only to a subset of *three* elements, for we admit that *b* might have been originally made by a hunk of matter that differs for *one* part. So, *b*'s essence is given by three of its original parts *plus* one arbitrary part.

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13 The situation is actually more complicated than this, for there is a difference between admissible and metaphysically genuine sets of essential properties. *Sitting*-Socrates does not seem a metaphysically genuine entity, but simply an admissible one. I am here simply deploying an intuitive example. Details about the distinction can be found in YABLO 1987.

14 Incidentally, and crucially, Leslie highlights that the idea of plenitude is motivated on independent grounds. Namely, it is not explicitly the rising of the paradox that pushes us to adopt plenitude. Rather, according to Leslie, plenitude is needed to correctly understand the very idea of essentialism (LESLIE 2011, pp. 289-90).

15 More specifically, we should say that in this case we should accept something like a *modal intermitted existence* because at w_2 it is incorrect to say that *a* exists. Rather, there is an entity that is different from *a*, *b* and *c*, which determined by a different essence, that continuously persists from w_1 to w_2: the entity that is originally made from L_1 and L_2, at w_1. But I set aside the problem of intermittent modal existence. The reason why I am pointing this out will become clearer in a moment.

It follows that *b*'s essence should be specified by multiple subsets - where we deploy '*x*' to symbolize an arbitrary part:

ESSENCE(*b*): $\{L_1, L_2, L_5, x\}$
$\{L_1, L_2, x, L_6\}$
$\{L_1, x, L_5, L_6\}$
$\{x, L_2, L_5, L_6\}$

Every table that originates from one of these sets of parts is *b*. This is how *b* "persists" through the modal space from w_2 and w_3. At w_2 and w_3, *b*'s essence is given by $\{L_1, L_2, L_5, x\}$, but what is different is what is the arbitrary part *x*: at w_2, *x* is L_6; at w_3, *x* is L_3. In particular, following this understanding of essence, it follows that, at w_3, *b* exists *together with c*, and so they are not numerically identical. To see this, let us move our focus on *c*'s essence.

Table *c* is originally made by the set of parts $\{L_1, L_2, L_3, L_5\}$. Hence, *c*'s essence can be described through the subsets of parts

ESSENCE(*c*): $\{L_1, L_2, L_3, x\}$
$\{L_1, L_2, x, L_5\}$
$\{L_1, x, L_3, L_5\}$
$\{x, L_2, L_3, L_5\}$

Namely, as in *b*'s case, we consider all the subsets of three original parts plus an arbitrary fourth part. Now compare ESSENCE(*b*) and ESSENCE(*c*). It is easy to notice that these matrix-like essences are different. So, *b* and *c* are numerically distinct, for they have different essences. Then, why do we believe that *b* and *c* are numerically identical at w_3?

To answer this question, following Leslie, we need to consider what plenitude teaches us: there could be distinct objects, determined by different essences, that are co-located. This is what happens at *b* and *c* at w_3: they are co-located. This co-location is made possible by the fact that *b* and *c* share a subset of original parts, i.e. the subsets

$(b)_{w3}$: $\{L_1, L_2, L_5, x\}$

$(c)_{w3}$: $\{L_1, x, L_3, L_5\}$

But having only a common subset is not enough to have the same essence. Essences of *b* and *c* are different, and so they are different tables. Still, the fact that they share a subset of their essences makes sense of the fact that they are co-located.

The same point holds for *a* at w_1 and w_3. Table *a* is originally made by $\{L_1, L_2, L_3, L_4\}$. Hence, *a*'s essence can be described as

ESSENCE(*a*): $\{L_1, L_2, L_3, x\}$
$\{L_1, L_2, x, L_4\}$

$\{L_1, x, L_3, L_4\}$
$\{x, L_2, L_3, L_4\}$

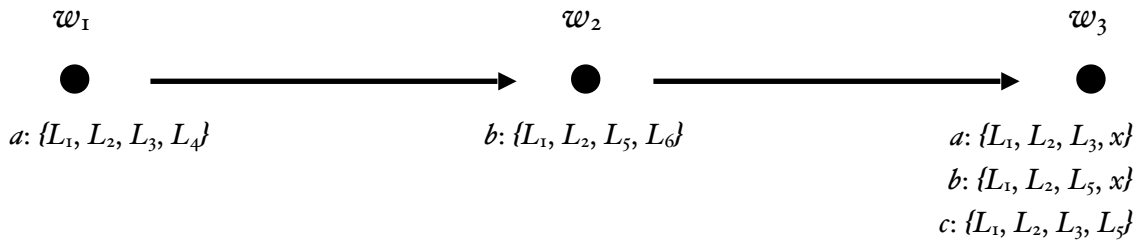
Now, compare ESSENCE(a), ESSENCE(b) and ESSENCE(c): that are all different essences, and so a, b and c are numerically distinct tables. Still, at w_3, a is characterized by

$(a)_{w3}$: $\{L_1, L_2, L_3, x\}$

And this subset can be completed by plugging in L_5 in place of x, and this makes it the case that a is co-located with b and c. Moreover, as you may have noticed, a does not exist at w_2, for there is no subset of its essence that corresponds to a set of available parts in the world (i.e. the set $\{L_1, L_2, L_5, L_6\}$).

Thus, Leslie's proposal depicts the scenario of *MP*1 in a very different way from the original one. We believe that the scenario under examination involves only numerically identical tables and that this is the crux of the problem. We believe that we end up in contradiction because c can be and cannot be identical to a. Leslie's description, instead, is radically different. According to this description, a exists at w_1 and w_3, b exists at w_2 and w_3 and c exists at w_3. Leslie's idea is that we must pay more attention to how many entities are involved in the model of the paradox and how they are related.

Let us visualize Leslie's proposal with the following diagram:



As you can see, at w_1 table a exists and it is composed of four parts $\{L_1, L_2, L_3, L_4\}$. However, given a's tolerant essence, at w_3, a exists as made of parts $\{L_1, L_2, L_3, x\}$, i.e. three of its original parts plus an arbitrary part, i.e. L_5 . At w_2, table b exists and it is composed of $\{L_1, L_2, L_5, L_6\}$. Also in this case, b's tolerant essence makes b exist also at w_3, where it is composed of $\{L_1, L_2, L_5, x\}$, i.e. three of its original parts plus a fourth arbitrary part, i.e. L_3. At w_3, also table c exists, and it is composed of $\{L_1, L_2, L_3, L_5\}$, which is the set of parts that identifies the only hunk of matter in this world. Despite there is only one hunk of matter, following Leslie's understanding of plenitude and tolerant essences, we can individuate three different sets of essential properties. It follows that there are three distinct tables co-located where the hunk of matter is located.

Summing up Leslie's way of interpreting the model of *MP*1, it follows that a, b and c are three numerically distinct tables distributed in various ways across possible worlds. Their difference is due to their different essences. However, a, b and c can be co-located at

some world, and this happens at w_3, where all of them are co-located. This is the source of puzzlement we feel when we face Salmon's paradox.

Once Leslie's picture is endorsed it is possible to block the derivation of a contradiction in *MP*1. From a formal point of view, Leslie's solution locks the derivation of the paradox by showing that there is a false sentence at play:

11. w_3: $\exists x\,(Or(x, \gamma)\ \&\ x = b)$

This sentence tells us that at w_3 there is a table originally formed by γ that is identical to *b*. However, according to Leslie, this is false, for there is no table originally made of γ that is identical to *b*. To see this consider γ, which is made by the set of parts $\{L_1, L_2, L_4, L_5\}$. If we follow Leslie, this set of parts determines the essence of *c* but not the essence of *b*. The essence of *b*, at w_3 is given by $\{L_1, L_2, L_5, x\}$ which is only a subset of the set of parts of γ. Hence, *b* is not identical to the table that originates from γ at w_3. At most, *b* is co-located with this table, which, still, is a different table. So, given the falsity of 11, we cannot proceed through the derivation of the second conjunct of Salmon's contradiction, the derivation of which is blocked.

This fact invalidates the following steps of the derivation of *MP*1:

9. w_1: $\Box\ (a \neq b)$

10. w_2: $\Diamond Or(b, \gamma)$

11. w_3: $\exists x\,(Or(x, \gamma)\ \&\ x = b)$

12. w_3: $\exists x\,(Or(x, \gamma)\ \&\ x \neq a)$

Here, 12 is derived by the conjunction of two facts. First, the idea expressed by 11 that at w_3 there is a table that is originally made from γ and identical to *b*. Second, the idea that *a* is distinct from *b* in every possible world. Given these facts, any table at w_3 made out of γ must be distinct from *a*. However, following Leslie, there is no table at w_3 that is originally made out γ and that it is identical to *b*. The only table originally made out of γ at w_3 is *c*, which is distinct from *both a* and *b*. Thus, it is false that *c* is identical to *b*.

Leslie's solution seems to work also in the case of *MP*2, where it blocks the derivation of a contradiction at step 6:

6. w_1: $\Diamond Or(a, \beta) \longrightarrow \Diamond\Diamond Or(a, \gamma)$

Namely, Leslie's understanding of tolerant essences does not admit *iterations* of *MT*. Indeed, according to Leslie's understanding of tolerant essences, *a*'s essence is determined by a set of possible original constitutive parts that does not include the set of parts that identifies γ. In the case of *MP*2, γ is so identified:

γ: $\{L_1, L_2, L_5, L_6\}$

This means that it *cannot* be a hunk of matter from which *a* is originally made. Indeed, *a*'s essence admits *a* original constitution only from hunks of matter that differ of one part if compared to

α: $\{L_1, L_2, L_3, L_4\}$

Thus, *a*'s essence is given by the following set of combinations of parts of matter

ESSENCE(*a*): $\{L_1, L_2, L_3, x\}$
$\{L_1, L_2, x, L_4\}$
$\{L_1, x, L_3, L_4\}$
$\{x, L_2, L_3, L_4\}$

This set does not include the one that identifies γ.

However, above set includes β, which is identified by the following set of parts

β: $\{L_1, L_2, L_3, L_5\}$

This means that at w_2 *a* is made out of β. So, this is the sense in which Leslie's account avoids the *iteration* of *MT*. On the one hand, *MT* holds, for it is true that

w_1: $Or(a, \alpha) \longrightarrow \Diamond Or(a, \beta)$

But it is not admissible to iterate *MT* in this way:

w_1: $\Diamond Or(a, \beta) \longrightarrow \Diamond\Diamond Or(a, \gamma)$

For, as shown, the set of parts that identifies γ is not part of the tolerant essence of *a*.

Thus, Leslie's solution seems to work for both *MP*1 and *MP*2. However, as in the case of previous solutions, I believe that this strategy does not work when the paradox is elaborated in an third alternative way.[16]

[16] It is important to point out that Salmon directly replied to Leslie; he argued that Leslie's proposal is based on a problematic ambiguity in her understanding of the concept of essence (SALMON 2021). I set aside this discussion for my aim is to build my argument against Leslie's solution, in Ch. 3, through the development of the revenger paradox.

§5 *Conclusion*

In this chapter, I analyzed three solutions so far advanced to Salmon's modal paradox. Recall that a first version of the paradox (*MP*1) arises when the conjunction of principles *SC*, *MT*, *NC* and *NI* is endorsed. Furthermore, the paradox requires the endorsement of modal system *S*4 (or *S*5) as the correct logic for metaphysical modality. There is also a second way to derive the paradox (*MP*2), which is simpler, for it endorses only *MT*, *NC* and the axiom *S*4. I analyzed how the solutions deal with both the versions of the paradox.

The solutions under examination were Salmon's original one and those advanced by Forbes and Leslie. The major difference among these solutions is how they understand the nature of the problem. According to Salmon's diagnosis, the problem has a logical nature. So, he argues that the paradox is solved once we switch from a modal logical system to another (i.e. from system *S*4 to *T*). Forbes, instead, thinks that the problem has a semantic root. However, I have shown that this idea comes from a bad diagnosis of the paradox, for Forbes thinks somehow that Salmon's paradox is a paradox about vagueness. Nonetheless, I also showed how Forbes's solution can be advanced from a purely metaphysical point of view. This Forbes-style solution replaces numerical identity with counterparthood, and solves the paradox by offering an alternative description of the model sustaining the paradox. The same strategy is pursued by Leslie, according to which the paradox arises exactly because we endorse a bad metaphysical stance on origin essentialism. Leslie's idea is that origin essentialism comes with the doctrine of plenitude supplemented with the idea of tolerant essences.

As regards the success of these strategy, Salmon's strategy is able to solve both the versions of the paradox so far examined. Indeed, axiom *S*4 is assumed in both version of the paradox, and so the derivation of a contradiction is blocked in both cases. The same happens with Leslis's solution, for her understanding of tolerant essence blocks the application of *MT* both in *MP*1 and *MP*2.

This double effectiveness is not, instead, a virtue of a Forbes-style solution. Indeed, the introduction of counterparthood in place of identity is not able to solve *MP*2. This is due to the fact that this alternative elaboration of the problem does not deploys identity concepts and, so, it does not deploys identity claims. This means that this solution can solve the paradox only when it endorses *NI*, and so it results weaker than those proposed by Salmon and Leslie.

With all of this in mind, let me now move on to the next chapter, where I want to show that the solutions so far advanced are not as good as they seem. To do this, I develop Salmon's paradox in a third different way. By doing this, I believe I can bolster the understanding of the paradox offered in this chapter. My overall conclusion will be that there is a better uniform solution at hand, which is rejecting *MT*.

3. *The Revenge of Salmon's Modal Paradox*

§1 *Introduction*

In this third chapter, I offer a more critical reflection on Salmon's modal paradox and the solutions so far advanced. Indeed, my aim is to argue that if you accept origin essentialism, then you should opt for a different solution than those proposed by Salmon, Forbes and Leslie. This solution is rejecting *MT*. I show this by elaborating what I call the *revenge* of the paradox, but from now onwards it will be labelled *MP*3.

In particular, I argue that the solutions so far advanced fail to solve a *MP*3 despite their *prima facie* success in solving *MP*1 and *MP*2 - exception made for the case of a Forbes-style strategy, which fails in solving *MP*2. This failure motivates the idea that these solutions are *ad hoc*, i.e. they work for the specific way Salmon developed the paradox. Given that the same paradox can be outlined in a different way, we should expect that solutions can solve the problem also in this case. However, this does not happen. Instead, once we drop *MT*, we can solve all the three versions of the paradox, and this motivates the idea that this solution is better than the previous ones.

To show my point, I proceed as follows. In §2 I develop *MP*3, and this happens in two steps. First, I show that Salmon's paradox can be elaborated through a simpler model. The crucial step for the development of this alternative model is specifying the *Overlapping Condition* in a different way - setting its value to 50% of the common matter. By doing this I follow Salmon's own reflection on this condition, i.e. that the paradox is not rooted in this or that specification of the condition. Second, I show that on the basis of this model, we can derive the very same contradiction as *MP*1 and *MP*2. This result is important to evaluate the solutions already exposed in the previous chapter, as I show in §3.

First of all, I evaluate Salmon's original solution and conclude that is not able to solve the problem at its heart (§3.1). Indeed, Salmon's solution is useless in this case. Indeed, *MP*3 does not rely on the modal system *S*4, but on the modal system *T*. Hence, Salmon's idea that the paradox arises because we endorse a bad modal system for metaphysics is flawed, for the paradox does not fully depend on the underlying logic. Second, I show

that also Forbes and Leslie's solutions do not give an adequate way out from the paradox, though they fail for a different reason (§§3.2-3.3). In their case, their metaphysical proposals push us against some unwelcome and absurd ideas about the nature of material objects. These unwelcome thoughts are tightly connected to the alternative model I elaborate in §2.1.

Taking this result into account, I motivate the idea that we need a different solution, and I then offer my preferred alternative: rejecting *MT* (§4). This solution has been defended also by Williamson (see Williamson 1991, Chs. 8, 9). However, I will not analyze Williamson's treatment of the paradox, for I would like to focus on my own argument.[17]

Nonetheless, there is an important similarity between my strategy and Williamson's one, and so it is important to point this out. Williamson, in part, argues in favor of the rejection of *MT* because this solution is able to deal with a variety of philosophical problems about identity - and so the virtue of this solution is its capability of being generalized and be effective when facing different paradoxes (See WILLIAMSON 1991, p. 126, 127, 135, 142).[18] I do not argue in favor of *MT* in this way.

Still, I agree with Williamson on the importance of being able to generalize the solution to a modal paradox *to some extent*. Precisely, I am looking for a uniform solution to the present paradox, and this amount to a solution that is able to solve *MP*1, *MP*2 and *MP*3 in a uniform way. This idea is motivated by the fact that *MP*1, *MP*2 and *MP*3 are not taken to be three different *paradoxes*, but three different *developments* - or *versions* - of the same modal problem, which is highlighted by the same modal contradiction derived in the three cases. Having a uniform solution means being able to deal with the core of the philosophical problem we are facing. This means that we understand the paradox in such a way that allows us to deal with its essential problematic features, and avoid to advance solutions that deal with contingent aspects of the problem.

It should be clear that my solution is conditional, for I am looking for the best solution that keeps the idea of origin essentialism alive. Namely, I *a priori* exclude the possibility of rejecting *NC*. Hence, my motivation against *MT* is conditional: if you want to endorse *NC*, then you cannot also endorse *MT* - otherwise you face the rising of modal paradoxes. This leaves open why rejecting *MT* is preferable to rejecting *NC* in absolute terms, which goes beyond the scope of my analysis. Moreover, recall that it has been already excluded the effectiveness of rejecting *SC* and *NI*, for *MP*2 is developed without these assumptions. Thus, rejecting them would be a way to solve only *MP*1 and *MP*3, but not *MP*2, and so it would not be a good uniform resolution of all the version of the paradox.

In conclusion, I motivate the rejection of *MT* in a twofold way: on the one hand, it is motivated by the failure of all the other available solutions, for it is the only left assumption to be discarded; on the other hand, it is motivated by the fact that the rejection of *MT*

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[17] Moreover, Williamson's solution is grounded on the elaboration of his epistemological framework for identity, and the way he solves the paradox is deeply connected on how this framework behaves in modal contexts. Thus, delving into Williamson's solution would require a detour into his framework.

[18] Salmon replied to Williamson's argument in SALMON 1993. He claims that Williamson's idea of generalizing the solution of the modal paradox to other paradoxes in different contexts is flawed, for it does not take into account important differences that are relevant to different contexts.

blocks the original paradox and its revenge, for the trivial assumption that by rejecting *MT* we get rid of the *Overlapping Condition*. I then consider some objections to my proposal and I reply to them, focusing in particular on the idea that the *Overlapping Condition* can be legitimately specified to be equal to 50% of the common matter (§5). It follows a general conclusion and recapitulation of the analysis of Salmon's modal paradox (§6).

§2 *The Revenge of Salmon's Paradox*

Despite their *prima facie* success in solving the paradox, I think that Salmon, Forbes and Leslie's solutions suffer a simpler version of the paradox - the one I we will call *MP*3. This alternative version of the riddle is some kind of *revenge* of the paradox and I hold that it pushes to accept a different solution: rejecting *MT*.

The principle of modal tolerance tells us that:

MT Let m and m^* be any two hunks of matter that have the same mass, volume, and chemical composition and that sufficiently overlap. If a wooden table t is the only table originally formed from m, then t is such that it might have been the only table originally formed from m^*.

In chapter 1, the principle was formalized in the following way:

$$\forall x(Or(x, m) \longrightarrow \Diamond Or(x, m^*))$$

MT claims that a certain degree of variation in the original constitution of a table is possible. So, *MT* says that it is possible for the very same table t to originate from a hunk of matter different from the one from which it actually originates. Call the alternative hunk of matter 'm^*' and the actual one 'm'.

What is crucial is that m^* must satisfy some precise conditions:

Overlapping Condition: m^* must sufficiently overlap m.

Qualitative Condition: m^* must have the same mass, volume and chemical composition as m.

The *Overlapping Condition* imposes a *quantitative* limitation on m^*. According to this limitation, a table that is originally made from m can originate from m^* as long as m^* is sufficiently similar to m. The two hunks are sufficiently similar when they share a certain amount of matter. This ensures the following intuition: a table t can originate from m^* as long as m^* is *not* composed of a *radically* distinct amount of matter if compared to m. This idea implies that there is a limit point within which m and m^* sufficiently overlap, and after which they do not overlap anymore.

The presence of a limit point is crucial to *MP*3. Following Salmon (SALMON 1986, p. 77), what matters is not *where* the threshold lies, but only that *there is* a limit point after

which a hunk of matter does not sufficiently overlap another hunk of matter – with the effect that from the two hunks there originate two different tables. So, it does not matter if we can actually know what this limit is, but it matters that it lies somewhere in between the identity of two hunks of matter and their complete distinctness.

Given this, Salmon's paradox should not be sensitive to a different specification of the *Overlapping Condition* in a particular way. This point is crucial in two ways. First, it enhances our understanding of the paradox, for we can acknowledge that the particular model it exploits it is only a specific way of articulating the paradox. Second, the possibility of developing the paradox through different models is an effective tool for the evaluation of solutions to the paradox. Indeed, by testing solutions over different models, we can analyze their virtues and their mistakes. Indeed, the result I want to show is that under a different stipulation of the *Overlapping Condition*, i.e. by deploying a different model, the solutions exposed above are no more as good as they seemed. A good solution should not be effective under one stipulation and ineffective under another.

Given this, let me first develop *MP*3 and show the ineffectiveness of the solutions already proposed. As before, I develop the model first (§2.1) and then I show how we end up facing a contradiction (§2.2). *MP*3 id developed by assuming *NC*, *MT*, *SC*, *NI* and *T*, which is the characteristic axiom of the modal system *T*.

§2.1 *Developing the Puzzle*

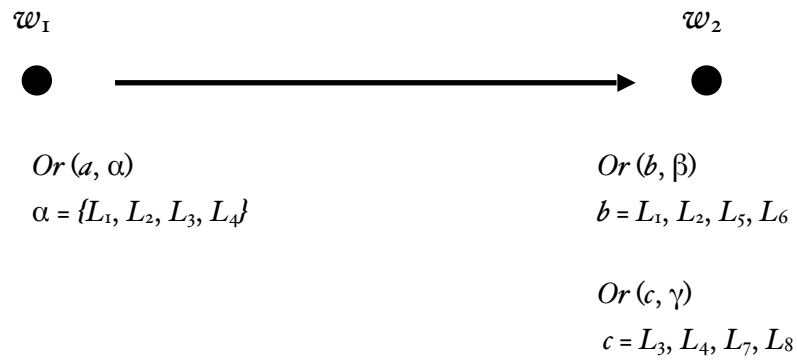
As already mentioned, to develop *MP*3, we assume *SC*, *MT*, *NC*, *NI* and axiom *T*. Moreover, we need a different specification for the *Overlapping Condition*. Through this move, we generate a different scenario from the one considered by Salmon. This scenario is characterized by the fact that we specify the condition so that a table *t* that is originally formed from a hunk of matter *m* at w_1 is identical to any other table at w_2 that is originally formed from a hunk of matter *m** as long as *m** is a hunk of matter that is qualitatively alike *m* and it is composed of the 50% of *m*'s matter (or parts).

Given this, consider three tables – call them *a*, *b* and *c* – and two possible worlds. Moreover, suppose that: *a* is originally made from a hunk of matter α that is composed of four parts: L_1, L_2, L_3, L_4; *b* is originally formed from β, which is composed of L_1, L_2, L_5, L_6; *c* is originally formed from a hunk of matter γ that is composed of L_3, L_4, L_7, L_8. Last supposition: imagine that *a* exists at w_1 and *both b* and *c* at w_2. Intuitively speaking, the scenario tells us something very simple. Suppose that a craftsman builds *a* at w_1 from the hunk α. Then, given how we have specified the overlapping condition, at w_1 two things are true. First, it might have been the case that *a* is originally formed from β; second, it might have been the case that *a* is originally formed from γ. These two alternative original constitutions of *a* are both realized at w_2, i.e. they are compossible.

Following this specification of the *Overlapping Condition*, the fact that *b* and *c* are compossible and both identical to *a* is something very intuitive. This fact reflects a situation like the following one. Suppose you are the craftsman at w_1, and you wonder how things might have been different from how they are. You have just realized table *a* from the hunk

of matter α and, while you look at it, you think about what else you could have done with α. You wonder that by combining pieces of α with some other additional pieces you might have realized two tables instead of one. These two possible tables are *b* and *c*, and w_2 is the world where you could have realized them.

The model for this scenario can be represented in the following way:



As the diagram shows, there are two possible worlds, i.e. w_1 and w_2, with w_2 accessible to w_1. At w_1, table *a* originates from α, which is composed of parts L_1, L_2, L_3, L_4. At w_2, there a two distinct tables. First, there is table *b* that is originally formed by β, which is composed of L_1, L_2, L_5, L_6; second, there is table *c* that is originally formed from a hunk of matter γ, which is composed of L_3, L_4, L_7, L_8.

As you may already notice, this scenario is problematic. Indeed, according to *MT* and given the way in which the *Overlapping Condition* has been specified, we are pushed to accept the truth of the following two claims:

□ *a* = *b*
□ *a* = *c*

Indeed, both *b* and *c* are originally made from two hunks of matter that sufficiently overlaps α, which is the hunk of matter from which *a* is originally made from. It follows that both *b* and *c* are numerically identical to *a*. Assuming the necessity of identity, *b* and *c* are necessarily identical to *a*. So, it might have been the case that *a* is originally made from both β and γ.

However, and this is the crucial point, it is also the case that

□ *b* ≠ *c*

Indeed, *b* and *c* co-exist in the same world and they are constituted by two entirely different non-overlapping hunks of matter, hence they are different. Indeed, despite the fact that β and γ both sufficiently overlap α, β and γ do not sufficiently overlap each other. This is perfectly reasonable, for the relation of *sufficiently overlapping* is a form of similarity, and so it is consistent to claim that α is similar to both β and γ while β and γ are not similar to each

other. The problem, instead, is about the identity of tables. Indeed, from the fact that *a* is necessarily identical to both *b* and *c*, it should follow that

$$\Box\ b = c$$

This immediately contradicts the fact that *b* and *c* are necessarily distinct.

Hence, again, we ended up facing a contradiction: it is both the case that $\Box\ b = c$ and $\Box\ b \neq c$. The *modal* contradiction we are pushed towards can be further specified, and this is what I am going to do in the next section. Roughly speaking, what is going on in this scenario is due to the interplay of the following factors: at w_1 it is the case that it is *not possible* that there exists a table that originates from γ (or β) and that it is distinct from *a* (this is due to *SC* and *MT*); however, at w_2 it is the case that there exist two tables that are different to each other, and so they are not identical to *a* (due to the transitivity of identity); so, at w_1 it is the case that it is *possible* that there exists (at least) one table that is originally made from γ (or β) and that it is different from *a*.

Hence, in the model for *MP*3, we face exactly the same contradictory scenario as the one envisaged by Salmon. However, there is a crucial difference in place: this model is made up of two possible worlds alone. This difference should not be underestimated, for it has an impact on the effectiveness of the solutions under examination. Indeed, this fact reflects the endorsement of a different modal system, i.e. system *T*, in place of the modal system *S*4.

§2.2 *Deriving the Contradiction*

Let me now show how to derive the same modal contradiction faced in *MP*1 and *MP*2 by exploiting the model just presented. As in the case of *MP*1, we assume *SC*, *MT* and *NC*, plus *NI*. However, there are two crucial differences with both *MP*1 and *MP*2. The first difference has been already explained: we rely on a different model based on a different specification of the *Overlapping Condition*. The second difference, instead, is about the modal system we endorse. I have already said enough about the first difference, so let me say something more about the second one.

As you may notice from the above diagram, the model deploys only two possible worlds. This fact reflects a crucial logical point: to derive the contradiction of *MP*3 through the new model we do not need to assume the transitivity of accessibility relation and, so, we do not need to endorse the modal system *S*4 (and so *S*5). This fact is particularly important when it comes to evaluating Salmon's original solution to the paradox (and I will set this aside until §3.1). Let me stress this point: I am not claiming that I am assuming that *S*4 (and so *S*5) is not the correct modal system for metaphysical modality. I am simply claiming that to derive the contradiction of Salmon's modal paradox we do need to rely on *S*4 characteristic axiom (and so on the transitivity of the accessibility relation).

Even if *S*4 is not explicitly endorsed, there is a different system that we must explicitly endorse, i.e. system *T*, which is characterized by the following axiom

T $(\Box q) \rightarrow q$

According to axiom *T*, if something is necessarily the case, then it is also simply the case. This means that if something is necessarily the case in a given world, then it is also actually the case in that very same world. This is why axiom *T* is connected to the property of *reflexivity* of the accessibility relation, according to which every possible world is accessible to itself. I believe this is an important requirement for metaphysical modality in general and for the specific case of Salmon's modal paradox, for it makes every necessarily true identity claim also actually true in every possible world. So, if at w_1 it is true that $\Box\ b \neq c$, then at it is also true that $b \neq c$.

Suppose that *T* is not in place, then we would be opening ourselves to the admissibility of a possible world where $\Box\ b \neq c$ is true, but where it is actually the case that $\neg\ b \neq c$ (i.e. $b = c$). This would be bad for *OR* (and metaphysics in general), for we would admit that some possible worlds verify some claims that can be used as counterexamples to metaphysical claims like identity claims. However, metaphysics aims to a general and coherent description of reality and has some modal demands. So, if we do not endorse *T*, we are open to accepting that sometimes sentences of the following form are true:

$(\Box q)\ \&\ \neg\ q$

This sounds problematic. Indeed, when '*q*' stands for a metaphysical claim, and so that should be necessarily true, we accept the idea that some possible worlds behave in a metaphysically odd way. Indeed, in these worlds, the metaphysical claim would be true (it would be true that $\Box\ q$) while it is also true a counterexample to the metaphysical claim (i.e. '$\neg q$'). We should ask ourselves: is it admissible that a metaphysical claim is true in a world where things are such that they offer a counterexample to the metaphysical claim? This sounds odd, and so, given that we are dealing with metaphysical principles, it sounds adequate to endorse *T* and the reflexivity of the accessibility relation.

Summing up, to develop *MP*3 we explicitly endorse the characteristic axiom of *T* (and the reflexivity of the accessibility relation with it). This seems the *minimum* requirement for the logic of metaphysics. However, we remain silent about *S*4 (and so *S*5), for we do not need its characteristic axiom to get at the heart of the problem raised by the paradox. We face a contradiction without bothering this or that modal system - an exception made for the minimum metaphysical requirement of modal system *T*.

Now that all the assumptions at play are clear, let us run through the derivation of Salmon's original contradiction, which, recall, is the following one:

C w_1: $\neg\Diamond\exists x\ (Or(x, \gamma)\ \&\ x \neq a)\ \&\ \Diamond\exists x\ (Or(x, \gamma)\ \&\ x \neq a)$

Again, we start from the simple assumption that a table *a* originates from a hunk of matter α, which has L_1, L_2, L_3, L_4 as proper parts. This means that a possible world w_1 it is the case that:

1*. w_1: $Or(a, \alpha)$

Moreover, there are two more tables to consider, i.e. *b* and *c*, which respectively originate from β and γ. The first hunk of matter is made up of L_1, L_2, L_5, L_6, the second one is composed of L_3, L_4, L_7, L_8. These hunks of matter originate *b* and *c* at the same possible world w_2. So, it is the case in this world that:

2*. w_2: $Or(b, \beta)$

3*. w_2: $Or(c, \gamma)$

This is the crucial difference from the previous case. Having specified the *Overlapping Condition* in a different way, it is now possible that *b* and *c* coexist in the same possible world. Namely, *b* and *c* originate from two distinct hunks of matter both sufficiently overlapping α at the same possible world. However, *b* and *c* originate from two distinct hunks of matter that do *not* sufficiently overlap each other.

From the fact that *b* and *c* both come from hunks of matter that sufficiently overlap *a*'s original matter, it follows that at w_1 two things are true:

4*. w_1: $\Diamond Or(a, \beta)$

5*. w_1: $\Diamond Or(a, \gamma)$

First, it is the case that is possible that *a* originates from β; second, it is possible that *a* originates from γ. Indeed both β and γ sufficiently overlap α.

Now let us recall *SC*, according to which, if a table can originate from a hunk of matter, then it is necessarily the case that every table originating from that hunk of matter is identical to the table originating from it. This means that if it is possible that *a* originates from γ, then every table that originates from γ is identical to *a*:

6*. w_1: $\Diamond Or(a, \gamma) \longrightarrow \Box \forall x(Or(x, \gamma) \longrightarrow x = a))$

Given this, from 5* and 6*, by transitivity, it follows that:

7* w_1: $\Box \forall x(Or(x, \gamma) \longrightarrow x = a))$

And 7* immediately delivers the first conjunct of Salmon's contradiction:

C_1 w_1: $\neg\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)$

Namely, at w_1, it is impossible that if something originates from γ then is not identical to *a*. This is the first conjunct composing the original contradiction of *MP*1, and with the relevant differences, of *MP*2. Let us now focus on the second conjunct.

At this point, to derive the second conjunct of the contradiction, let us process the information we have from the model about some identity relation at play. First of all, let us consider the fact that at w_2 *b* and *c* are numerically distinct:

8*. w_2: $b \neq c$

This is due to the fact that they originate from two distinct and non-overlapping hunks of matter. Second, let us consider that we also have reason to think that *b* is identical to *a*. Indeed, *b* originates from β, which sufficiently overlaps α, and so, it cannot be the case that is different from *a*. So:

9*. w_n: $\Box\ a = b$

The fact that *a* is necessarily identical to *b* means that this holds at every possible world, and so it also holds at w_2:

10*. w_2: $a = b$

Once this is recognized, it follows that, at w_2, *a* and *c* are different. Indeed, if, at w_2, *b* is different from *c* but identical to *a*, then we must conclude that *a* is different from *c*, on pain of contradiction. Thus:

11*. w_2: $a \neq c$

Once 11* is accepted, it follows that at w_2 there is a table that originates from γ and it is distinct from *a*. This table is *c*: it is originally made from γ (as 3* claims) and it is distinct from *a* (according to 11*). So, the existence of such a table allows us to claim that

12*. w_2: $\exists x\,(Or(x, \gamma)\ \&\ x \neq a)$

And if this is the case, and given that w_2 is undoubtedly accessible to w_1 by assumption, it follows that at w_1 it is possible that there exists a table that originates from and it is distinct from *a*:

C_2 w_1: $\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)$

And so we obtain the second conjunct of Salmon's original paradox. Thus, by conjoining C_1 and C_2 we obtain

$C \qquad w_1: \qquad \neg\Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)\ \&\ \Diamond\exists x\,(Or(x, \gamma)\ \&\ x \neq a)$

Hence, we face again Salmon's original contradiction.[19]

§3 *A Stronger Paradox*

We are now in front of a third alternative elaboration of Salmon's modal paradox, and I believe that the solutions offered to the original paradox are not good solutions for its alternative elaboration. This is mainly due to two crucial differences between this version of the paradox and *MP*1 and *MP*2. First, they deploy a different logical system. This factor is crucial to evaluating Salmon's original solution. Second, they are based on two different models that describe different metaphysical scenarios. This feature of the two elaborations of the paradox is essential to evaluate Forbes and Leslie's solutions. Still, the two versions of the paradox point out the same contradiction.

The fact that solutions so far advanced are not able to meet the challenge of *MP*3 is of first importance. Indeed, I believe we should be suspicious about solutions that solve a paradox relatively to this or that model, for this fact highlights that the alleged solutions do not solve the problem at its heart. *MP*3 shows that the original contradiction can be derived from a different model. If we want to escape the contradiction, a solution to the paradox must be able to block the route to the contradiction under every model. Otherwise, it is not a full-fledged solution that acts on the core of the philosophical problem, but simply a remedy against a circumscribed metaphysical challenging scenario pushed forward by this or that model. A full-fledged solution, instead, must be able to dissolve the problem once and for all by blocking the development of metaphysically problematic situations.

Given this, let me show how the solutions taken into account fail to deal with *MP*3. Let me start with Salmon's original solution and show that Salmon's idea of rejecting axiom *S*4 is useless in the context of *MP*3 (§3.1). The reason is simple: *MP*3 does not assume axiom *S*4, and so it is useless to blame the logic. Then I move on to consider Forbes and Leslie's solutions (§3.2 and §3.3), which, in this context, are useless in a different way from Salmon's one. Indeed, they fail to solve the paradox because they suffer from a metaphysi-

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[19] Notice: I have run the derivation to reach *C* in such a way that it deploys *a* and γ as constants. However, given the nature of model sustaining the paradox, I could have run the paradox in a different way, and derive a different contradiction that deploys *a* and β as constants:

$C^{\beta} \qquad \neg\Diamond\exists x\,(Or(x, \beta)\ \&\ x \neq a)\ \&\ \Diamond\exists x\,(Or(x, \beta)\ \&\ x \neq a)$

This is due to the fact that *b* (that originates from β) and *c* (that originates from γ) are both related to *a* in the same controversial way. My choice is due to simply achieve uniformity with Salmon's original paradox. The fact that the contradiction can be derived also focusing on how *a* is related to β enhances the idea that we are facing a controversial situation.

cal point of view. Namely, they face serious difficulties to make sense of the metaphysical scenario sustaining the paradox. So, in the attempt of solving the problem raised by the paradox, Forbes and Leslie's solutions end up generating additional problems. Recall, however, that the failure of Leslie and Forbes' solutions must be taken distinct under one respect: the former is able to deal with *MP*2, while the latter does not.

Once all of this has been done, I will use this fact to motivate the idea that, so far, our best option at hand is to reject a precise assumption of our metaphysical picture, i.e. *MT* (§4). Indeed, this move, contrary to the solutions I am going to examine, is able to solve all the three versions of Salmon's modal paradox. Hence, this strategy blocks any possible metaphysically controversial scenario. This happens under the condition that we want to save origin essentialism and, so, we do not want to get rid of *NC*.

§3.1 *Salmon's Solution*

Salmon's solution to the paradox is to abandon the modal logic system *S*4 (and *S*5 with it), according to which the accessibility relation between worlds is transitive. However, *MP*3 shows that there is no reason to think that the modal system *S*4 is responsible for the rising of the paradox. Indeed, this case is developed within the modal logic system *T*, which is a simpler system for modal logic than *S*4. In particular, system *T* does not endorse a transitive accessibility relation.

Thus, the choice of a particular modal system (and the subsequent characterization of the accessibility relation) is not the deep reason for the rise of the paradox. We can accept that this choice plays a role in *MP*1 and *MP*2, but it seems that it is not the kernel point of the problem. Rather, it seems that its role is contingently linked to the scenario Salmon exploits and so to a particular specification of the *Overlapping Condition*. In conclusion, while the solution endorsed by Salmon works for the case of his original paradox, it does not work for its revenge.

To get the point, compare the models sustaining *MP*1 and *MP*3. In Salmon's original case, the model is made up of three possible worlds where three tables inhabit three different worlds: *a* at w_1, *b* at w_2 and *c* at w_3. Progressively, the parts composing these tables are rearranged, from world to world, in such a way that makes *a* and *b* identical to *c* while different from each other. The transitivity of the accessibility relation is essential to this model if you want to show that there is something contradictory in it, for w_3 must be accessible to w_1 through w_2, as shown in Chapter 1.

In *MP*3, transitivity does not play any role. Indeed, there are only two possible worlds and, while at w_1 there is only *a*, at w_2 there are both *b* and *c*. This makes the transitivity of the accessibility relation useless in this context. There is no need to appeal to this transitivity to show that there is a problem with the model. Rather, it is sufficient to simply accept the idea that w_2 is accessible to w_1. This fact is tangible also at a formal level, for *MP*3 does not applies the axiom *S*4, which was instead vital to outline *MP*1 (and *MP*2).

Could Salmon reply to my case that *MP*3 is pushing us to move from *T* to another modal logical system? It is hard to tackle the paradox with this strategy. Indeed, as I explai-

ned at the beginning of §2.2, *T* looks like an important modal system for metaphysics. Indeed, without the characteristic axiom of *T* (and so without the reflexivity of the accessibility relation), we should accept that metaphysical principles can be necessarily true but also refuted in some possible worlds. So, if we should make a change in the logic, we should make a change at the very heart of our understanding of the logic of metaphysics. The resulting theoretical cost would be really high - especially if compared to the solution I am going to advance, i.e. to reject *MT*.

§3.2 *Forbes' Solution*

Let us now move to Forbes' suggestion. As explained, this is not Forbes' original solution, but the best alternative elaboration of his proposal, which advances the idea of replacing transworld identity with the relation of counterparthood. I want to show that the solution is not viable in the context of *MP*3. In particular, let me show that *if* we endorse counterparthood to block the derivation of the contradiction displayed by this version of the paradox, *then* we must pay a conceptual price: endorsing a metaphysical odd account of material objects, like artifacts and, so, tables. Of course, the undesirable implications of this metaphysical account clash with the very idea of origin essentialism.

To show this, let me endorse counterpart theory and describe the model through the lens of this theory; also, let me show that we can indeed block the formal derivation of the paradox (§3.2.1). In the end, let me explain why by endorsing this theory we end up committing ourselves to a suboptimal metaphysical account of origin essentialism (§3.2.2).

§3.2.1 *The Formal Resolutive Strategy*

As a starting point, let us look at the model of *MP*3 through the lens of counterpart theory. The idea of describing the model in a different way is the heart of the Forbes-style solution under examination. Indeed, by proposing to replace identity with counterparthood, we propose to endorse a different metaphysical account. The result of switching to a different metaphysical account is that we have to read the information contained in the model in a different way.

So, let us apply Forbes' alternative reading of the model. At w_1 there is table *a* that is originally composed by α; at w_2 there are tables *b* and *c* that are respectively originally composed by β and γ. These tables are related to each other through the following transworld relations: *b* and *c* are counterparts of *a*. This is due to the fact that β and γ are both hunks of matter that sufficiently overlaps α. Indeed, once origin essentialism is understood in terms of counterparthood, we obtain that a table existing at w_2 is a counterpart of *a only if* it is originally formed at w_2 from a hunk of matter that sufficiently overlaps α - i.e. the hunk of matter composing *a* at w_1. A hypothetical table *d* that originates at w_2 from a hunk of matter ω that does not sufficiently overlap α is not a counterpart of *a*.

So far so good. Still, there is a further aspect to take into account. Despite the fact that we replaced *trans*-world numerical identity with the relation of counterparthood, we have not abandoned the relation of *intra*-world numerical identity. This is why we are able to claim something true about *b* and *c*, i.e. that they are *not* numerically identical. Indeed, *b* and *c* originated within the same possible world from two distinct and non-overlapping hunks of matter. So, *b* and *c* are numerically distinct tables. Also, they are both counterparts of *a*. Let us bear this in mind.

Given this understanding of the model and how objects of the model are related to each other, it is possible to block the derivation of the contradiction of Salmon's paradox. Indeed, we can falsify trans-world identity claims. This is the same way in which Forbes' solution deals with Salmon's original paradox. Namely, from a formal point of view, we are pushed to recognize as false the following claim:

9*. w_2: $\Box\, a = b$

Given that *b* is the counterpart of *a*, it is not the case at w_2 that *a* is identical to *b*. So we can block the derivation of a contradiction.

However, and this is crucial, despite this formal victory of counterpart theory, this solution suffers a conceptual problem: to block the formal derivation of the contradiction, the solution under examination pushes us to endorse a problematic metaphysical account. In particular, in order to block the formal derivation of *MP*3, the present account has to accept the model as a genuine metaphysically possible scenario. Recall that the Forbes-style strategy is to interpret the model in a different way. The outcome is that once it is correctly interpreted, it is no more a problematic model. Let us ask: once the model of Salmon's paradox revenge is understood through counterpart theory, is it truly admissible from a metaphysical point of view? Let me argue that it is not.

§3.2.2 *A Problematic Metaphysical Outcome*

Recall a crucial feature of the solution we should be looking for: a uniform solution that is able to save the intuition of origin essentialism. My point against a Forbes-style solution is not that is not such a solution. First, it is not uniform, as we saw in Ch. 2 §3.3, for it is unable to solve *MP*3. Second, which is the point under examination now, it pushes us to endorse a metaphysical view that conflicts with origin essentialism itself. The reason why this conflict emerges is due to the fact that, if we believe in origin essentialism, we cannot accept a metaphysical account that allows the presence of two counterparts of the same

object in the same possible world.[20] A Forbes-style solution runs in the opposite direction, for it would make the model deployed by the revenge of Salmon's paradox a genuine metaphysical scenario.

The fact that *b* and *c* coexist and are both counterparts of *a* at w_2 makes true the following claim at w_1:

w_1: $\Diamond(Or(a, \beta) \,\&\, Or(a, \gamma))$

The truth of this claim is given by the fact that β and γ are two hunks of matter that sufficiently overlaps α. However, we must focus on the important fact that *b* and *c* are counterparts of *a*. Recall a crucial fact about *b* and *c*: they are numerically distinct. They coexist in the same world at the same time and they originate from two distinct non-overlapping hunks of matter. So, *b* and *c* are simply two different tables. Moreover, it is thanks to the existence of *b* and *c* that the claims are true of *a*. Indeed, following counterpart theory, we can tell what is possible about *a because of* the presence of *a*'s counterparts in another possible world.[21] However, the truth about *a* sustained by *b* and *c*'s coexistence is that it is possible that *a* might have originated from both β and γ. Here we face a metaphysical problem.

Counterpart theory allows that *a* might have been originally made from both β and γ, and this runs against origin essentialism, for β and γ are generated from distinct hunks of matter, and so it cannot be the case that *a* is originally made from both β and γ. It is impossible that the same unique table is originally made from two distinct hunks of matter. This is the crux of Forbes' solution: it pushes the original contradiction one step away and generates a new problem about the consistency of counterpart theory and the intuition of origin essentialism. Let me give more details about this problem.

First, let us focus on the crucial implication of endorsing counterpart theory: it is possible that *a* originates from two hunks of matter, i.e. β and γ. This is due to the fact that, at w_2, *b* and *c* are the counterparts of *a* that originate from β and γ. This fact would have been problematic if *a*, *b* and *c* were related by numerical identity, for *a* would have been split into two different tables (running against the transitivity of identity). However, when counterpart theory is endorsed, this problem does not subsist. Indeed, *a* exists only at w_1, where it is a perfectly unique table. Still, it might have been the case that *a* is originally formed by two distinct hunks of matter - this is a genuine possibility.

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[20] I believe that Forbes himself would agree with this claim. This would not be contradictory, but it is simply due to the fact that he did not consider Salmon's paradox from my perspective (as I argued in §4.2) and that he was not aware of the two-world paradox that I have just developed. I believe that he would agree from the following words of him: "Whatever precise essentialist claim about origin one chooses to defend, it is clear that the following has to be ruled out: that a [table] could develop at one world *u* from one collection of [matter] and at another *v* from an entirely distinct collection of [matter], where the two collections both exist simultaneously at *u*, or more weakly, are simultaneously compossible, i.e., all exist together at the same time at some world" (FORBES 1986, p. 8). So, at least, Forbes is aware that it is problematic.

[21] Counterpart theory is committed to this idea after it has been advanced the objection that when in a modal context we speak about a thing, like *a*, we are talking about what is possible of *a*, not about *a*'s counterparts (like *b* and *c*). The standard reply of counterpart theory is that it gives a semantic model that makes modal claims about *a* true (or false) *in virtue* of there being counterpart's of *a*.

The problem of allowing the possibility of *a* originating from both β and γ is related to the nature of artifacts and their being material things. Table *a* is a material thing, so it must originate from some matter. It is not relevant if *a is* nothing more than the hunk of matter under a particular fashion, or shape, or structure, or if *a* is numerically distinct from the hunk of matter. If anything, what is essential is that there is a one-to-one correspondence between an artifact and the hunk of matter it originates from. This means that for any artifact there is only one hunk of matter from which it can originate. This does not mean that if a craftsman has a stock of eight parts of wood he can make only one table out of it. We are assuming that tables are made of four parts of wood, so the craftsman can make two tables out of the stock. Still, the essential point is that the two tables are originally made from exactly two arrangements of four parts, and there is a one-to-one correspondence between these arrangements of woods and the tables. When originally made, a table is entirely located where its original hunk of matter is located.

The co-location of hunks of matter and tables is particularly important when it comes to understanding how tables come into existence. Origin essentialism is deeply connected to the phenomenon of tables coming into existence. Indeed, what count as the original constitutive matter of a table is determined by the moment at which the table comes into existence. If you believe that a table is nothing more than its matter, this moment is the one at which the matter reaches the shape of a table. If you believe that the table and hunk are distinct, this moment is the one at which the table pops into existence from the matter. Either way, when the moment comes, and the table comes into existence, it *cannot* be the case that it is located in two distinct places. So, if there are two numerically distinct hunks of matter, at the same time, in the same possible world, and they are both used to produce a table, it cannot be the case that they are used to produce the same table. Otherwise, the table would come into existence as *two* tables, which is absurd.

When I claim that it *cannot* be the case that a table is located in two distinct places, I mean that it is *necessary* the case that a table is located where its original hunk of matter is located. This necessity has a metaphysical nature: any possible material object must respect this fact. In particular, this fact ought to be endorsed by origin essentialism, if the point of this doctrine is to capture the essence of an artifact through its original material constitution. So, we should accept that the following principle is implied by origin essentialism:

CL $\quad \Box \forall x(Or(x, m) \longrightarrow Cl(x, m))$

Call this the *Principle of Co-location*. To read it, consider that the '*x*' variable ranges over tables (or even material objects in general), *m* stands for a hunk of matter whatsoever, and '*Cl*' is the relation of being co-located. Thus, the principle claims that necessarily, if a table is originally made from a hunk of matter, then the table is co-located with the hunk of matter it originates from.

Once *CL* is accepted, a Forbes-style solution ends up being extremely problematic. Indeed, the fact that it is possible that *a* is originally made from both β and γ pushes us against the principle. This is due to the fact that the possibility allowed by the model, i.e.

w_1: $\Diamond(Or(a, \beta)$ & $Or(a, \gamma))$

implies the possibility that *a* is co-located with *both* β and γ when it comes into existence. Namely,

w_1: $\Diamond(Cl(a, \beta)$ & $Cl(a, \gamma))$

However, if it is possible that *a* is co-located with both β and γ, it must be possible for β and γ to be co-located. Instead, in our model, β and γ are not co-located. Rather, they are two numerically distinct (and non-overlapping) hunks of matter. So, admitting the possibility of *a* being co-located with two not co-located hunks of matter is absurd. It cannot be the case that a single table is co-located with two non-co-located hunks of matter.

In particular, recall that we are here describing *a*'s original constitution. So, we would be admitting the possibility that *a* comes into existence from two non-co-located hunks of matter. It does not matter that this possibility is guaranteed by there being two *distinct* counterparts at w_2. Now the problem is what is true at w_1; and what is true goes against a metaphysical principle that must be true in every possible world, for it holds with necessity. What is necessarily the case is that when a table comes into existence it is entirely co-located with its original matter. So, if there are two non-overlapping hunks of matter from which a material object is coming into existence, we must conclude that two distinct objects are coming into existence from the two hunks of matter.

Summing up, a Forbes-style solution does not look like an attractive solution to *MP*3. Hence, it is not a solution able to save origin essentialism from the threat of the paradox. Indeed, by endorsing counterparthood to block the derivation of a contradiction, we end up assigning to the model underlying the paradox the status of a genuinely possible metaphysical scenario. However, once the scenario is metaphysically possible, we end up endorsing a metaphysically odd conclusion, i.e. that a table can come into existence dislocated in two different regions of space. This runs against the idea that necessarily, a table is co-located with the hunk of matter it originates according to a one-to-one correspondence. Namely, we contradict the idea that a table, as a material object, must come into existence co-located with only one hunk of matter.

§3.3 *Leslie's Solution*

Let us now discuss Leslie's solution, which depends on the acceptance of plenitude and a peculiar understanding of tolerant essences. As already explained, the strength of Leslie's proposal is that we are suggested to revise our essentialist metaphysical picture. When facing *MP*1 and *MP*2, it seems that the picture advanced by the theory of plenitude is able to describe the model underlying the paradox in such a way that dissolves the problem. However, I believe that the same does not happen when it comes to giving an alternative description of the model behind *MP*3. So, Leslie's solution suffers the same kind of problem

suffered by Forbes' one, i.e. a problem with the viability of the metaphysical picture that the model pushes us to endorse.

The metaphysical problem generated by Leslie's proposal is a problem with the numerical identity of tables. Indeed, Leslie's account pushes us to accept the odd possibility that a single table can split into two identical tables. So, the problem resembles the one that a Forbes-style solution suffers, but with a crucial difference: Leslie's solution does not endorse counterparthood, but it deploys numerical identity to advance its metaphysical picture. Given this, the fact that a table can be originally made as two distinct tables is deeply problematic, for numerical identity implies *uniqueness*, and so, two *numerically distinct* things cannot be one and the same. Let me show how we end up facing this problem.

First of all, let us recall the peculiarities of Leslie's strategy: when plenitude is endorsed, there are far more entities than those we intuitively recognize. The entities we are interested in are tables, and if we endorse plenitude, we are ready to accept that there are also co-located tables. We are able to distinguish all the tables involved in a scenario thanks to their essences, which given origin essentialism are determined by the parts of the hunks of matter constituting the original matter of a table. Indeed, given that essences are understood as tolerant, the essence of a table is given by different possible sets of its original parts plus some appropriate additional parts. Let us apply this way of counting tables to the model sustaining the revenge of Salmon's paradox, taking into account how the *Overlapping Condition* has been differently stipulated.

At w_1 there is table *a* that is originally made from α, which is made of parts L_1, L_2, L_3, L_4. As a stipulation, we know that tables are made of four parts, and so, at w_1, there is only one table, i.e. *a*, for there are only four available parts that can originate a table. There are other entities at w_1, each of which is determined by a subset of the set of parts constituting α, i.e. the set $\{L_1, L_2, L_3, L_4\}$. However, none of these subsets identifies a table. So, *a* is the only table at w_1 and it possesses the following essence

$$\begin{aligned}\text{ESSENCE}(a): \quad & \{L_1, L_2, x, y\} \\ & \{L_1, x, y, L_4\} \\ & \{L_1, x, L_3, y\} \\ & \{x, y, L_3, L_4\} \\ & \{x, L_2, y, L_4\} \\ & \{x, L_2, L_3, y\}\end{aligned}$$

These are all the possible subsets of the original set of parts determining the essence of *a*. As you may notice, the list of subsets is different from the case examined in Chapter 2 (§4), where *a*'s essence was determined by four subsets, while here we have six subsets. This is due to the fact that we are now specifying the *Overlapping Condition* in a different way so that we have two variables for arbitrary parts, i.e. *x* and *y*. Given the presence of two variables for arbitrary parts, we obtain more possible combinations of parts constituting *a*'s original constitution.

Then, let us focus on w_2, where we can isolate *b* and *c*, which are respectively originally made from β and γ. β is composed of the set of parts $\{L_1, L_2, L_5, L_6\}$; γ is composed

of the set of parts $\{L_3, L_4, L_7, L_8\}$. Contrary to what happens at w_1, at w_2 there are more tables than we immediately recognize. Indeed together with *b* and *c* there is also *a*, which has persisted through the modal space. This happens because of the way in which origin essentialism is understood. Indeed, according to the view advanced by Leslie, *a* is numerically distinct from *b* and *c* at w_2, but it is somehow co-located with them. This is due to the fact that *a* is still a countable table as long as a world contains the parts needed to individuate *a*'s essence. Given *MT* and the way in which we specified the *Overlapping Condition*, it follows that *a* exists at w_2 as long as two parts of the original parts of *a* inhabit the world. This condition is met at w_2, for both *b* and *c* are composed of two parts that constitute *a*'s original essence.

Following Leslie's way of describing a model for tables' original material essence, at w_2, we have three numerically distinct tables. Let us focus on the essences of *b* and *c,* and how these essences are *actually* realized within w_2, i.e. what are the parts possessed by *b* and *c* in this world:

$(b)_{w2}$: $\{L_1, L_2, L_5, L_6\}$

$(c)_{w2}$: $\{L_3, L_4, L_7, L_8\}$

Together with these particular realizations of *b* and *c*'s essences, at w_2, there is a further essence that is realized, i.e. *a*'s essence:

$(a)_{w2}$: $\{L_1, L_2, x, y\}$
$\{x, y, L_3, L_4\}$

So, at w_2, there actually are three tables.

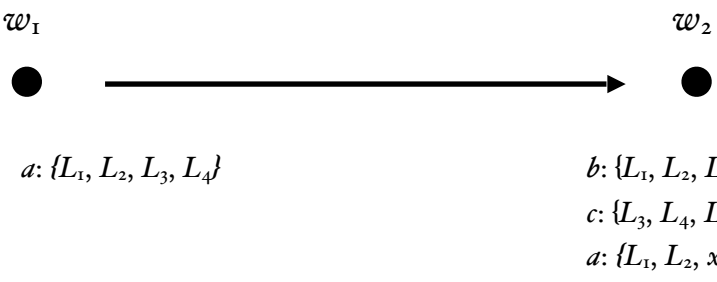
According to Leslie, the paradox is dissolved by correctly counting existing tables, which are determined by different sets of properties. The strategy is the same already deployed in the original case. Indeed, by correctly counting tables we can falsify some identity claims that *prima facie* hold among *a*, *b* and *c*. Precisely, what we falsify in this context is the same claim falsified by the Forbes-style solution:

9*. w_2: $\Box\ a = b$

Following Leslie's metaphysical picture, *a* and *b* are not numerically identical. Rather, they are simply co-located, and this is due to the fact that there is an overlapping between two of their possible sets of essential properties.

Let us visualize what happens once Leslie's account is endorsed:

As the diagram shows, the modal space is populated by three distinct tables which are made of three different sets of essential properties. However, the fact that *a*'s essence is determined at w_2 by two different sets of essential properties generates a problem for Leslie's view.



Once at w_2 the existence of *a* is recognized together with its being numerically distinct from both *b* and *c*, Leslie's metaphysical picture ends up in trouble. The trouble is about *a*'s identity at w_2, for *a* is split in this world. As you may notice, at w_2, there are two subsets of *a*'s essence that are realized. To get the point, focus on the following fact. Hunks of matter β and γ are both constituted by two parts of the original essence of *a*. This is why they both sufficiently overlap α: β and γ share two parts with α. Given *MT* and our specification of the *Overlapping Condition*, it follows that *a* is present at w_2, as colocated at the same time with *b* and *c*. Indeed, where *b* is located, there are two parts of the original essence of *a*, and so *a* is located where *b* is. Moreover, where *c* is located, there are two parts of the original essence of *a*, and so *a* is located where *c* is.

Let us focus on the first subset of essential properties of *a* at w_2:

$(a)_{w2}$: $\{L_1, L_2, x, y\}$

This subset overlaps the set of essential original parts of *b*, for they have two parts in common:

$(b)_{w2}$: $\{L_1, L_2, L_5, L_6\}$

This shows that *a* is located where *b* is located. The problem is that the same holds for *a* and *c*, i.e. they are co-located as well. Indeed, the second subset of *a*'s essence, i.e.

$(a)_{w2}$: $\{x, y, L_3, L_4\}$

overlaps the set of essential original parts of *c*:

$(c)_{w2}$: $\{L_3, L_4, L_7, L_8\}$

The absurd result of this picture is that *a* is co-located both with *b* and *c*. This is absurd because two tables co-located with two distinct tables cannot be one and the same table.

Notice: the problem is not that there is *half* of *a* where *b* is located and *half* of *a* where *c* is located. This would be the case if we admit that a table could have been originally made with only two parts, which is contrary to our supposition. Indeed, we agreed, and

Leslie agrees with us, that a table is formed by four parts. So, at w_2, as at w_1, *a* is made of four parts. Thus, the problem is that, at w_2, *a* is made of *two* sets of four parts, and it is located in *two* different regions of spacetime. So, *a* is split in the sense that is originally made from two distinct hunks of matter, i.e. those characterized by two different sets of parts: $\{L_1, L_2, L_5, L_6\}$ and $\{L_3, L_4, L_5, L_6\}$. The heart of the problem is that these two sets of parts determine the essence of two tables that should be numerically identical. But two tables cannot be a unique table!

Hence, the overall result of applying Leslie's solution to the case of *MP*3 is that we end up in metaphysical trouble. The trouble is that we commit ourselves to a metaphysical absurdity, i.e. that two numerically distinct tables can be one and the same table. This is due to the fact that, at w_2, *a* is originally made of two distinct hunks of matter, i.e. β and γ. The scenario is problematic even for those who, like Leslie, endorse plenitude. Indeed, despite the fact that we acknowledge the presence of more tables than intuition suggests, we still have to accept the presence of *one entity too many* - there cannot be two numerically identical *a*s. I conclude that Leslie's solution is not the best uniform solution available.

§4 *The Lesson and a New Proposal*

Let me sum up the situation we end up into. In this chapter, I developed *MP*3, and thus we now have three different versions of a modal paradox:

*MP*1	$SC, MT, NC, S4, NI \vDash \bot$
*MP*2	$MT, NC, S4 \vDash \bot$
*MP*3	$SC, MT, NC, T, NI \vDash \bot$

I examined three solutions trying to highlight that none of them is uniform, i.e. none of them is able to solve all the versions of the modal paradox.

Recall the proposed solutions: Salmon proposed that the paradox is solved by abandoning the idea that *S*4 is the correct modal system for metaphysical modality; Forbes proposed (with some differences from his original idea) that we could solve the paradox by replacing trans-world identity with counterparthood, i.e. a different trans-world relation; Leslie claims that we solve the paradox if we acknowledge that essentialism has to be differently understood, to the effect that our modal space contains more entities than we initially thought.

All this considered, I showed that these solutions are not as good as they could seem. Salmon's solution does not work with *MP*3, for it is not developed by endorsing the modal system *S*4. Rather, it is developed by endorsing the system *T*. So, Salmon is wrong: the paradox arises even if we drop the axiom *S*4. Forbes' suggestion of replacing transworld identity with the relation of counterparthood is equally flawed. Indeed, once the model sustaining *MP*3 is reinterpreted through counterpart theory, we end up facing a me-

taphysical difficulty. Namely, we end up committing ourselves to the idea that an artifact (like a table) can originate from two entirely distinct hunks of matter. This fact runs against our understanding of material objects (of which artifacts are a specific case). As regards Leslie's solution, we face again a metaphysical difficulty when dealing with the model of *MP*3, but of a different sort. Indeed, Leslie's idea of plenitude and her way of understanding *MT* push us towards the metaphysical absurdity that a table might have originated as two numerically distinct tables. This is absurd for it runs against our understanding of numerical identity.

Given this situation, I conclude that it is valuable to advance a different solution for Salmon's paradox. The solution is to reject *MT*.[22] We get rid of the principle pushing us to stipulate the *Overlapping Condition*, and so we endorse a more rigid version of origin essentialism, i.e. a metaphysical picture that does not allow any degree of tolerance about the original constitution of tables. Though such an intolerant form of essentialism looks like a radical point of view on artifacts, there are reasons in favour of this resolutive strategy.

First, rejecting *MT* solves all the versions of the paradox so far examined in a uniform way. If compared to the other solutions examined so far, rejecting *MT* blocks the rising of all the version of the paradox, for it is - together with *NC* - the only common assumption. Let us have a look at how these versions are solved by rejecting *MT*. To do this, let me separate the analysis of *MP*1 and *MP*3 from the analysis of *MP*2. This is due to the fact that the *MP*1 and *MP*3 both assumes also *SC* and *NI*, thus they require to talk about transworld identity conditions, while the latter does not.

As regards *MP*1 and *MP*3, if we reject *MT*, both their model must be reinterpreted, for we refuse the idea that a table might have originated from a distinct hunk of matter as long as it overlaps the original hunk of matter generating the table. Thus, in the models, *a*, *b* and *c* are all numerically distinct tables, for their essence is determined by different hunks of matter. By dropping *MT*, we do not allow any tolerance about the essence of a table. Once this is accepted, no identity claim is true of *a*, *b* and *c*, and so the derivation of a contradiction is blocked both in *MP*1 and *MP*3.

This does not mean that we get rid of trans-world identity and corresponding true identity claims. We simply drop the idea that trans-world identity relations can be grounded (in a loose sense of the term) in virtue of sufficiently overlapping relations. Indeed, this is what *MT* does: making identity claims about tables true on the basis of the sufficiently overlapping relation holding between hunks of matter. By abandoning *MT*, we drop this idea.

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[22] This solution has not have been completely neglected in the literature. As mentioned, it is defended by Williamson. Moreover, it is akin to Roderick Chisholm's *mereological essentialism*, according to which parts are essential to their whole (see CHISHOLM 1973). However there is a crucial difference, for I do not take any commitment on mereology. Moreover, I think that rejecting *MT* does not *ipso facto* result in endorsing this mereological thesis. Indeed, once *MT* is dropped we simply endorse the idea that there cannot be mereological differences in the original constitution of artifacts. This does not exclude the possibility of an artifact losing its part through time and retain its numerical identity. What it is essential to an artifact is that it comes into the existence through a specific matter; however, the artifact does not go out of existence if it is not made of its original parts at a specific moment of its existence.

This reason is related to the metaphysical relations involved in the metaphysical picture given by origin essentialism and the trans-world relations it deploys. Indeed, rejecting *MT* can be motivated by the acknowledgement of there being a tension between trans-world relations involved in *MP*1 and *MP*3, which are trans-world identity and the relation of sufficiently overlapping. The tension is given by their different features, according to which these relations behave in different ways.

Trans-world numerical identity follows what we may call the *Euclidean law*.[23] This principle can be so expressed:

EL $\quad \Box \forall x \forall y \forall z ((x = z \,\&\, y = z) \longrightarrow x = y)$

In other words, necessarily, if two things are identical to a third thing, then they are identical to each other. This is can be easily shown. Numerical identity implies uniqueness. If '$x = y$' is true, then there is a unique thing out there in the world that makes the claim true. So, if both '$x = z$' and '$y = z$' are true, there must be a unique thing out there in the world making them true. Hence, that very unique thing must be the same thing that makes '$x = y$' true.

This law is at play in *MP*1. Indeed, in the first case, we have three tables, *a*, *b* and *c*, that we are pushed to identify in virtue of this law. This is due to the fact that *a*, *b* and *c* comes from sufficiently overlapping hunks of matter, and so, following *MT*, we are pushed to accept that both *a* and *b* are identical to *c*. However, following *NC*, *a* and *b* are not identical. Hence the model is problematic. So, part of the problem is given by the fact that *EL* is violated in the model.

We face again the same violation in *MP*3. Indeed, *a*, *b* and *c* are related in the following way: both *b* and *c* are identical to *a*, but *b* and *c* are different from each other. Again, this is due to the fact that the hunks of matter from which tables are made sufficiently overlap in such a way that makes arise problems of identity. Let us focus, then, on the relation of sufficiently overlapping.

The relation of sufficiently overlapping is. as numerical identity, a trans-world relation, for it holds among hunks of matter in different possible worlds. Sure, it can also hold among hunks of matter within the same possible world, but this feature is not crucial. This relation is a specific type of similarity relation, and so it behaves differently from numerical identity. In particular, sufficient overlapping does not follow *EL*. Consider the specific case of α, β and γ in the model of *MP*1: α sufficiently overlaps γ and β sufficiently overlaps γ, but α does not sufficiently overlap β, and this is perfectly coherent. It is just due to different parts-compositions of the hunks of matter.

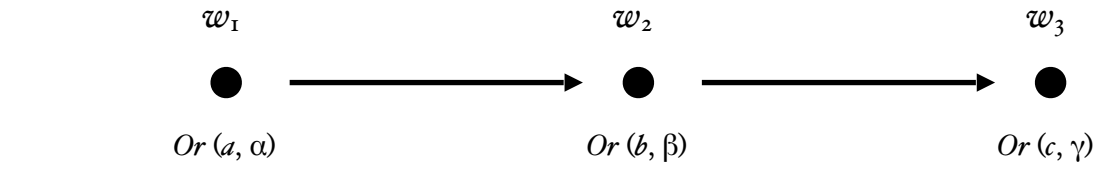
With this difference between trans-world identity and the relation of sufficient overlapping in mind, consider now a crucial fact: in the models of the two version of the paradox, some identity-facts about tables are grounded in (or depends on) "overlapping-facts", i.e. facts about hunks of matter overlapping or not other hunks of matter. What I

[23] I use this name for the principle I am going to discuss is one of Euclides' *common notion* in his *Elements* (see BYRNE AND OECHSLIN 2022, p. 17)

mean is that some tables are declared to be identical on the basis of some hunks of matter sufficiently overlapping. So, for example, in the model of *MP*3, *a* is identical to *b* and *c because* α sufficiently overlaps β and γ. It is in virtue of an overlapping trans-world relation that some trans-world identity claims are true.

This fact is crucial to highlight a tension underlying the paradox when it explicitly deploys principles about identity like *SC* and *NI*. This tension is due to there being two levels of connected trans-world relations that have different crucial features. On the one hand, there is the level at which hunks of matter are connected through a trans-world similarity relation, i.e. the relation of sufficiently overlapping. Call this level *the bottom-level*. This level does not follow the *EL* principle. On the other hand, there is the level at which tables are connected through trans-words numerical identity. Call this level *the upper-level*. This level follows the *EL* principle. The two levels are connected in a precise way: some facts about the bottom-level (similarity) determines some facts at the upper-level (identity).

Let me use these ideas to depict the model of *MP*1 in the following way, where I deploy sentences of the form '$x \approx y$' to express the overlapping (and so similarity) of hunks of matter:



Upper-level	$a \neq b$	$a = c$	$b = c$
Bottom-level	$\alpha \not\approx \beta$	$\alpha \approx \gamma$	$\beta \approx \gamma$

With the model so-interpreted, my point is that we should pay attention to two crucial factors. First, the upper level is regulated by *EL*, to the effect that '$a = c$', '$b = c$' and '$a \neq b$' cannot be all true on pain of contradiction. The bottom-level, instead, is not regulated by *EL*, to the effect that '$\alpha \not\approx \beta$', '$\alpha \approx \gamma$' and '$\beta \approx \gamma$' can be all true without pushing us towards a contradiction. Second, given that the truth of identity claims at the upper level is determined by the truth of similarity claims at the bottom-level, we face a tension. Focus only on the upper level: claims of this level are regulated by *EL* but determined by facts at the bottom-level. However, the bottom-level is not regulated by *EL*. Hence, at the upper level, there are two forces in conflict: on the one hand, there is a metaphysical principle governing trans-world identity; on the other hand, the truth of claims at this level is determined by facts holding at a level that is not governed by *EL*.

Following this diagnosis of why models of *MP*1 and *MP*3 are problematic, it follows that a sensitive choice is to reject one of the two trans-world relations and dissolve the

tension. A Forbes-style solution, somehow, dissolves this tension, for it replaces trans-world identity with counterparthood, which is a similarity relation. Thus, following this strategy, we make both the bottom- and the upper-level free from the constraint of *EL*. However, we saw that a Forbes-style solution leads us to different metaphysical problems.

The same result as a Forbes-style solution can be achieved by rejecting *MT*. Indeed, once *MT* is dropped, we drop the idea that some similarity-facts of the bottom-level determine some identity-facts of the upper-level. Indeed, once *MT* is no more part of our metaphysical picture, we do not ground the identity of tables on the similarity of hunks of matter. This is because, together with the principle, we drop its *Overlapping condition* that pushes us to establish similarity relations among hunks of matter.

Formally speaking, in the case of *MP*1 and *MP*3, we invalidate the following steps of the derivation of Salmon's original paradox and its revenge. As regards *MP*1, we invalidate the following line of reasoning:

1. w_1: $Or(a, \alpha)$

…[24]

4. w_1: $Or(a, \alpha) \longrightarrow \Diamond Or(a, \gamma)$

5. w_1: $\Diamond Or(a, \gamma) \longrightarrow \Box \forall x(Or(x, \gamma) \longrightarrow x = a))$

6. w_1: $Or(a, \alpha) \longrightarrow \Box \forall x(Or(x, \gamma) \longrightarrow x = a))$

7. w_1: $\Box \forall x(Or(x, \gamma) \longrightarrow x = a))$

The reasoning starts from the fact that *a* is originally made of α (1). It then applies *MT* (4): given that γ sufficiently overlaps α, it is possible for *a* to be originally made of γ. Then, through an application of *SC* (5), we are entitled to tell that if it is possible for *a* to be originally made of γ, then necessarily any table originally made of γ is identical to *a*. By a simple application of transitivity, we conclude that necessarily any table originally made of γ is identical to *a* (7). However, once *MT* is dropped, we cannot appeal to *MT* at 4, for *MT* is no more among our metaphysical principles.

As regards *MP*3, by dropping *MT* we invalidate the very *same* line of reasoning:

1*. w_1: $Or(a, \alpha)$

[24] Missing in-between steps simply stated some assumptions deployed later on in the derivation, so I omit them.

…

5*. w_1: $Or(a, \alpha) \longrightarrow \Diamond Or(a, \gamma)$

6*. w_1: $\Diamond Or(a, \gamma) \longrightarrow \Box \forall x(Or(x, \gamma) \longrightarrow x = a))$

7* w_1: $Or(a, \alpha) \longrightarrow \Box \forall x(Or(x, \gamma) \longrightarrow x = a))$

8* w_1: $\Box \forall x(Or(x, \gamma) \longrightarrow x = a))$

Again, as before, this reasoning is invalidated because we cannot apply *MT* anymore. In this case, it cannot be applied at 5*.

Let us move to *MP*1, for which the above diagnosis does not hold, for it does not rely neither on *SC* nor *NI*. Indeed, recall that *MP*2 derives a contradiction assuming only *MT*, *NC* and the axiom *S*4. Under the assumption that *NC* should not be dropped, and given that rejecting the axiom *S*4 is not a uniform solution, for it does not solve *MP*3, it follows that rejecting *MT* is a good solution. And by rejecting *MT* we indeed solve the problem raised by *MP*2. Indeed, formally speaking, by rejecting *MT* we block the derivation of the modal contradiction at these steps:

1. w_1: $Or(a, \alpha)$

…

4. w_1: $Or(a, \alpha) \longrightarrow \Diamond Or(a, \beta)$

5. w_1: $\Diamond Or(a, \beta)$

Indeed, if *MT* is not endorse, at step 4 we do not have a true claim anymore. Thus, the move to step 5 is invalidated. It simply untrue that *a* might have been originally made from β.

Thus, by rejecting *MT* we solve *MP*1, *MP*2 and *MP*3. This is the reason why this solution is better than those I analyzed. Indeed, no other solution is able to solve all the three versions of the paradox. Still, there is room to advance some objections to my argument in favor of rejecting *MT*. These objections can be directed against my development of *MP*3, which plays a crucial role in motivating the rejection of *MT*, or against the resulting metaphysical account of origin essentialism when deprived of a degree of modal tolerance. So, let me expose and reply to these objections.

§5 *Objections and Replies*

There are some objections that can be moved against my analysis of Salmon's revenger paradox and the resulting proposal of rejecting *MT*. These objections share a common core: they move against the way I specified the *Overlapping Condition* and, thus, against the metaphysical admissibility of the model of the paradox. If they are correct, the revenge of Salmon's paradox is not solved by rejecting *MT*, and thus this is not a uniform solution able to deal with all the versions of the paradox. Moreover, we should conclude that the development of *MP*3 does not help us to enhance our understanding of the modal paradox and rejecting *MT* is no more appealing.

§5.1 *Co-possibility and Overlapping Condition*

A first line of objections is the one trying to cast some suspects on the development of the model for *MP*3. First of all, it could be advanced the idea that *MP*3 can be solved by imposing a ban on co-possibility. This would block the existence of both *b* and *c* at the very same possible world w_2, and thus avoid the paradox. Second, it could be advanced the idea that the paradox is avoided by imposing a limit to the specification of the *Overlapping Condition*. This would make my specification of the condition illegitimate so that hunks of matter do not sufficiently overlap if they share the 50% of their matter. I believe that both these objections are flawed, for they advance *ad hoc* resolutions of the paradox. I show this in order.

Consider the first objection, according to which we should impose a ban on the co-possibility of tables *b* and *c at* w_2. This feature of the model is crucial to the development of the revenge of Salmon's paradox. An objector could then advance the idea that the paradox can be blocked if co-possibility is not allowed. This idea could be probably applied by imposing some conditions on how the trans-world relation for tables behaves. But any way you believe this can be done, I believe it would be very *ah hoc*, for I do not see any reason - except the fact that the paradox arises - to impose it.

Rather, it seems to me that it is perfectly reasonable to accept that *b* and *c* are compossible at world w_2. Indeed, admitting that there is a possible world where both *b* and *c* exist amounts to validating a very plausible line of reasoning: if I make a table out of a hunk of wood, then there is a table (in a possible world); if I had cut the hunk of wood in two halves before making a table, I could have done two tables out of the same hunk of wood; had things gone in this way, there could have been two tables (in the same possible world).

Running against this line of thought, in the context of Salmon's modal paradox, means to be doubtful about its metaphysical admissibility. *Why* should we think that this line of reasoning is metaphysically problematic? It seems to me that it does not bear any metaphysical weight. If anything, it seems to me that the problem is the other way round: given that this line of reasoning is allowed, why should I accept a metaphysical principle that makes this line of thought problematic? The principle is *MT*, for it is *MT* that pushes

us towards the identification of *a* with *both b* and *c* even if *b* and *c* are two distinct objects. Thus, the objection is *ad hoc* and not more reasonable than accepting my proposal of rejecting *MT*.

Now, consider the second objection, which, instead, specifically focuses on the *Overlapping Condition*: *MP*3 arises if we allow that the threshold for the *Overlapping Condition* can be set at 50% of the matter. Then, we can avoid the paradox by simply accepting that the threshold cannot be set to a value lower than 51%, for 50% pushes us towards problematic scenarios. The upshot of this proposal is the same as the previous one, for by limiting the *Overlapping Condition* in this way, we do not allow the co-possibility of both *b* and *c* at world w_2. This is because *b* and *c* would not be originally made by β and γ specified as having 50% of the matter in common with α.

To this objection, my reply is that it misses what I believe is a crucial point of the modal paradox under examination: it arises *independently of* how we set the limit of the *Overlapping Condition*. I showed this in a formal way: either if you follow Salmon's specification of the condition or you follow my specification, we end up facing *the same* contradiction. This fact is vital, for it shows that independently from how we specify the *Overlapping Condition* (and thus how we develop a model), the heart of the problem does not change: we are pushed toward a contradictory metaphysical picture - contradictory in the same way. Thus, blaming this or that choice of a limit point simply misses the problem raised by the paradox.

However, it could be further objected to my reply that the revenger paradox *is sensitive to* - or dependent on - the specification of the *Overlapping Condition*, for the revenge paradox requires the threshold to be set to a specific value, i.e. 50% of the matter. Hence, the objection goes, *MP*3 is not a version of Salmon's modal paradox, but a different paradox that arises exactly because of a particular value assigned to the *Overlapping Condition*. It should follow that the solution to *MP*3 is to reject the admissibility of the 50%-value.

The objection could be also strengthened. Indeed, this objection could be further developed: given that the revenger paradox is sensitive to a specific value for the *Overlapping Condition*, it is a *reductio ad absurdum* of the very idea that this value is metaphysically acceptable. In other words, it could be argued that the rising of *MP*3 is an argument against the admissibility of the 50%-value, to the effect that we cannot assign this value to the *Overlapping Condition*. It follows, also in this strengthened case, that the solution to *MP*3 is to reject the admissibility of the 50%-value.

My reply to this double-objection is that it is only partially correct to claim that *MP*3 is sensitive to the specification of the *Overlapping Condition*. In particular, this is true only under a specific understanding of *being sensitive*, which is not relevant to the metaphysical context under examination. To show this, let me point out that there are at least two senses of *being sensitive* (and *not being sensitive*) to this specification. According to one of these senses, the revenger paradox is as much sensitive to the the specification of the *Overlapping Condition* as *MP*1 (and *MP*2). According to the other sense, both the version of the paradox are *not sensitive* to this specification, for they are two ways of articulating the same problem. Let me articulate on this.

In the first sense of *being sensitive*, *MP*1 is sensitive to the fact that we set the limit point of the *Overlapping Condition* to 75% of common matter between hunks of matter. Indeed, it is in virtue of this specification of the condition that we obtain a specific model that makes it possible to visualize and understand the problem. In other words, it is in virtue of this specification that we deal with a specific metaphysical scenario that makes us understand - or visualize - the problem. Of course, the problem is not completely represented by the model or scenario; rather, we end up facing a problem when we face the fact that a contradiction can be derived from a set of assumptions.

Still, to derive the contradiction, we need a way to fix the meaning and evaluate the truth of the sentences deployed in the derivation, and the specification of the *Overlapping Condition* has a role in this process. Indeed, when we claim that it is truly the case that, for example, table *a* cannot be originally made from the hunk of matter γ, we are evaluating this claim as necessarily true. This is due to the fact that it holds in virtue of *NC* when the threshold for hunks of matter being sufficiently overlapped is set to a specific value (75%, 50%, and others).

Thus, the value set for the *Overlapping Condition* has an impact on at least two aspects of a version of a paradox: the model, or metaphysical scenario, we deal with; the particular way we derive the contradiction. Of course these aspects are deeply related to each other, for they are two different way of represent the same problem raised by a paradox. Because of this, there is a sense in with both *MP*1 and *MP*3 (and *MP*2 together with them) are sensitive to the specification of the *Overlapping Condition*.

In the second sense of *being sensitive*, neither *MP*1 nor *MP*3 (nor *MP*2) are sensitive to the value for the threshold of the *Overlapping Condition*. This, I believe, is the relevant sense to the analysis of the modal paradox. This is what I take from the fact that three different versions of the paradox under examination lead to the same modal contradiction about the original constitution of tables, showing that there is a common problematic core beyond these different elaborations of the paradox. Indeed, *MP*1, *MP*2 and *MP*3 derive the same metaphysically problematic contradiction.[25]

This fact should not be ignored: despite their differences, the three versions of the paradox point towards the same metaphysical problem. This is why I take them to be three *versions* of the same modal paradox. And this is why, despite their differences, I believe that it is crucial to evaluate that they all revolve around there being *a* value for the *Overlapping Condition*. The essential stipulation is there being a limit, and it is unessential to the paradox which is the value of this limit. In other words, the fact that there is a threshold for the *Overlapping Condition* is crucial to develop the paradox, while the *quantitative* stipulation, i.e. the value, of this condition is unessential to the problem it pushes us to face.

Once we focus on the two senses of *being sensitive* to the specification of the *Overlapping Condition*, the following reply to the above objection can be articulated: one the one hand, I can agree that somehow *MP*3 is sensitive to assignment of the 50%-value to the

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[25] Recall the caveat of Ch. 1 §6: the simpler version of the paradox leads to a slightly different contradiction than Salmon's original paradox and its revenge. However, also this contradiction is phrased in modal terms and its about the original constitution of tables. I take these similarities as sufficiently strong to point towards the same metaphysical problem.

Overlapping Condition; on the other hand, I disagree on the fact that this is relevant to the understanding of the metaphysical problem raised by *MP*1, *MP*2 and *MP*3 taken all together; rather, the overall picture is that there are three versions of a paradox that highlight the same problem even if the *Overlapping Condition* is differently specified.

It follows that it would be a mistake to take this paradox as a *reductio ad absurdum* of the 50%-value for the *Overlapping Condition*. Indeed, it would amount to believe that the derivation of the contradiction is the *reductio ad absurdum* of one of its unessential features. Probably someone could have independent reasons against the acceptance of this quantitative value. But even if so, she could not claim an advantage over the understanding of the problem raised by the paradox, which is one of my main goal; rather, she would simply hold a metaphysical view that does not face this particular version of the paradox. I am coming back soon on this independent reasons in §3.2.

On the basis of the reply so far outlined, it is possible to give a second reply to the above objection. This second reply is an invitation to the objector to further motivate her suspicious attitude towards the 50%value, and it could be articulated in this way: given that the objector is ready to believe that the 50%-threshold is the reason for the rising of a contradiction in the case of *MP*3, then why the objector is not ready to believe that the 75% threshold is the reason for the rising of a contradiction in the case of *MP*1 and *MP*2?

As I said, this is an invitation to further specific the above objection. The objector should feel the pressure of this question, unless she believes that all the versions of the paradox under examination are actually three different paradoxes, highlighting three different metaphysical problems. In that case, we disagree on the very nature of the modal paradox under examination. So, this second reply is not a knock-out one, but dialectically pushes the research towards further inquiry on the nature of the paradox, and to set aside the technical goal of simply avoiding the derivation of a contradiction.

§5.2 *Further Metaphysical Problems*

A second line of objection can be outlined on the basis of cognate metaphysical problems that arise when we deal with co-possibilities or other problems related to the material constitution of objects. This can be pursued by highlighting independent reasons (i.e. gathered out of the context of the modal paradox under examination) for rejecting the 50%-threshold. This thought is of first importance, for there are indeed metaphysical problems rooted in this stipulation of metaphysical relations akin to the one of sufficiently overlapping. The presence of these problems pushes us to think that a 50%-threshold has indeed a *negative* special character within metaphysical contexts in general, and so it is not an appealing metaphysical view. Let me examine this special character, for I believe that it is not special enough to turn *MP*3 into an example of problems of this kind.

A first, general reply to the above objection is that independent reasons to be suspicious about the 50%-threshold are not fully relevant to dialectical context of analysing the problem under discussion in this work. To show this, a further distinction should be drawn. In particular, we should distinguish the following two applications we could do of a

metaphysical idea like there being a 50%-threshold for the *Overlapping Condition*: one thing is to *use* the 50%-threshold to analyze and run the paradox in a specific way; another one is to *endorse* the idea that the 50%-threshold is a good metaphysical view. The former is a way to inquiry the problem raised by the paradox and how it can be differently derived from different sets of assumptions. The latter is a metaphysical view that you can accept or decline. Declining it *is* a solution to *MP*3, but it is not a good uniform solution, for it only solve the paradox when is articulated on the basis of such specification, and this is why it is *ad hoc*.

If this general reply is unconvincing, let us have a look at one of the problems that the endorsement of a 50%-value for the *Overlapping Condition* could lead to. A notable family of cases is the one of puzzles about *survival* in *fission* cases. In this cases, we could easily end up facing the following problem when we endorse the 50%-threshold. As an example, consider a homogeneous lump of matter, and call it q. Imagine that q is made of two equal portions of its matter, and call the first portion q_1 and the second q_2. The two parts are equal, thus q_1 is the 50% of the total matter of q, and q_2 is the rest of the 50% of the total matter of q.

Now, let us consider what happens if we allow q to be split *and* being able to survive through the split. Namely, let us suppose that if we separate q_1 and q_2, q is still existent. This means that q exists as two separate and smaller homogeneous lumps of matter. But, then, we face a problem, given by the fact that q is identical to both q_1 and q_2, for we assumed that q survives the split in these two parts. Namely, considering that $q = q_1$ and $q = q_2$ *but* $q_1 \neq q_2$, we face the following contradiction:

$C_q \qquad q_1 = q_2 \,\&\, q_1 \neq q_2$

Here we face a metaphysical problem: it cannot be the case that q_1 and q_2 are at the same time the same thing and two different things.

This example can be used to bolster the objection against the viability of setting the *Overlapping Condition* to 50%. This can be done in two ways. First, it could be objected that the presence of independent metaphysical problems rooted in how the threshold is set is a good reason to consider it metaphysically unacceptable. Second, it could be argued that if my strategy of dropping *MT* in virtue of a paradox sensitive (in a sense) to this specification of the threshold would be used also in the case of other related metaphysical problems, then we would end up endorsing mereological essentialism. Namely, we would end up being intolerant about any degree of change that a material object can undergo, for every part of the object is essential to its being what it is. Given that this view is unattractive, for it is too rigid, it follows that it is much better to ban this value from the range of possible values of the *Overlapping Condition*.[26]

However, I believe that this family of survival problems has some crucial differences to the modal paradox under examination. But once these differences are acknowledged, I hold that the presence of different problems related to the deployment of the

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[26] Recall that I introduced mereological essentialism above, where something like the reply here exposed is anticipated (p. 64 fn. 23).

50% value are no more relevant in the overall economy of analyzing the modal paradox. To articulate my reply, let me proceed from the second to the first part of the objection, for I believe is the best way to understand the differences between *MP*3 and the survival problem of the above example.

To reply to the second part of the objection, i.e. the idea that treating cases like the one above by rejecting *MT* amounts to accepting the idea of mereological essentialism, I believe that is not necessarily the case. Namely, I believe that the rejection of *MT* does not directly imply the endorsement of mereological essentialism. This does not happen neither in the case of the modal paradox nor in the example of survival problems exposed above.

My reply is sustained by focusing on the fact that there are different kinds of change, and *MT* and mereological essentialism deals with two different kinds of change. Let us focus only on two kinds of change: *accidental* change and *substantial* change.[27] The first one, is the change things undergo without ceasing to exist, while the second kind of change is the one that leads things to come into existence or to go out of it. An example: our body during the time of our life constantly replaces cells and we gain and loose features that are unessential to our being alive; still, we have also come into existence through our birth and we will go out of existence through our death.

Moreover, as regards substantial change, it is important to keep distinct the two different types of substantial change, i.e. coming into existence and going out of it. Despite they are both changes about the existential status of an object, there is no need to believe that they must be regulated by the same metaphysical, and so modal, principles. Indeed, we do not come into existence for the same reason has the one we will go out of it.

My idea is that, once we reject *MT*, it is essential to an object that it *originates* from a specific hunk of matter and we cannot tolerate any different, though similar, hunk of matter to be the material basis for the development of the same object. By rejecting *MT* we are modally intolerant about *this* fact. Namely, we are intolerant about the modal profile of objects coming into existence. We are not telling anything about the *survival* conditions of the object. Thus, rejecting *MT* is consistent with the idea that a material object can loose its parts without ceasing to exist. Namely, we are not taking any stance on the conditions of the accidental changes that the object can undergo. In the same way, we are not telling anything about the conditions that leads the object to go out of existence. So, in the case of *MP*3, we obtain that a table is essentially determined by the matter - the exact matter - it comes into existence, but *once* it exists, it can undergo changes of this matter without ceasing to exist. The same applies *mutatis mutandi* for the lumps in the example of survival.

If anything, the crucial difference between the two cases is that the example about the lumps is about the survival conditions of the lumps, not about the conditions under which it comes into existence. All the lumps in the example (q_1, q_2 and q_3) can be determined by their original amount of matter. The problem, here, is generated by different factors, i.e. the *survival* threshold for the lumps. So, the 50%-value in the two cases is assigned to two different conditions that are correlated to two different kinds of change that the objects in question can undergo. Hence, we are dealing with two different metaphysical

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[27] On forms of change and how substantial change is different from accidental change see LOWE 2006.

problems. While the survival case deals with the persistence conditions of the lump and sets a value for a threshold of survival, the specification of the *Overlapping Condition* in *MP*3 is meant to specify the modal conditions for the coming into existence of tables. Moreover, in *MP*3 the *Overlapping Condition* regulates the *similarity* of hunks of matter, which in turn are be used to regulate the coming into existence of tables.

This comparison between the case of survival and *MP*3 should show that the special nature of the 50%-threshold for the *Overlapping Relation* can be related to further metaphysical problems that present similar characteristic to *MP*3. However, there are crucial differences that runs agains the idea that the special nature of the 50%-threshold has the same role in all these related - but distinct - problems.

§5.3 *Commonsense does not Help*

In the end, let us consider how problematic it would be to object to the proposed rejection of *MT* that *MT* is too in line with our commonsense to be rejected. To this I would reply that setting a limit point at 50% is in line with our commonsensical intuitions as well. Maybe is statistically odd, for few people would have this intuition. Still, as any other element of our commonsense, an intuition that someone might have.

I do not want to defend our commonsense, for I intend to reject *MT*, but I want to highlight that if you want to impose a limit on the *Overlapping Condition*, you endorse *MT*, for this condition is due to *MT*. So you face the following tension: you motivate *MT* through commonsense, but commonsense also motivates that setting the *Overlapping Condition* to 50% is admissible. So, your idea of setting the limit to 51% is ill-motivated.

Why is 50% an admissible commonsensical stipulation? For commonsense does not have the resources to specify the *Overlapping Condition*. From a commonsensical point of view, scenarios about tables and their overlapping matter could be controversial, but no one would refrain a craftsman from believing that he would have produced the very same table had deployed 50% of different matter. You need metaphysical or logical reasons for specifying the condition in this or that way. You need them because the problem we face with Salmon's paradox is of a logico-metaphysic nature. This is why the objection under examination is *ad hoc*, for it lacks a logico-metaphysical motivation to set such a limit.

The objector may wonder that is hard to prove that a 50%-threshold is a commonsense intuition. But I would reply that the same could be said of the 75%-threshold of *MP*1 and *MP*2. How do we evaluate what is a genuine intuition of commonsense? We probably would need a global survey for this. Nonetheless, it is hard to let commonsense be a guide for metaphysical principles - unless someone tries to develop a metaphysical theory of commonsense that delivers some precise quantitative result like rejecting the 50%-threshold. Simply appealing to the intuitive commonsensical correctness of an idea does not make it more appealing than a sharply less intuitive one. In this context we need to solve a metaphysical problem, and we should have logico-metaphysical good reasons to appeal to commonsensical intuitions.

Does rejecting *MT* have a logico-metaphysical motivation? Yes! First, if my analysis of the modal paradox is correct, this is rooted in a problem of consistency, i.e. there is a set of claims that generates a contradiction. This set contains *MT*. Even more, *MT* is contained in all the sets of assumptions of three different development of the same metaphysical problem. When facing a problem of consistency, there is a logical reason for dropping one of the claims of the set to not let the contradiction arise. Second, the set of claims under examination is about origin essentialism, which is a metaphysical doctrine. Now, *if* your aim is to save *NC*, there is no better choice than dropping *MT*, for this principle does not encapsulate the idea of origin essentialism. *MT* is a principle we assume because it makes the idea of origin essentialism more in line with our commonsense and our intuitions. So, dropping *MT* has a metaphysical motivation.

Recall, I am assuming that *NC* should not be dropped. If you believe that *MT* is strongly motivated by commonsense, the result of my analysis of Salmon's modal paradox should push you to consider the rejection of *NC* instead. As I said, this is further philosophical work. If anything, my analysis motivates that this inquiry should be taken more seriously, for rejecting *MT* and *NC* are the only two uniform solutions across the board. Probably, we underestimate the interaction between these two principles.

§6 *Conclusion*

In this third chapter, I developed a third version of Salmon's modal paradox, i.e. *MP*3, and I used it to motivate a different solution to it, i.e. rejecting *MT*. To do this, I argued that the previous solutions are incapable to solve the revenger paradox in a uniform way as rejecting *MT* does. This conclusion is conditional, i.e. it works under the assumption that we should not reject *NC*. Other solution fails where rejecting *MT* succeeds. Indeed, an effective solution should be able to dissolve the paradox and save origin essentialism independently of the particular way in which the paradox is outlined. It follows that solutions under examination are *ad hoc*, i.e. they work only for the specific way in which Salmon developed his original paradox. Instead, I showed that once *MT* is rejected, we can solve both versions of the paradox, and this motivates the idea that this solution is better than the previous ones.

To show this point, I proceeded by outlining *MP*3 first. I did this by offering a different specification of the *Overlapping Condition*. I used this different specification to outline a different model and I showed how, on the basis of this model, it is possible to derive the core contradiction already encountered with *MP*1 and *MP*2.

*MP*3 does not assume that *S*4 is the correct logic for metaphysical modality. This fact has an important consequence on Salmon's solution to the paradox, according to which we should drop the axiom *S*4. However, given that the axiom is not endorsed *MP*3, it follows that dropping *S*4 cannot be a viable solution. Moreover, *MP*3 is based on a different model that neither Forbes nor Leslie's metaphysical views are able to take into account without generating further difficulties. As regards a Forbes-style solution, the metaphysical view elaborated on his suggestion of endorsing counterparthood pushes us to an odd un-

derstanding of material entities. Namely, it pushes us to accept the odd idea that a material object can come into existence while it is co-located with two numerically distinct hunks of matter. As regards Leslie's solution, the way Leslie understands origin essentialism and tolerant essences allows the possibility of an artifact splitting into two different ones that originate from two distinct hunks of matter. Hence, all the solutions under examination look inadequate to solve *MP*3.

I thus advanced the idea that a better solution on the table is to reject *MT*. The solution is motivated by the failure of all the other available solutions and by the fact that the rejection of *MT* blocks all the versions of the modal paradox, and so its virtue is that it solves all the versions of the paradox in a uniform way.

Still, the development of the model for *MP*3 relies on a controversial assumption, i.e. that it is legitimate to set the limit for the *Overlapping Condition* at 50% of the common matter between hunks of matter. I thus defended this idea by replying to some objections that could be moved against this idea, and so I defended my proposal of rejecting *MT*. The objector who is not convinced by my defense, could still embrace my conclusion in a conditional way, along the following lines: *if* the 50%-value for the *Overlapping Condition* is admissible, *then* the best solution to Salmon's modal paradox is rejecting *MT*.

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Part II

4. *Ontological Realism and the Linguistic View*

§1 *Introduction: Ontological Realism and Language*

In this chapter, I expose a precise understanding of ontological realism ('*OR*' from now onwards), which I call *the OR-paradigm*. This is a metaontological view about the theoretical activity pursued by ontology with a realist spirit. The ultimate goal of discussing the *OR*-paradigm is to analyze the interaction between ontological theorizing and linguistic expression when a realist perspective is endorsed. This analysis is developed in three chapters, and the present one poses the basis for the subsequent methodological discussion.

The idea I advance is that *OR* has to be understood as a paradigm where different ontological theories coexist and cooperate towards the fulfillment of the same theoretical aim, which is the development of the best true and complete description of reality in itself, i.e. reality understood in a mind-independent way. I intend this aim as regulative, i.e. as an end that determines how the theoretical activity of the paradigm has to proceed.

In §2 I explain this understanding of *OR*, focusing on how theories belonging to this paradigm describe reality. I call these theories *OR-theories* and I mainly conceive of them as descriptive objects (in a very general sense of 'objects'). What I mean is that each *OR*-theory offers a different description of reality. These descriptions make use of two fundamental sets of conceptual tools: categories of being and ideological relations (i.e. relations that describe how entities of different categories are related to each other). To express their descriptions, *OR*-theories use a language - i.e. they describe reality through language. This fact is the main motivation to have a look at how the content of *OR*-theories (i.e. the description they offer) is related to the language they deploy to express their contents.

To clarify this metaontological understanding of *OR*, in §3 I compare the terminology deployed by the *OR*-paradigm with Willard v.O. Quine's ontological jargon. This comparison is motivated by the fact that Quine elaborated a distinction between ontology and ideology that is different, under some relevant aspects, from the distinction between categories and ideological relations that identifies *OR*-theories. Through this discussion, I want to highlight some crucial differences between *OR* and what I call *the Linguistic view*, which is a particular metaontological perspective - championed by Quine - according to which the theoretical development of ontology is subordinated to linguistic analysis. Highlighting

these differences is crucial to get a comprehensive picture of the *OR*-paradigm and how it differs from linguistic metaontological accounts.

In §4 I discuss how Schaffer's metaontology and the *OR*-paradigm are related to each other. I argue that Schaffer's view, which he calls 'The Aristotelean view' can be understood as a particular *OR*-theory. This shows that the metaontology of the *OR*-paradigm is broader than the one proposed by Schaffer and thus more useful to outline a realist front to be opposed to the linguistic view. Hence, my intention is not to argue that Schaffer's account is flawed, but to show that it is partial if compared to the *OR*-paradigm.

To conclude my exposition of the *OR*-paradigm, in §5, I offer a second comparison of it with a different account endorsing a linguistic view on ontology, i.e. the metaontology of Rudolph Carnap. In particular, I want to show the differences between *OR*-theories and what Carnap calls 'Ontological frameworks'. This difference is vital to introduce the methodological point I tackle in the following chapters. Indeed, the comparison between *OR*-theories and ontological frameworks helps clarify the way *OR*-theories are related to language and their need of being able to express their description of reality through a language.

The conclusion I trace is that a methodological analysis of how language has to be deployed within the *OR*-paradigm is needed. The way the *OR*-paradigm is understood requires taking a clear stance on how language has to be deployed in its theoretical activity. This is due to its very nature of being guided by a regulative aim according to which its object of inquiry is reality in itself. This requires that, on the one hand, *OR* has to develop *OR*-theories in a language-independent way, but, on the other hand, *OR* has to inquiry the way to *OR*-theories are related to language.

§2 *Understanding Ontological Realism: the OR-paradigm*

First of all, let me introduce the *OR*-paradigm (§2.1) and then explain the crucial features of *OR*-theories, i.e. theories that populate this philosophical paradigm (§2.2).

§2.1 *The OR-paradigm*

The way I conceive of *OR* is that of a philosophical project that can be developed in different ways by different ontological theories. So, I do not take *OR* to be a theory about a precise subject matter. Rather, being a paradigm, *OR* is populated by different theories that cooperate to fulfill the aim of the paradigm, which is giving an ontological description of reality. Let me explain this idea.

Consider the example of the debate on the existence of *universals*. In this case, a realist is someone who believes that universals are existing entities. Opponents to this form of realism hold a form of *nominalism* according to which universals do not exist - at most, they are nothing more than linguistic constructs that do not deserve the status of a really existing entity. Rather, I take *OR* to be a broad philosophical project, of which nominalism

and realism about universals can be seen as two particular applications on a precise subject matter.

So, I characterize *OR* as follows:[28]

> *OR* is the philosophical paradigm driven by the regulative aim that it is possible to find the best true and complete ontological theory that describes reality in itself.

According to this characterization, *OR* is a philosophical paradigm that aims at the development of a theory that truly and fully describes a precise object of inquiry, i.e. reality in itself, from an ontological perspective. Despite its simplicity, this characterization needs all the crucial concepts it deploys to be clarified. So, let me explain them.

First of all, let me explain what a philosophical paradigm is. I call *OR* a paradigm exactly because it is not a theory about a precise subject matter (as in the above example about realism and nominalism about universals). Indeed, what I mean by 'paradigm' is a set of theories that share the same *regulative aim*. In this case, the aim is the description of reality in itself; and it is a regulative aim because it sets the ultimate goal of the paradigm so that when the ultimate true theory of reality is reached, the research activity of the paradigm is put at rest. This means that the aim of the *OR*-paradigm is not a piece of content (e.g. a particular ontological claim) shared by different theories, but a methodological claim that constraints the content of different theories.

Realism and nominalism about universals can be seen as examples of these theories: the first claims that universals are real, while the second claims that they are not. Even *nihilism*, understood as the theory according to which nothing really exists, can be a possible theory of the *OR*-paradigm, for what the nihilist would be claiming is that reality is such that nothing exists - namely, that no existential fact holds in reality. In a specific sense, even *relativism*, according to which there are alternative ontological descriptions of reality, can be accommodated within the paradigm. This happens if a relativist theory claims that it is a feature of reality itself that can be described in different ways. Instead, if a relativist theory claims that the very fact that reality can be in described different ways depends exclusively on our linguistic and conceptual tools, then it falls outside the paradigm.

Second, there is an important notion to be specified, i.e. the one of *possibility*. Indeed, according to *OR*, the description of reality in itself is a *possible* theoretical enterprise. Here, the sense of this modal notion is very *pragmatic*: philosophers *can* reach such a theoretical achievement. This possibility is important, for it means that we can transcend the tools through which we investigate reality, such as linguistic practices and conceptual schemes.

This idea of transcending is useful to understand a crucial notion of the characterization, i.e. the one of *reality in itself*. I will not offer a precise account of what reality is or follow any particular existing account; however, I will intend reality in itself as reality as it is *independently* of the language, the concepts and the experience deployed in the attempt of its

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[28] There are other ways of characterizing *OR*. My characterization makes explicit the crucial feature of *OR*, which is the one I am interested in. For a panoramic on *OR* see JENKINS 2010, where the idea that the best way to characterize *OR* through the concept of independence is defended.

description.[29] Notice that, in this context, I am not endorsing any particular view on what reality in itself is. I am simply offering a general and neutral characterization of *OR* that aims to capture a crucial feature of the paradigm. This feature must be shared by all the different theories of the paradigm. However, these theories can even assume different views on what reality is. We could go with Theodor Sider and think that reality is determined by its *fundamental structure* (SIDER 2011); or, on the contrary, we could even accept the idea that there is no real distinction between what is fundamental and what is not.[30] We could even accept Kit Fine's idea that reality in itself is a *primitive* metaphysical concept, and so that we cannot offer any analysis of it (FINE 2001).

The crucial point is that, whatever view of reality in itself we take, if our theoretical activity is developed within the *OR*-paradigm, then we aim at offering a description of reality in itself. So, in this chapter, I suspend my judgment about different accounts of reality. What I offer, instead, is a clarification of the concept of reality in itself, which is the object of inquiry of *OR*.

I characterize reality in itself through the notion of *independence*. Following Carrie Jenkins, a way to explain the independence of reality in itself on an intuitive level is through the notion of mind-independence. Following her idea, reality in itself is reality as it is independently of "the way we think, talk, experience, conceptualize, and so on" (JENKINS 2010, p. 883). The basic idea is that the way reality truly - or objectively - is does not depend on our activity of knowing it through our mental capacities, among which there notably are *thinking*, *talking*, *experiencing*, *conceptualizing*, among the others.

If anything, our minds and their capacities are *real*, and it is essential to take this fact into account. Indeed, reality in itself is such that knowers, like human-beings, have mental capacities that they deploy to know reality. So, there is a sense in which the way reality it is *depends* on there being knowers made in a specific way. Still, if there is a reality in itself, it is not determined by mental capacities of knowers, in the sense that these capacities does determine how reality in itself is. Consider, for example, the process of thinking that reality is in this or that way, e.g. suppose that someone thinks that reality is colorless (sure, this is an odd thought, but just take it for the sake of explanation). If you follow *OR*, you refuse the idea that this thought *makes* reality to be colorless. Under this respect, reality in itself is independent of our mental cognition, and this is the crucial sense of independence that characterizes reality in itself in the spirit of *OR*.

This characterization of reality in itself has an important upshot. Embracing the view of *OR*, we are interested in offering a true and complete ontological description of reality in itself. Hence, such a description is also about knowers' minds and their capacities. Thus, some bits of a description of reality in itself offers a picture of knowers' minds and their capacities. Indeed, these are aspects of reality in itself, and so a complete description of it should not miss to describe them.

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[29] This idea of the accessibility of reality in itself and the consequent possibility of understanding it is akin to Lowe's ideas on the viability of metaphysics in a realist spirit (see LOWE 2002, pp. 7-16).

[30] The idea that there is no distinction between a fundamental level and a non-fundamental one is discussed in SCHAFFER 2003.

In the present work, I am mainly concerned about the interaction between the theoretical activity of *OR* and language. So, consider what reality in itself should be when considered relatively to language, understood as a mental feature of knowers. As a matter of fact, we deploy languages to talk about the world. Thus, reality is such that there are knowers that describe it through languages, so, in a sense, what reality is depends on the fact that knowers deploys language to describe it. Moreover, languages - both *natural* (like English, Italian, and others) and *artificial* (like first-order predicate logic) - are real things. So, just to give an example, languages could be understood as abstract objects, or structures, that are essentially determined by the way the work according to their rules - like grammatical rules - and so on. No matter how you understand languages, what matters is that they can be ontologically described.

Still, languages, when deployed by knowers, should not determine what reality in itself is, if you follow *OR*. Otherwise, we would end up developing a theory of reality as it is relatively to the deployment of a specific language. This problem will be analyzed in Ch. 5, where I argue that there is a methodological stance that could push us towards this mistake, and that I call *the language-first* methodology. As I will point out, I will restrict my attention to formal languages, which are artificial languages, and this is of great importance, for they are theoretical products as the theories produced by the *OR*-paradigm. So, my aim is to highlight a possible way of compromising the theoretical aim of *OR* when the development of a formal, and so artificial language, takes priority over the development of a description of reality.

Having clarified these points, let us move to characterize the different theories that populate the paradigm and that compete to be the best true and complete one. Characterizing this type of theory is crucial to analyze the theoretical activity of the paradigm, for it is ultimate goal is to find the ultimate description of reality in itself.

§2.2 *OR-theories*

Let us now focus our attention on the theories produced within the *OR*-paradigm. Since *OR* is a philosophical paradigm, it is composed of different philosophical theories. Let me call these theories *OR-theories*. I take *OR*-theories to be *descriptive artifacts*, along the lines of what Robert Arp, Barry Smith and Andrew D. Spear propose in their development of what they call *Formal Ontology*. Using their words:

> Ontologies represent (or seek to represent) reality, and they do so in such a way that many different persons can understand the terms they contain and so learn about the entities in reality that these terms represent. […] Ontologies consist of terms arranged together in a certain way, and terms are an important subtype of representations:

> representation $=_{def}$ an entity (for example, a term, an idea an image, a label, a description, an essay) that refers to some other entity or entities.
>
> ARP, SMITH AND SPEAR 2015, p. 2

In the text, if you substitute 'Ontologies' with what I call '*OR*-theories', you obtain the basic idea of what *OR*-theories are, i.e. representational entities. In particular, *OR*-theories seek to represent reality through language. Linguistic items are the representational tools of *OR*-theories, through which they refer to entities. This notion of reference is intentionally left unexplained and intuitive. Reference is simply the relation holding between a representational linguistic item and entities populating reality.

Let me illustrate this point with a very simple example. Imagine an *OR*-theory endorsing the existence of both universal properties and individuals. This *OR*-theory describes reality as populated by universal properties, like *redness*, *yellowness*, *wisdom*, and so on, and individuals, like you, me, my car, an apple, and so on. Notice, universal properties and individuals are usually distinguished by the fact that universals are instantiated by different individuals, while individuals are not instantiated at all. So, if you and I are both wise, then we are both instances of *wisdom*. However, we (you and I) are two distinct individuals - and we can be instances of different universals (you can be tall and I can be short). Now, consider how the *OR*-theory under examination represents a small portion of reality, e.g. the fact that an apple is red, where the apple is the individual and redness is an universal. Following the standard language for first-order predicate logic, it describes reality with the following sentence:

Ra

where '*R*' represents the universal of redness and '*a*' represents the individual apple.[31]

The fact that *OR*-theories describe reality through language requires to take into account the interaction between these theories and the language they deploy to express their description. This relationship is complex, and one of my aims is to show how much it is. For now, let me highlight some points that will be essential for the subsequent discussion.

First of all, let me clarify the way we should intend the fact that *OR*-theories deploys a language to describe reality. First clarification: from now onwards my attention is restricted to formal languages, which are artificial and symbolic languages that are deployed to analyze and understand natural languages and our way of using them. Thus, formal languages are abstract objects that simulate the way in which knowers - like human beings - talk and interact through languages. Second clarification: *OR*-theories, and theories in general,

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[31] Notice, according to the above Smith's definition, both '*R*' and '*a*' represents and, so, they both refer to real entities. This means that '*R*' refers to redness and '*a*' to the apple. While is common to claim that a name for an individual like '*a*' refers to things, it is quite uncommon to hear that a *predicate* like '*R*' refers to universals. Rather, it is commonly held that predicates *stand for* universal, avoiding the notion of reference. However, as explained, reference is understood in the present context as the relation holding between linguistic representational items and real entities. Linguistic name-reference and the *standing for* relation for predicates and universals are both examples of reference in this context.

do not talk like human beings do. So, when I claim that they deploy a language I mean that a formal language is required to express the description in such a way that is understandable by a knower of reality. Thus, the overall resulting picture is that *OR*-theories are expressed by formal languages to the effect that they can be understood by a knower of reality as producing descriptive claims about reality.

The first upshot of these clarifications is that *OR*-theories, in a sense, depend on language, for without a language they would not be able to express their descriptions of reality. Still, let us bear in mind that what *OR*-theories describe is reality in itself, which is mind-independent. Namely, *OR*-theories describe reality as it is independently of how mental capacities of knowers elaborate it. Recall, there is a sense in which these capacities are real; still, what reality in itself is is not determined by these capacities. Among these capacities, there is language. Thus, despite the fact that language is real, the deployment of a language to describe reality ought not to determine how reality in itself is. It follows that the deployment of this or that language to express an *OR*-theory does not determine the content of the description of the *OR*-theory, for this content is a representation of reality in itself.

In offering such a representation, an *OR*-theory should also be able to describe what language is and how it is connected to reality. Thus, an *OR*-theory should be able to account for the ontological nature of linguistic items - it should be able to classify them, to explain how they are related to each other and to reality, and so on. This is due to the fact that languages are real, and, being part of reality, they should be somehow described - setting aside *how* they are described.

Now, let us move on and consider more features of *OR*-theories. As regards the tools through which *OR*-theories describe reality, I consider *OR*-theories as descriptions that possess at least a *categorization* and an *ideology* of reality. Categories and ideological relations are the two essential types of tools that *OR*-theory deploys to develop their description of reality.

On the one hand, a categorization represents how an *OR*-theory differentiates *kinds* of being. So, for example, there can be a theory endorsing a two-category organization of reality, as in the case of the *substance-universal dualism*, and there can be a theory endorsing a one-category description of reality, as in the case of *substance monism*. According to the first theory, reality is composed of entities of two kinds, i.e. substances and universals. According to the second theory, reality is composed of a single kind of entity, i.e. substances. Of course, there can be theories accepting a plurality of categories, for example, those endorsing *tropes* together with substances and universals, and so on. There is no in-principled reason to posit a limit of categories that an *OR*-theory can endorse.

On the other hand, an ideology is the set of *formal relations* that a theory uses to describe the ways in which different beings are related. A famous example can be the relation of *ontological dependence*, which is the relation holding between two entities *a* and *b* when the existence of one of them depends on the existence of the other.

Let me compare two different *OR*-theories to give examples of this type of theory. Consider Keith Campbell and John Heil's theories (CAMPBELL 1997, HEIL 2012). According to Campbell, reality can be described through the category of tropes together with the ideological relation of co-location. So, Campbell's theory is a monistic theory, for it deploys

a unique category of being, i.e. tropes. Tropes are defined as *regions of space-time*, while the relation of co-location is defined as the relation giving *unity* to collections of tropes. In this way, every real existing entity is a trope or a collection of tropes. Intuitively, tropes are particular aspects of reality, such as the particular grey of my laptop; and my laptop is a collection of a lot of other particular aspects taken together by the relation of co-location.

Now, consider Heil's theory instead, which is a dualistic theory, in the sense that it endorses two categories of being: tropes[32] and substances. In addition to this, Heil endorses a different ideological relation, i.e. the relation of *mutual dependence*, according to which the existence of tropes depends on the existence of substances, and vice-versa. So, for example, the particular grey of my laptop (the trope) depends on the existence of my laptop (the substance), and vice-versa. This is linked to how tropes and substances are defined: substances are conceived of as tropes bearers and tropes as ways substances are. At this point, I think this is enough to show how *OR*-theories can differ from each other.

However, when it comes to *OR*-theories, the set of things that a theory recognizes as existent *depends* on the categorization deployed by the theory. To see this, consider again Heil's and Campbell's theories and imagine that they had to describe a world where only one thing exists - and suppose that this thing is my laptop. According to Campbell's description, the world contains tropes (particular aspects of my laptop) and a collection of tropes (i.e. the laptop). According to Heil's description, instead, the world contains tropes (the same particular aspects of my laptop) and a substance (the laptop). So, Heil's and Campbell's worlds are different because the first contains a substance and the second contains a collection of tropes - indeed, they both accept the presence of tropes (and I am assuming they agree on *what* the tropes are). This means that the two sets of things that these theories are different, and they are different in virtue of their different categorizations of reality.

As anticipated, the *OR*-paradigm looks for the best *true* and *complete* *OR*-theory. Before moving on to consider what counts as the best *OR*-theory, let me say something about their truth and completeness, which are two crucial conditions that every *OR*-theory aims to fulfill.

As regards the truth of *OR*-theories, this feature has to characterize each descriptive claim of this type of theory. It could result trivial, but the aim of any type of theory is to tell something true, for the presence of false claims is generally seen as a theoretical deficit. The same happens with *OR*-theories: their primal aim is to describe reality through true claims. False claims have not descriptive power, for they do not actually describe how things are. I remain neutral about the notion of truth, and I do not have a specific account of what makes descriptive ontological claims true. Thus, I do not know *how* the ultimate word on ontological theorizing is achievable. Still, what is essential to the enterprise of the

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[32] To be precise, Heil prefers the expression 'modes' instead of 'tropes'. This is a terminological choice that reflects the fact that Heil's conception of modes is not completely equivalent to Campbell's one. However, is nothing more than a terminological choice. For my part, I prefer to uniformly use the expression 'tropes'.

OR-paradigm is that claims of *OR*-theories aim to be true, and that the best true *OR*-theory can be pragmatically achieved.[33]

The second crucial feature of an *OR*-theory that aims to be the best is completeness. Intuitively, the idea is that an *OR*-theory must be able to describe every aspect of reality in itself, so that there is no relevant aspect of reality for which the theory does not offer a description. More technically - but without going through the finest details - a theory is complete if it is consistent and for every sentence it can produce, either that sentence or its negation is provable within the theory. This feature, thus, is composed by two different components: on the one hand, *OR*-theories ought to aim to consistency, to the effect that they do not contain - or they do not make possible to derive - contradictions;[34] on the other hand, for every sentence that the theory can produce either can be proved that this sentence is true or it can be proved that it is true its negation. The second component of completeness is of particular importance, for its effect is that for every aspect of reality there is a true sentence that can describe that specific aspect of reality or it is true the negation of that sentence.

Having clarified these points, let me now say something about the theoretical activity of the *OR*-paradigm. In particular, let me outline an essential feature of this activity: there is disagreement within the *OR*-paradigm. As a paradigm, *OR* is moved by a regulative aim, i.e. the possibility of reaching the best description of reality. So, the development of different *OR*-theories inside the paradigm has to be intended as the attempt to produce the best description of reality. It follows that each *OR*-theory is somehow competing to be this description of reality and, in the end, only one theory will be considered the final and conclusive one.

Disagreement and the development of the final theory come in degrees and with time. It is quite hard to imagine that the ultimate *OR*-theory will be developed and immediately recognized as such. Instead, it is much more reasonable to imagine a scenario in which *OR*-theories are developed and evaluated until there is consensus on claims that will lead to a final theory. This process has not to be linear, i.e. theories may be discharged and then resurrected together with new developments. So, the crucial point is simply that there is disagreement, and this disagreement pushes us toward the philosophical activity of evaluation of *OR*-theories.

How should evaluation of *OR*-theories be pursued by the paradigm? This is where meta-ontology and, so, methodological considerations play a crucial role. It is a matter of

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[33] As regards the relation between metaphysical realism (and so *OR*) with conceptions of truth see PUTNAM 1981 and WRIGHT 1987. According to Putnam and Wright, being realist amounts to endorsing a certain theory of truth. This idea has been further developed in DUMMETT 1991, where Dummett argues that, from a *verificationist* perspective on truth, metaphysical realism amounts to the acceptance that metaphysical claims transcend their verification conditions.

[34] This is a classic definition of completeness, and it requires an important caveat to be consistent with something I will deal with in Ch. 5, §4.3, where I will discuss the possibility - which I admit - of deploying different logics for different *OR*-theories. By admitting this possibility, we also admit the possibility of developing *OR*-theories based on paraconsistent logics, according to which some contradictions are actually theoretically acceptable. In this case, the definition of completeness for *OR*-theories should be refined in such a way that it does not strictly requires consistency. For now, however, this is the best definition of completeness that can be used to explain an important feature of *OR*-theories.

methodological reflection on *OR*-theories and their theoretical virtues. A classic example of such methodological ideas is the so-called *Ockham's razor*, firstly introduced by Wilhelm of Ockham. According to this methodological stance, *OR*-theories should be as much ontologically parsimonious as they can. So, the best available *OR*-theories are those theories that endorse the does not multiply categories of being beyond necessity (BOEHNER 1990).

I am not suggesting that Ockham's razor has to be endorsed as a criterion with any doubt. Indeed, within the *OR*-paradigm there is also room for disagreement about metaontology, and this means that there are different methodological proposals that should be evaluated on purely methodological grounds. Rather, I am pointing out that metaontology is vital to the development of *the* best *OR*-theory. Indeed, it is only through the development and subsequent evaluation of *OR*-theories that the paradigm will fulfill its regulative aim.

To give an example of disagreement, we could object to Ockham's razor (as it has been just exposed) that it does not take into account features of *OR*-theories that are as important as their being parsimonious. For example, we could highlight how important is the explanatory power of these theories, i.e. how many phenomena they are able to explain (LOWE 1989, 2002, 2013). Or, also, we could think that *OR*-theories should be judged on the ground of their being aligned with scientific theories (DASGUPTA 2009). Or, even more, we could think that aesthetics virtues makes a theory better than others. For example, we could follow D.K. Lewis and praise the ratio between the simplicity of axiomatization of a theory and its explanatory power as a crucial metaontological virtue (LEWIS 1983). Or we could follow T. Williamson and consider elegance, like it happens when evaluating mathematical theories, makes an ontological theory preferable to less elegant ones (WILLIAMSON 2013).

In the end, let me add an important consideration about out what is the ultimate result of the *OR*-paradigm, i.e. the individuation of the best true and complete *OR*-theory. Everything said so far about *OR*-theories and the research of the best *OR*-theory implies that there is only *one* best *OR*-theory. I believe that the *OR* paradigm has to commit to this idea. I have no conclusive argument for this idea, but it seems reasonable to accept something along the following lines.

Let us suppose there are two *equally good* true and complete *OR*-theories. If they are equally good, then their theoretical virtues must be on a par, so that there is no way to establish if one theory is better than the other. Assuming that reality in itself is *unique*, i.e. that there is only one reality in itself, the presence of two equally good true and complete *OR*-theories has an ontological weight for the *OR*-paradigm. Namely, the fact that a unique reality can be equally good described by two different *OR*-theories has to be explained in ontological terms. This means that, contrary to our supposition, the theoretical activity of the paradigm did not reach its end, for there is still something that has to be explained. In other words, contrary to our supposition, the two *OR*-theories are *not* complete. To fill this theoretical gap, we must produce an *OR*-theory that subsumes the two *OR*-theories and that describes reality taking together the descriptive tools of both, i.e. the categorizations and the ideologies of both theories. Once this is done, we embrace a unique true and complete *OR*-theory that is able to take into account how a unique reality can be described by two alternative sets of categories and ideological relations.

As anticipated, this idea is not conclusive, and, so, I am open to the possibility of finding out that at the end of its theoretical activity the *OR*-paradigm could discover that there are more than one equally good true and complete descriptions of reality. This fact will not affect the subsequent discussion, with just an exception. My overall analysis does not change if we are open to the possibility of a form of pluralism for *OR*, but it will simply require to adjust some details. This is due to the fact that such a form of pluralism would not change neither the features that *OR*-theories ought to possess nor the features that the theoretical activity of the entire paradigm ought to display. The only exception is that opening up to the possibility of a form of pluralism requires a different way of comparing *OR*-theories to carnapian frameworks, as it will result clear in §5. I will say more about this point when I will deal with this comparison.

Now that all the essential features of *OR* have been specified, let us move to compare the terminology deployed so far with Quine's jargon for ontology. This comparison should help to clarify some vital feature of the *OR*-paradigm through a comparison with his influential jargon.

§3 *Quine's Jargon for Ontology*

To describe *OR*-theories I deployed a distinction between categorization and ideology. This distinction could probably recall the Quinean distinction between ontology and ideology (QUINE 1951*a*, 1983).[35] Intuitively, this is partially correct, but differences are radical: where Quine speaks about ontology, *OR* speaks of categorization; where Quine intends ideology in a linguistic way, *OR* intends it in a non-linguistic way. Let me clarify these differences.

Quine's metaontology is an example of what I call *the linguistic view*, i.e. a metaontological approach to ontology that subordinates the development of ontology to linguistic analysis to the effect that descriptions of reality are understood in linguistic terms. Precisely, Quine's perspective is *semanticists*, to the effect that ontological descriptions of reality is gathered by analyzing the semantics of specific linguistic items. These items are, according to Quine, existential quantifiers and some specific predicates. These linguistic items are the basis upon which Quine elaborates a jargon for ontological activity, according to which we describe reality through an ontology and an ideology. This jargon ought not to be misunderstood with the one of *OR*, according to which *OR*-theories are made of a categorization of entities and an ideology of formal relations.

The tension between Quine's metaontology and the one driving the *OR* paradigm is that the former elaborates a description of reality *from* language, while the latter elaborates such a description that is expressed *through* a language. The core of the tension is that *OR* metaontology demands a more specific understanding of how *OR*-theories describes reality, in a way that is not offered by Quine's metaontology. Let me explain this by focusing on Quine's metaontological jargon.

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[35] See further TURNER 2016, and FINOCCHIARO 2019 for a discussion of this distinction.

Quine set an ontological tradition that is tightly connected to its peculiar jargon, according to which ontology is an inquiry into "what there is" and when he uses the word 'Ontology' he refers to the *domain of objects* that this or that theory endorses as existent objects (QUINE 1948). These theories, however, are not full-fledged ontological theories (or ontological descriptions of reality). Rather, they are mainly scientific theories, among which Physics is taken as the the aptest form of inquiry into the ontology of reality. Moreover, according to Quine, together with different ontologies - i.e. different sets of objects - there are also different ideologies. The ideology of a theory is a set of *predicates*, through which the theory can express its "ideas" about reality (QUINE 1951*a*, p. 14). So, by combining ontology and ideology, a scientific theory describe reality in its peculiar way. The overall Quinean picture, thus, is that scientific theories describes reality through an ontology and an ideology. The role of philosophy is to reach such descriptions through linguistic analysis.

According to Quine, the theoretical activity of ontology is an inquiry into what there is. In particular, it amounts to inquiring what there is according to scientific theories. The expression 'What there is' has to be taken in its rigorous and formal interpretation, which is captured by the first-order existential quantifier. So, ontology has to deal with what we quantify over in a given language. Given that the existential quantifier works together with variables, thanks to which we can deploy quantification, the study of what there is amounts to the study of what are the domains of objects over which the quantifier of this or that scientific theory ranges over. So, ontology aims at the understanding of *domains* of scientific theories - being the domain the maximal set of values assignable to variables. This is the idea behind Quine's motto: "To be is to be the value of a bound variable" (QUINE 1948).

The idea that ontology aims at the understanding of domains of languages of scientific theories carries with it two important upshots. First, the theoretical activity of ontology actually amounts to *listing entities*, i.e. giving a comprehensive catalogue of values for variables bounded to the existential quantifier.[36] This is due to the fact that domains, or, more precisely, domains of values for first-order variables, are unordered sets of entities. So, when doing ontology we are interested in elaborating a list of all the members of the set - no matter how these entities are related to each other or if they belong to different categories. Second, ontological activity starts from the analysis of a *given* language through which scientific theories express their claims on reality. So, the aim of ontology is to extrapolate the catalogue of real entities from an already given language - a language that is not specific to the ontological activity itself.

From this idea about the ontological theoretical activity, it follows the most characteristic Quinean use of the word 'Ontology': it refers to this or that domain of real entities. So, for example, we can talk about the ontology *of* physics, the ontology *of* biology, the ontology *of* social sciences, and so on. In each case, following Quine's jargon, we mean the list of all admissible values for variables bounded to quantifiers in the language of physics, the language of biology, the language of social sciences, and so on.

Scientific theories, according to Quine, also have an ideology, which is characterized as a set of predicates specific to the theory (some of which are primitive, and some of

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[36] See, for example, VARZI 2011, pp. 408-9.

which are definable - but this distinction can be set aside). As Quine puts it, ideology is what is needed to articulate the ideas of the theory (QUINE 1951*a*). So, for example, the relational predicate '— is composed by —' can be seen as a piece of ideology of physics, for we find it indispensable to express some ideas of physics. For example, we find this predicate in sentences like 'An atom is composed of protons, neutrons and electrons'. Interestingly enough, Quine recognizes also that two scientific theories can have the same ontology (i.e. the same domain) but different ideologies, to the effect that they give two different descriptions of reality.

Thus, summing up Quine's jargon, we end up with the following picture: of scientific theories, we can isolate an ontology and an ideology. The ontology is the domain of entities over which the existential quantifier ranges over; the ideology is composed of predicates needed to express the ideas of the scientific theory. So, ontology and ideology combined together make it possible for a scientific theory to describe reality. Hence, descriptions of reality are made up of an ontology and an ideology.

This is why, if you follow Quine's jargon, the idea of *OR*-theories have a categorization and an ideology could sound familiar to your ears. Still, there are some crucial differences. The first, and more evident one, is that where Quine speaks of ontology, the *OR*-theorist speaks of a categorization. Thus, where Quine aims at disclosing the catalogue of existing things, *OR* looks for a structural organization of the catalogue in different kinds. The second is that where Quine speaks of an ideology of predicates, the *OR*-theorist speaks of formal relations. Hence, while Quine intends ideology in a linguistic way, *OR* takes it to be a formal feature of reality.

These terminological differences matter because they disclose the crucial difference between a Quinean perspective and the metaontology of *OR*: Quine's understanding of the ontological activity is linguistic, while *OR* understand its theoretical activity in a language-independent way - even though, notice, *OR* does not deny an essential role to language, since language is needed for the expression of *OR*-theories. Quine takes different ontologies to be the domain of a language, and ideologies to be predicates. So, Quine's view is semanticist, in the sense that it places ontological activity within the scope of semantics, which is a linguistic theoretical activity (QUINE 1951*a*, p. 15). Indeed, a domain is crucial to outline the semantics of quantification, without which we do not know the scope of a quantifier, and predicates need a meaning, if they have to tell us something about reality. The best we can do as philosophers is to find a way of bringing ontologies and ideologies out of the language used by scientific theories to describe reality.

OR does not endorse a semanticist perspective on ontology. Rather, it takes categorizations and ideologies to be part of an autonomous activity of describing reality in itself. Thus, categories and ideologies are not primarily understood as linguistic elements, but as *worldly* elements: categories and ideological relations are features *of* reality, and not linguistic items like predicates.[37]

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[37] On the difference between linguistic and the wordly understanding of ideology see further FINOCCHIARO 2019, pp. 5-6.

Of course, given that *OR* describes reality through *OR*-theories, and *OR*-theories need a language to be expressed, it follows that *OR* has to express linguistically categories and ideologies. However, *OR* does not take them to be primarily linguistic, but simply linguistically expressible. What they primarily are is a matter of how reality is, not a matter of the semantics of this or this or that language.

Someone may wonder that there is a way of making Quine's linguistic view compatible with *OR*. The proposal could be phrased in the following way: there are true claims about reality, and we want to explain what these claims are true in virtue of; the best way of fulfilling this aim is by analyzing the semantics of the language and discover what commitments these true claims about reality have. Now, these commitments are parts of reality as it is in itself - i.e. they are mind-mind-independent, for they do not belong to language, but to the reality that makes some claims true. It would follow a metaontological understanding of ontology as the theoretical activity of uncover how reality is in order to explain the truth of claims about it. To do this, semantics seems to be the best way of pursuing this activity, for thanks to semantics we can explain how language and reality are related. Overall, we would be embracing the linguistic view, but developing it in a consonant with the theoretical aim of *OR*.

The above objection is reasonable. Indeed, semantics is the best way to explain how language and world are related, and *OR* needs to develop a semantics, as I will show both in Ch.5, §4.2, and in developing some ideas of Ch. 6. Still, I am here trying to highlight the fact that Quine's semanticist view is not a good metaontological view for *OR* because it understands descriptions of reality in linguistic terms that do not capture the nature of *OR*-theories, i.e. of what these theories are.

To get the point, take the following sentence and consider it as a true sentence about reality:

Ra

Let us suppose that this sentence describes a red apple, so that we could phrase it like this: 'The apple is red'. Let us suppose that we embrace the picture pushed forward by the above objection, so that we follow the linguistic view. Since '*Ra*' is true, we would obtain a description of reality if we can get what this claim is true in virtue of. Let us focus on the semantics of the name '*a*'. Following Quine, the sentence brings an ontological commitment with it, so that the claim

$\exists x\,(x = a)$

is true. It follows that *a* exist, and so it is part of the domain of quantification of the language through which we express '*Ra*'. Once this is accepted, we say that *a* is part of our ontology, i.e. it is an element of the domain of quantification. Incidentally, we claim that '*R*' - the predicate - is a piece of ideology, i.e. a predicate that allows to express ideas on reality being predicated of the existing thing *a*.

From the point of view of *OR*, we still have not reached a description of reality, i.e. a piece of *OR*-theory, for there are theoretical issues that are left untouched and that are actually what an *OR*-theory should bring to light. Indeed, despite we are ready to accept the existence of *a*, we still do not know what *kind* of thing *a* is. For example, recalling Heil and Campbell's theories, is *a* a substance or is it a collection of tropes? Language does not by itself tells us what category of being *a* belongs to. Indeed, both a substance or a bundle of tropes could serve as a description of this object.

And what about '*R*'? Is there a further entity involved? Is this predicate representing a universal property? If so it is representing an entity, if, for example, you believe that universal properties are a category of real entities. If, instead, it stands for an ideological relation, which formal relations is it representing? These questions are not answered by language, and, further, answers to these question could be different accordingly to our understanding of *a*. Indeed, if you follow, for example, Heil's *OR*-theory or Campbell's one, you have different options on the table, for each theory deploys different categories of being and different ideological relations.

Henceforth, the overall result of this first comparison with Quine's view is that its jargon should be abandoned within the *OR*-paradigm. Rather, Quinean expressions have a different meaning: 'Ontology' should not refer to a domain of existing things endorsed by this or that theory, but it refers to an autonomous inquiry into reality of producing *OR*-theories; 'Ideology' is not intended as a set of predicates, but they are worldly formal relations. Moreover, where Quinean understanding of ontology demands uncovering unstructured domains of existing things, *OR* aims at understanding how (and if) reality is made of different kinds of being. These terminological remarks are the first step toward a departure from a linguistic approach to *OR*.

Notice, this does not mean that a linguistic semanticist view is fully incompatible with *OR*. Rather, I am here highlighting that following Quine's metaontology and comparing it to *OR* we gather a senes of how much in-depth the relationship between the development of *OR*-theories and languages have to be discussed. I do not exclude the possibility of reaching a full understanding of this relationship - rather, I do believe that is possible - but I think that a semanticist metaontology like Quine's one does not adequately captures the way *OR* intends to describe reality.

§4 *Schaffer's Metaontology and the OR-paradigm*

In *On What Grounds What* Schaffer criticizes Quine's understanding of ontology and advances (and defends) a different perspective that he calls *Aristotelean* (SCHAFFER 2009).[38] To do this, he develops a general picture of ontology that distinguishes different ways of de-

[38] Schaffer actually speaks of *metaphysics* instead of ontology, but as I will show we are speaking of the very same activity of describing reality. It is not clear where exactly the distinction between ontology and metaphysics has to be drawn (see VARZI 2011), so, along these pages I will simply continue speaking of ontology to call the theoretical activity of describing reality.

scribing reality. In this section, I want to compare the understanding of *OR* proposed above with Schaffer's picture. This comparison shows that his way of characterizing ontology can be described as a specific way of pursuing the theoretical activity of *OR*. Namely, Schaffer proposes a specific *OR*-theory. Hence, the metaontology of *OR* is broader than the one proposed by Schaffer.

What is interesting - and thus motivates this comparison - is that the *OR*-paradigm can subsume and describe in its own terms Schaffer's proposal. Moreover, given that Schaffer opposes his view mainly against the linguistic view pushed forward by Quine, it is interesting to have a confrontation with his metaontological view. Let me begin by describing his proposal and highlight that it relies on an ontologically relevant ambiguity between sorts and categories (§4.1). Then let me show that once this ambiguity is clarified we can rephrase Schaffer's view according to the *OR*-paradigm (§4.2).

§4.1 *Types of Ontological Descriptions of Reality*

First of all, Schaffer distinguishes three different forms (or types) of descriptions of reality (SCHAFFER 2009, pp. 354-56). These ways are characterized by the type of description of reality that they advance. The first type of description is called by Schaffer a *flat* description, which corresponds to a Quine-like ontological theory. The second type is called *sorted* description, and no example of available theories of this type is given. The third type, which corresponds to the Aristotelean view defended by Schaffer, is called a *structured* description.

My aim is to show that Schaffer's structured (or Aristotelean) description of reality can be described as a particular *OR*-theory among other possible *OR*-theories. This point matters because Schaffer himself opposes his Aristotelian metaontology to Quine's one. What is interesting is that also his way of interpreting Quine's flat ontology can be described as a particular *OR*-theory. In this way, I conclude that Schaffer's metaontological view is *partial* if compared to the one described by the *OR*-paradigm, to the effect that the latter has more descriptive power than the particular Aristotelean view. To show my point, let me begin with an exposition of Schaffer's interpretation of the Quinean view and then move to his metaontology.

Schaffer interprets Quine's ontological theory as delivering a flat description of reality, for, according to Quine, the ultimate upshot of ontology is to give a catalogue of existing things, as illustrated above. So, basically, an ontological theory describes reality as a set of things. Precisely, this set of things is the *domain* of things that the existential quantifier of the language of the theory ranges over. According to this view, once we can produce a catalogue of all the existing things, we have given an ontological description of reality.

The second type of ontological theory is characterized by theories that give sorted descriptions of reality. The basic idea, following Schaffer, is that these ontological theories are qualitatively richer than Quinean flat theories, for they differentiate reality into different sorts of things. So, the descriptions offered by these theories are lists of existing things that are organized in different classes of things. As an example, take all different species of

animals and imagine that we want to describe only a portion of reality, i.e. the kingdom of *Animalia*. If you develop a Quinean ontological theory, then you list all the existing animals. Instead, if you develop a sorted ontological theory, then you have to list all the animals and be able to distinguish which animal belongs to which species.

The overall result is that a sorted ontological theory describes reality as a plurality of classes of things. For example, a sorted description of the kingdom of *Animalia* would be divided into sub-classes of vertebrates and invertebrates animals. In turn, these sub-classes have their own sub-classes. For example, the sub-class of vertebrates is divided into amphibians, birds, fish, mammals and reptiles. Sorted ontological theories describe reality only if they are able to account for the division of reality into classes.

The third type of ontological theory is called by Schaffer 'Ordered', or, alternatively, 'The Aristotelian view' of metaphysics. He describes the view in the following way:

> The target of metaphysical inquiry is an ordered hierarchy generated from (i) a list of the substances *F*, plus (ii) a list of the grounding relations *G*.
>
> SCHAFFER 2009, p. 355

As already explained, where Schaffer speaks of 'metaphysical inquiry' I speak of the 'ontology', to the effect that the production of ontological theories is a task of metaphysical inquiry. Thus, Schaffer's words can be rephrased in the following way:

> The target of metaphysical inquiry is the production of an ontological theory that describes reality through (i) a list of the substances […], plus (ii) a list of the grounding relations […].

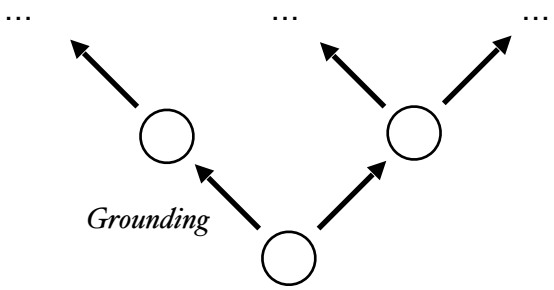
This means that, following Schaffer's Aristotelean view, ontological theories have to describe reality through substances and the grounding relation. Set aside Schaffer's choice of the term 'list' (i.e. 'list of substances' and 'list of the grounding relations'), which he probably uses for rhetorical purposes. Indeed, he defends the idea that listing things is not enough to describe reality. Rather, a description of reality has to highlight an ordered structure elaborated by combining substances and the grounding relation. In this way, according to Schaffer, ontology can describe what is fundamental in reality and what depends on it. This view is more complex than the previous ones, so let us go step by step.

First of all, Schaffer talks of substances as the fundamental things of reality. So, intuitively, substances constitute the unanalyzable ontological bedrock of reality. The most suitable example is provided by the view of reality provided by physicalism. According to this view, reality is ultimately described by physics, and, so, fundamental reality, is given by the fundamental elements that physics can describe, i.e. fundamental particles. If you follow both Schaffer and physicalism, it follows that what Schaffer calls substances are the fundamental particles of physics.

Even if substances are the fundamental bits of reality, listing them is not enough for Schaffer. So, ontology has also to describe how substances are related to other sorts of things. This happens through the *grounding* relation, which is taken, roughly, as a necessary and asymmetric relation of dependence. According to Schaffer, through this relation, we can describe the ordered structure of reality, which is the proper aim of ontological realism (or - as he would say - metaphysics).

To see this, consider again the case of physicalism and how such an ontological theory would describe my wooden desk. The desk is a material thing, and let us agree that it exists. This means that in a list of existing things of reality, there is my desk. The desk is made of a specific material, i.e. wood, and this means that it is made of some particular fundamental particles. These particles exist too, and they exist in addition to the desk (at least if we follow Schaffer). However, a description of reality is not exhausted by listing the desk and the fundamental particles composing it. According to Schaffer, and the ordered structure, we must also explain how these existing things are related. Following the physicalist view, the explanation we are looking for is that the existence of fundamental particles grounds the existence of the desk.

It is possible to intend the description of reality advanced by the Aristotelean view as a tree-shaped structure, where substances are the roots of the three and the grounding relations are branches that connect substances to other non-fundamental existing things:



Notice: the fact that substances are the ultimate bedrock of reality means that there is nothing that grounds substances. Substances are the fundamental bits of reality and grounding is the fundamental relation through which we explain the existence of other sorts of things. So, the fundamental structure of reality is, following Schaffer, given both by substances and the grounding relation.

Schaffer quickly considers also a fourth type of ontological theory, i.e. what he calls "sorted-and-ordered" (SCHAFFER 2009, p. 355). This type of theory is given by the conjunction of the second and the third type, i.e. by the conjunction of sorted and ordered theories. The result is that an ontological theory of this type describes reality by distinguishing different sorts of things and ordering the structure of the description according to the grounding relation. Still, Schaffers do not believe that this type of theory has to be mentioned as a full-fledged type, and he motivates this fact in the following way:

> I will not be paying further attention to the prospects for the sorted (or sorted-and-ordered) conception, because I think the categories are indeed determined by the grounding relations. That is, categories just are *ways things depend on substances*.
>
> SCHAFFER 2009, p. 355

Namely, according to Schaffer, a sorted-and-ordered type of theory is reducible to ordered theories, for it is in virtue of the grounding relation that we can describe different sorts or categories of being. Thus, the descriptive role of sorts or categories of being is reducible to the descriptive role of grounding, for by describing what grounds what we also describe what different kinds of things are related through grounding.

I believe that this point of Schaffer's metaontology relies on an ambiguity between *sorts* and *categories*. Moreover, I believe that this idea is what makes Schaffer's metaontology partially miss what the theoretical aim of ontological (and metaphysical) inquiry is. To show this, let me first explain the ambiguity affecting Schaffer's idea, and then I will offer a way to understand Schaffer's Aristotelean view as a particular *OR*-theory.

So, let us focus first on between sorts and categories. Sorts and categories can be both interpreted as classes of things, for they are general terms through which we can isolate different classes of more individual (or particular) things. However, classes determined by sorts and classes determined by categories are different. In doing ontology, this difference is crucial, for categories and sorts are two different ways of grouping things.

The difference between sorts and categories can be exposed in temporal terms. A categorization is *unalterable*: it cannot change with time. For example, take a theory that describes reality through the categories of substances and universals. This theory denies that reality can change in such a way that a new category of things arises. So, for example, this theory cannot accept that at a particular time a thing that belongs to the category of tropes will come into existence. In other words, categories are fixed. A classification of things through sorts, on the contrary, is *mutable*, i.e. it can change with time. For example, consider dinosaurs, which are a particular sort of biological thing. They disappeared, to the effect that the class of nowadays living dinosaurs is empty. Another example is the class of human beings, who appeared only at a certain time during the history of reality.

This difference applies also to ideological relations. An ontological theory that describes reality deploying a specific ideological relation, like ontological dependence, takes this relation as fixed. So, if tropes are taken as ontologically dependent on substances, reality cannot change in such a way that tropes are capable of emancipation from substances. On the contrary, material relations can change. For example, take the relation of *being engaged*: at any time fiancées can brake up and the relation does not hold anymore.

If Schaffer's idea is that we can dispense the descriptive role of sorts through the grounding relation, then this idea is viable, and this makes sorted-and-ordered ontological theories a derivative type of ontological theories. Indeed, a sorted-and-ordered theory would describe reality through three conceptual tools: the category of substance, the grounding relation and classes of things. Consider how this theory would describe a table. To do this let us embrace again a physicalist interpretation of substances, to the effect that

substances are fundamental physical particles. It follows that this theory would describe a table as a sort of thing grounded by substances arranged in a particular shape. Given that the table is a sort of thing, it follows that tables can be erased from reality, and the structure of reality is left unchanged. Indeed, classes determined by sorts are mutable. However, what is unalterable is the presence of substances: no substances no reality. Hence, given that everything that is not a substance is real as long as it can be described as grounded by substances, and given that everything that is not a substance is a sort of thing, it follows that to describe the structure of reality we do not need sorts of things. It is sufficient to deploy substances and the grounding relation.

However, if Schaffer's idea is that we can dispense the descriptive role of categories through the descriptive role of the grounding relation, then this idea is self-defeating. Indeed, if anything, particular substances belong to the category of substance, without which we cannot describe reality. Even Schaffer's Aristotelean view deploys a categorization, i.e. a categorization of a single category of being, which is the category of substance.

Schaffer could probably advance an objection to this point. He could point out that he could define the category of substance through grounding. Namely, he could define substances as those elements of reality that are *ungrounded*. This would explain the fact that they are the fundamental bedrock of reality. Moreover, given a definition of substance based on the notion of grounding, he could claim that he is able to describe reality through the grounding relation alone.

To this objection, however, I would reply that by defining substances through the notion of grounding we gather no description of reality. Rather, we set a conceptual priority of the notion of grounding over the notion of substance. Namely, we describe how conceptual tools are related to each other, but we are not *deploying* them to describe reality. Consider again the case of a table. If it were true that by defining substances through grounding we are describing reality, we would be describing a table as a sort of thing grounded in ungrounded things arranged in a particular shape. We paraphrased the above description by replacing 'substances' with 'ungrounded things', but the description is the same. Indeed, given that, according to the example, substances are the fundamental particles of reality, the class of the fundamental particles of reality is the class of substances. Calling this class 'the class of ungrounded things' does not change the fact that they are needed to describe reality. The class of substances and the class of ungrounded things are co-extensive, i.e. they are made of the same elements, and they both cannot be empty if we want to describe reality.

Thus, even if the category of substance is defined through the relation of grounding, the descriptive role of the category of substance is left untouched. Hence, if Schaffer's idea is to replace the descriptive role of categories through the descriptive role of grounding, his idea is self-defeating.

To show this point, let me look at Schaffer's metaontology through the lens of the *OR*-paradigm. Recall: according to the *OR*-paradigm ontological realism is a paradigm populated by different *OR*-theories that share the same regulative aim and that are developed on the basis of a categorization and ideological relations. As anticipated, my point is that Schaffer's view can be described as a specific *OR*-theory of the *OR*-paradigm, and so the framework of *OR* encapsulates Schaffer's proposal.

To stress the point, I neither criticize Schaffer's defense of the Aristotelean view nor do I believe that the view is flawed. Rather, my goal is to show that Schaffer's proposal is too narrow to be understood as the target of ontological (or metaphysical) inquiry. On the contrary, the metaontology of the *OR*-paradigm is better equipped to describe such a target. Indeed, its degree of generality makes it able to describe the Aristotelean view as a specific *OR*-theory, i.e. as a viable description of reality among others. Hence, I do not disagree with Schaffer's view; but I want to show that his proposal can be developed in such a way that makes it only a specific case of a more general framework for ontological realism.

To show my point, let us look at Schaffer's Aristotelean proposal through the lens of the *OR*-paradigm. The resulting picture is straightforward: Schaffer develops an *OR*-theory endorsing a single category of being, i.e. the category of substance, and a single ideological relation, i.e. the grounding relation. Hence, Schaffer advances the idea that is possible to give a complete description of reality through a precise monist categorization and a single ideological relation.

Let us ask: what type of theories are *OR*-theories? If we had to use Schaffer's terminology, *OR*-theories resemble sorted-and-ordered theories. However, we saw that his discussion of this type of theory is based on an ambiguity between sorts and categories of being. If this type of theory is truly intended as about sorts, then *OR*-theories are not sorted-and-ordered theories, for *OR*-theories do not essentially rely on classes individuated by sorts of things. However, given that *OR*-theories essentially rely on categories, let me call the type they belong to '*categorical-and-ordered* theories'. The idea is that what makes *OR*-theories categorical is their use of categories, while what makes them ordered is their use of ideological relations.

Following this terminology, Schaffer's Aristotelean view is a categorical-and-sorted theory, and, so, an *OR*-theory. However, Schaffer's theory is not the only viable option, and this is important if we want to evaluate his proposal as a general understanding of the theoretical aim of ontology (and metaphysics). To show this, let us compare Schaffer's view with a different categorical-and-sorted theory. For example, consider Arp, Smith and Spear's *Basic Formal Ontology* (ARP, SMITH AND SPEAR 2015), from now onwards '*BFO*'. This can be interpreted as a categorical-and-ordered theory, following Schaffer's metaontology, and as an *OR*-theory from the point of view of *OR*. According to the theory, there are two bedrock categories of reality: 1. *Occurrents*, i.e. entities that *happen*, and so that are extended *in* time; 2. *Continuants*, i.e. entities that persist through times. To get the distinction through an intuitive example, consider a person at a party. The person is a continuant, for

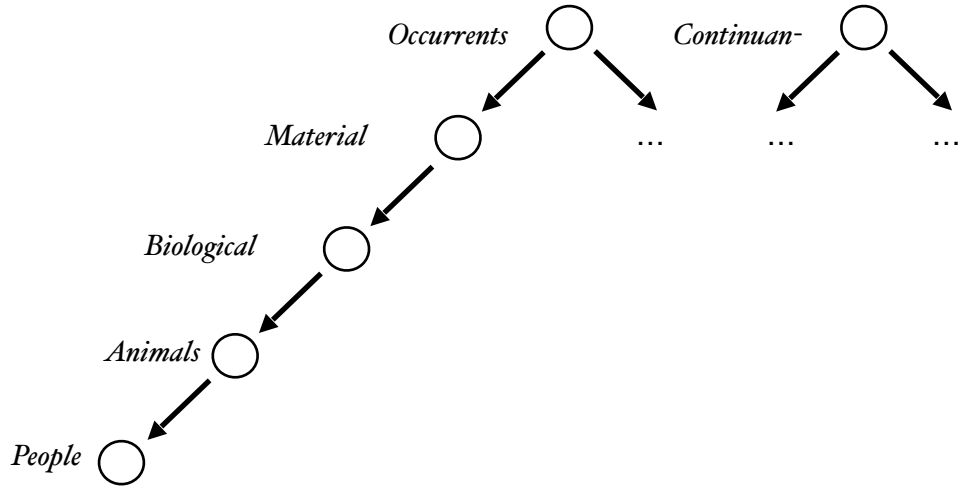
she acts and moves within the party, so, she persists within the party. The party is an occurrent, for it is an event, and so it is determined also by its duration - a party is extended in time. According to *BFO*, continuants and occurrents are the basic ontological categories of reality.

BFO also relies on an ideological relation, which can be labelled as *belonging to*, or, as their developers say, the relation of '*is_a*'. Focus on the person in the above example, according to *BFO* the person exists and she belongs to the category of occurrent. In other words, the person *is_a* occurrent. By describing reality through this relation, *BFO* offers a description organized from the most general features of reality (i.e. categories) to the most particular ones (i.e. specific entities).

Crucially, between categories and particular things, there are intermediate classes that help the theory to develop a complete description of reality. So, for example:

A person *is_a* animal
A animal *is_a* biological entity
A biological entity *is_a* material being
A material being *is_a* occurrent[39]

This is an example of a pathway that leads from a person to the category of being she belongs to through intermediate classes of belonging. The overall result of a description like this is an ontological taxonomy that takes again form of a three:



Now compare the structure of Schaffer's Aristotelean theory and *BFO*. They are both categorical-and-ordered, in different ways. The Aristotelean theory endorses substances as a single category (or ontological sorts), while *BFO* endorses two categories, i.e. occurrents

[39] This is example of how to categorize a person is purely illustrative, and it does not come directly from Arp, Smith and Spear. The point is not how *BFO* conceives of people, but *how* they could be ontologically described.

and continuants. Schaffers endorses the grounding-ideology, and this gives the theory a bottom-up order, i.e. from substances at the fundamental level to less fundamental things grounded in substances. *BFO* endorses the *is_a*-ideology, and this shapes the order of the theory in a top-down shape, i.e. from the more general categories to the most particular entities.

The main difference between the top-down and the bottom-up shapes is due to the different ideologies deployed by these theories, i.e. *grounding* and *is_a*. These relations differ in their descriptive role. On the one hand, *grounding* allows a hierarchical description of reality that makes us visualize how non-fundamental things are related to fundamental ones. So, for example, imagine you interpret Schaffer's theory in a very physicalist way, and consider a material object whatsoever. Schaffer's description shows us how the material object is a particular arrangement of fundamental physical particles, which are the fundamental entities of reality (i.e. substances).

On the other hand, *BFO* describes reality through the *is_a* relation that allows a description of reality that goes from what is more general to the most particular things. This makes the theory describe reality in a top-down shape, for what is more general has more descriptive power from an ontological point of view. Unless we know to what category of being a person belongs, the ontological description is missing something. Thus, in this case, the hierarchy is reversed if compared to Schaffer's one, according to which the fundamental substances of reality are the most particular bits of reality.

Incidentally, notice that the possibility of mixing up the two descriptions of reality is not precluded. It could be advanced the idea that the best description of reality has to be so descriptively powerful to be able to describe reality both in a top-down and in a bottom-up shape. I cannot offer indications on how this can be done. However, in principle, it does not seem an option to be banned.

Notice that to explain the difference between Schaffer's view and *BFO* I focused on the explanatory role of ideology. However, their difference is also determined by their different categorization. On the one hand, Schaffer's view is monist, for it recognizes only one category of being, i.e. substances. On the other hand, *BFO* is dualist, for it recognizes two categories of being, i.e. occurrents and continuants. However, as I pointed out, Schaffer underestimates to some extent the role of categories.

This comparison shows how both Schaffer's Aristotelean theory and *BFO* are understood as *OR*-theories, i.e. categorical-and-ordered descriptions of reality. This is why the metaontology of *OR* is able to encapsulate Schaffer's one and interpret his proposal as the elaboration of a single *OR*-theory of the *OR*-paradigm. Of course, Schaffer's theory and *BFO* do not exhaust the pool of viable *OR*-theories of the paradigm

This point matters especially if we consider that Schaffer opposes the Aristotelian view to the Quinean metaontology. If I am right, what has to be opposed to a Quinean view is the entire *OR*-paradigm, and not only a specific *OR*-theory. Especially if we consider that also the Quinean flat ontology can be described as a specific *OR*-theory. Indeed, from the perspective of *OR*, quinean flat ontology is a monist *OR*-theory that endorses a single category of being - something like the category of *existing things* - and *no* formal relations.

In conclusion, despite I agree with Schaffer on the fact that his Aristotelean view has to be opposed to the Quinean *methodology* (and not his ontology), I disagree with his interpretation of descriptions of reality. There are more *OR*-theories than the Aristotelian one, and they are best understood as categorical-and-ordered descriptions of reality. With this comparison, I hope I have clarified as many points as I could on the nature of the *OR*-paradigm. It is now time to turn to a discussion of linguistic views, that, I believe, push forward a methodology for the theoretical activity of ontology that is incompatible with the *OR*-paradigm.

§5 *OR-theories and Carnapian Frameworks*

In this section, let me tackle a linguistic view on ontology that could be associated with some ideas expressed above, i.e. Carnap's metaontology, which is a form of *linguistic* metaontology. I have already presented Quine's view as an example of a linguistic view (§2.2). In particular, I explained how Quine's view is a semanticist, for it proposes to develop ontologies by analyzing the semantics of languages. Carnap's metaontology shares this feature with Quine's one, and it also proposes some ideas to be compared with the metaontology of *OR*. Through this a comparison I want to say more on how *OR* should understand the relation between linguistic analysis, the development of languages and its theoretical activity. In particular, I would like to highlight how Carnap's understanding of descriptions of reality as linguistic frameworks is in tension with *OR*'s understanding of *OR*-theories, for carnapian frameworks are taken to be part of languages.

Again, as remarked in Quine's cases, in line of principle there is room to develop a semanticist perspective compatible with *OR*, but my primary goal here is to highlight that this perspective has to be developed by taking into account a more comprehensive view on how *OR*-theories and language are related to each other. In the context of this chapter, however, the goal is simply to show how Carnap's semanticists metaontology is crucially different from *OR*'s one.

First of all, let me recall some crucial features of *OR*. This is a paradigm, which is shaped by different and interconnected theoretical features, and inhabited by more than one *OR*-theories. The entire *OR*-paradigm aims at describing reality in itself, i.e. reality as it is in a mind-independent way, and so, also as it is independently of language. Each *OR*-theory is an attempt to give such a description of reality itself. *OR*-theories try to fulfill their task by describing reality through a categorization and ideological relations.

The first crucial feature of *OR* to be compared with Carnap's view is *pluralism*. Indeed, on the one hand, Carnap defended *ontological pluralism*, according to which there are multiple and equally viable ontologies. On the other hand, *OR* is populated by more than one *OR*-theory. However, *OR* does not endorse ontological pluralism. The second crucial point of comparison is the role assigned to language. Carnap's view is semanticists, so that different ontologies are obtained from different languages. So, Carnap's pluralism is based on his linguistic understanding of ontology. On the contrary, *OR*-theories are not under-

stood as languages, but as theories that express their descriptions of reality through languages. Through a clarification of these points I want to show some important differences between *OR* and the linguistic view.

Let us begin by considering what Carnap calls *ontological frameworks*. The pivotal idea of this view is that there are several ways of specifying existing things according to different languages. Carnap takes ontological frameworks to be ways of specifying the meaning of referring expressions of a language (primarily *names*), to the effect that through this specification we obtain the domain of entities of which a language can talk about (CARNAP 1950). This is why Carnap's view on ontology is semanticist: ontological frameworks are understood as linguistic components of languages that specify the semantics of the language itself. This specification consists in the assignment of referents to referring expressions. Thus, ontological frameworks are parts of languages, and this means that they have a linguistic nature. Borrowing a useful expression from Matti Eklund, ontological frameworks are "fragments of languages" (EKLUND 2009, p.132).

Incidentally, notice that Carnap's idea shares a vital point with Quine's one: ontological frameworks allow the production of a catalogue of existing things on the basis of the domain of a language. However, a crucial difference is how this catalogue is obtained from a language. Indeed, while Carnap looks at the semantics of names (and so to referents of names), Quine looks at the semantics of existential quantification, as explained in §3. So, from a Carnapian perspective, catalogues of existing entities are produced by listing referents of names, while, from a quinean perspective, they are produced by listing possible values for variables bounded to existential quantifiers.[40]

As anticipated, a vital feature of Carnap's view is its pluralist nature. This means that, according to Carnap, there are more equally good ontological frameworks. In other words, there is no privileged ontological framework. Rather, all these fragments of languages can be deployed when they are needed. So, for example, if we are doing physics, we rely on a language the semantics of which is determined by an ontological framework of physical things. If we are doing sociology, instead, we need a language the semantics of which is determined by an ontological framework of people and groups of people.

A second crucial feature of Carnap's pluralism is how disagreement in ontology works. Carnap's idea of ontological disagreement is that it has be investigated through the lens of a distinction between *internal* and *external* disagreement.[41] This distinction leads to the heart of Carnap's view on the theoretical activity to be pursued when doing ontology. To simply put it, Carnap draws a distinction between speakers who disagree by deploying the same ontological framework and speakers who disagree *on* ontological frameworks. Let me illustrate this through two examples.

Example 1: consider the case of two physicists deploying the same ontological framework. This means that they deploy the same language, for ontological frameworks are

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[40] See Quine's discussion of Carnap's metaontology in QUINE 1951*b*.

[41] Precisely, Carnap draws this distinction as a distinction between internal and external *questions*. However, in this case is much more useful to consider the distinction from the point of view of speakers that disagree on ontological matters. Carnap too speaks of questions (and their relative answers) to outline philosophical disagreement over ontological frameworks (see CARNAP 1950 pp. 30-33).

fragments of languages. Suppose they disagree about the existence of Higgs' boson. This case is a case of internal disagreement, for two speakers disagree on there being or not a specific entity according to the very same ontological framework.

Example 2: consider the case of a chemist and a sociologist who disagree about how reality has to be described. More precisely, imagine that they want to achieve the ultimate explanation of a portion of reality, e.g. a phenomenon about human interaction like love. The chemist pushes forward his view about reality being described by a language that deploys a framework of chemical objects; the sociologists oppose to this view the one according to which reality has to be described through a language that deploys an ontological framework of people and groups of people, which are kinds of things that are not reducible to chemical ones. The chemist argues that the explanation has to be pursued in chemical terms alone by appealing to chemical objects and reactions. The sociologist disagrees, and she believes that the explanation has to be pursued with a framework of social objects and interactions alone. This would be a case of external disagreement, for the two speakers disagree on *which* ontological framework (and, so, on which language) has to be deployed to describe reality.

Thus, internal ontological disagreement is about the existence of particular things and it is pursued within the same ontological framework; external ontological disagreement is about ontological frameworks themselves.

Carnap's distinction is not only descriptive; it is, rather, somehow *prescriptive*. Indeed, according to him, only internal disagreement can be pursued in a meaningful way. Namely, according to Carnap, there is no way of debating on the correctness of this or that ontological framework. The best we can do when pursuing ontological theorizing is to understand when disagreement is external and suspend our debate, for it does not make sense. We should accept, instead, that there are more equally good ontological frameworks and that it is a pragmatical matter what framework has to be used on which occasion. Which ontological framework is well suited for this or that task is simply a matter of pragmatics and not a theoretical activity about the nature of reality.

Given that ontological frameworks are fragments of languages that specify semantics conditions; and given that a language is meaningful if the semantics conditions are specified; it follows that there is no language apt for a meaningful discussion about frameworks that can lead us to understand which ontological framework is the best one for a description of reality.[42] This argument shows how a linguistic view can lead to a methodological prescription for ontology on the basis of how ontological theories are understood. Let us compare this point with the metaontology of *OR* to see how differs from Carnap's one

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42 This is not the usual way of motivating Carnap's prescriptive point. Indeed, as it is widely known, at the heart of Carnap's philosophy there his *empiricist* spirit. As shown by Quine, it is this empiricist spirit that led Carnap to endorse the distinction between synthetic and analytic claims, which differs respectively for telling us something about reality and telling us anything about it. The reason is that the truth of analytic claims is given by their meaning alone, as for example in claims like 'All bachelors are unmarried man'. A claim like this does not tell anything about reality because its truth is given by meaning alone: a bachelor is for definition an unmarried man, so we do not need to look at how things are in the real world to declare the claim true. Quine criticized this distinction (QUINE 1951*a*). However, I set aside the debate over the analytic-synthetic distinction and empiricism, for it would take us far away from the main point under discussion, which is *OR*.

despite some intuitive similarities. Namely, let me show how a different understanding of ontological theories leads to a different methodological consequence.

First of all, even if *OR* accepts the idea that the paradigm can be populated by different *OR*-theories, it does not endorse ontological pluralism. Namely, the paradigm does not accept that a plurality of *OR*-theories is equally good and ready to serve this or that purpose on a simply pragmatical ground. Rather, the theoretical activity of the paradigm is oriented to the elaboration of a single *OR*-theory that is the best description of reality in itself. This means that the acceptance of more *OR*-theories within the paradigm is based on heuristic reasons. By developing more *OR*-theories, and by comparing and evaluating them, the paradigm aims at the development of the unique best *OR*-theory.

This fact does not exclude the possibility of developing an *OR*-theory that describes reality in some pluralist fashion. For example, the true *OR*-theory could describe reality through *perspectivalism*. The basic idea of perspectivalism is that two different *OR*-theories "may both be equally accurate representations of one and the same reality" (ARP, SMITH AND SPEAR 2015, p. 44).

To give an example, consider that there could be an *OR*-theory that endorses both an *occurrent* and *continuant* understanding of material individuals (ARP, SMITH AND SPEAR 2015, pp. 126-8). So, take a material object like a person. According to the occurrent-view, the person is an entity that persists identical to itself throughout her changing. Over time, a person changes a lot of her features, e.g. she passes from being young to being old, she replaces all the cells composing her body, and so on. According to the perdurant view, the person is the real existing thing that gains an loses these features across time. So, the person is an entity the identity of which is not determined by time. According to the continuant-view, the person is actually a fourdimensional entity, the identity of which is actually determined by time. When we speak of a person we speak of an event that is extended in time, and at each time-point there is a time-part of the entire person-event.

If you endorse perspectivalism you accept the idea that a person can be described *both* as persisting thing (occurrent) and as a fourdimensional entity (or event, or continuant). What is crucial is that occurrent and continuants are understood by perspectivalism as different categories. Hence, a perspectivalist theory accepts the idea that the same material object belongs to two different categories. It is a pragmatic matter when it comes to describing the person through the category of occurrent or through the category of continuant. However, it is not a pragmatic matter what category of being a person belongs to, for it really belongs to both.

The essential difference between ontological pluralism and perspectivalism is that perspectivalism is a view pushed forward by a single and unified *OR*-theory, while pluralism is the idea that there are more available theories that can describe the same portion of reality in an equally good way. Being perspectivalism a feature of a single theory, it follows that the theory has to *explain* why reality is such that the same portion of it can be described through different categories. So, while perspectivalism is a single and unified way of describing reality, pluralism is the acceptance of the fact that reality can be described in a plurality of single and unified ways.

To stress the point, I am not claiming that perspectivalism should be endorsed. Rather, I am pointing out that from the perspective of *OR*, even if you want to be somehow pluralist, this has to be done through a single *OR*-theory. Once this theory is elaborated, it coexists within the paradigm together with other *OR*-theories. If the paradigm will end up evaluating this *OR*-theory as the best description of reality, this does not mean that pluralism is correct. Rather, it will mean that the best available *OR*-theory describes reality in a pluralist fashion.

At this point, let me recall a point already mentioned in §2.2. In line of principle, even if is not my preferred option, *OR* could develop a form of pluralism. Namely, the theoretical activity of *OR* could end up individuating that there are multiple equally good true and complete *OR*-theories. In this case, this first part of the comparison with carnapian frameworks is no more in place. However, the second crucial difference that I am going to analyze is still crucial, so let us focus on it.

The second essential point of comparison between the Carnapian view and *OR*. Carnap's pluralism accepts the idea that we can discuss in a pragmatic way which ontological framework is more apt for the description of this or that portion of reality. As explained, this pragmatism is a way of making sense of the activity of selecting frameworks. However, Carnap does not allow the possibility of conducting this activity through a meaningful language. The main reason for this is that there is no language that is supplemented with an ontological framework that allows a meaningful discussion about frameworks themselves.

I believe that *OR* ought to take a different stance on how language has to be deployed in its theoretical activity. This is firstly due to what *OR*-theories are. *OR*-theories are not linguistic fragments specifying the semantics of a language, contrary to Carnap's understanding of descriptions of reality as frameworks. *OR*-theories are descriptions of reality made of a categorization and an ideology. They require a language to be expressed, but they are not linguistic fragments, i.e. semantic specifications for this or that language. So, an *OR*-theory is not *part* of a language.

This understanding of *OR*-theories breaks the argument against there being the possibility of a meaningful discussion about *OR*-theories. Indeed, there is no more reason for endorsing the idea that a meaningful language for the paradigm cannot be developed, for there is nothing pushing us to believe that this language needs its own ontological framework (or *OR*-theory). Hence, if disagreement within the paradigm is meaningful or not is open to metaontological reflection.

This does not mean that *OR* paradigm already has this language though, and this is crucial. Rather, the fact that this language can be developed sets a linguistic challenge for the entire paradigm. Once the prescriptive core of Carnap's metaontology is refused, the linguistic challenge faced by *OR* can be outlined through the external-internal distinction. In other words, the challenge can be simply described through this distinction without endorsing also Carnap's ban on ontological disagreement.

On the one hand, *OR* has to deal with the internal use of languages. Indeed, *OR*-theories require to express their description of reality through a language. This is an internal feature of *OR*-theories, for it regards the way in which every single *OR*-theory is ex-

pressed. Moreover, it also regards disagreement internal to a specific *OR*-theory. For example, this could happen when two speakers endorsing a precise *OR*-theory disagree over its application. Two ontologists could both endorse Schaffer's Aristotelean account and describe reality as populated only by substances. Still, they could disagree about which object counts as a substance and which does not. Someone could believe that substances are fundamental physical particles alone; someone else could believe that any physical (or material) object is a fundamental substance.

On the other hand, *OR* has to deal with an external use of language. Indeed, the paradigm is populated by a plurality of *OR*-theories, and this means that it is possible to allow disagreement about *OR*-theories themselves. Moreover, the paradigm could be interested in understanding if and how communication among different *OR*-theories is possible. For example, it could be interested in understanding if it is possible to develop a language that transcends the languages deployed by particular *OR*-theories to describe reality. A language of this type could be a language that is able to translate claims of an *OR*-theory into the language of another *OR*-theory, or could based on a semantic that explains how speakers endorsing different *OR*-theories with different languages can understand each other.[43]

Now, notice, the difference between Carnap's metaontology and *OR*'s one holds also if we accept that *OR* can develop a form of pluralism. Indeed, even in the case in which *OR*'s theoretical activity ends up individuating, for example, two equally good true and complete *OR*-theories, still it reaches this conclusion towards what Carnap would call external disagreement. Indeed, to reach the theoretical goal of individuating the best two *OR*-theories, *OR* has to compare and evaluate competitor *OR*-theories. *Both* the two best *OR*-theories would have been individuated by comparing them with competitor and alternative *OR*-theories.

To conclude, the fact that *OR* does not endorse Carnap's prescription does not mean that *OR* does not have to subscribe to different methodological duties. In the following chapter, I want to delve more in-depth into the methodology of the linguistic view and show how it is incompatible with the metaontology of *OR*.

§6 *Conclusion*

In this chapter, I exposed a way to understand *OR* as a paradigm populated by different *OR*-theories that cooperates to develop the best *OR*-theory, i.e. the best description of reality in itself. Describing reality in itself requires developing *OR*-theories that are able to describe reality as it is independently of the language they deploy to express their description. *OR*-theories operate such a description through a categorization and a set of ideological relations, and these are the two essential features of this type of theory.

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[43] An example of a inquiry of this type is Cian Dorr's development of Ontologese, which is how he calls the language for ontology (see DORR 2005). Dorr specifically focuses on a semantics that can explain how ontological disagreement works. This project has been pushed forward by Theodore Sider, who investigates Ontologese more in-depth in the context of describing fundamental reality (see SIDER 2011).

I showed how this metaontological view is broader, but also in line with, Schaffer's Aristotelean view. In particular, I argued that Schaffer's view is only a particular way of articulating an *OR*-theory within the *OR*-paradigm. Indeed, the Aristotelean view can be interpreted as an *OR*-theory endorsing a unique category of being, i.e. substances, and a unique ideological relation, i.e. the relation of grounding. Despite this fact, I agree with Schaffer on the need of highlighting some crucial differences between a realist perspective on ontology and the linguistic view, and I showed this by comparing the *OR*-paradigm with Quine's jargon for ontology and Carnap's account of ontological frameworks.

This comparison brought some important metaontological differences between *OR* and a Quine and Carnap's linguistic views. These differences highlighted some tension between *OR* and Quine and Carnap's metaontologies. Overall, the tensions are rooted in the fact that the linguistic view takes the development of descriptions of reality to be subordinated to language, i.e. linguistic analysis comes before the development of these descriptions. It follows a linguistic understanding of descriptions of reality that is not in line with *OR*'s understanding of *OR*-theories.

The tensions were also useful to understand the crucial features of *OR* and why this paradigm has to deal with language in a different way from the linguistic views developed by Quine and Carnap. This is preparatory to the next chapter, where I will deal with the language-first methodology, which is *a* methodology that could be endorsed within the linguistic-view, to show that it ought not be endorsed by *OR*. Otherwise, *OR* would compromise it research activity by betraying its regulative aim.

As regards Quine's case, I showed how we should avoid its terminology for ontology, for it discloses a different metaontology. First, where Quine speaks of ontology, we should instead speak of categories. This is due to the fact that Quine understands different ontologies as different catalogues of existing things that show how different scientific theories have different ontological commitments. Instead, The *OR*-paradigm takes different *OR*-theories to be different descriptions of reality that deploy different categorizations of reality. Second, we should avoid interpreting ideology as a set of predicates, for according to *OR* ideological relations are worldly relations, and not linguistic items.

Overall, Quine's jargon discloses his semanticist view, according to which the theoretical activity of ontological has to uncover the semantics of existential quantification, through which we recognize the ontological commitment of scientific theories, and the semantics of predicates deployed to express ideas on reality of this or that scientific theory. In the next chapter, I show how this semanticist spirit is the root of Quine's elaboration of a language-first methodology for ontology. This will further explain the difference between the *OR*-paradigm and the linguistic view.

As regards the case of Carnap's metaontology, a comparison between *OR*-theories and ontological frameworks has shown the need for a deeper understanding of the role that language should play within the *OR*-paradigm. From Carnap's semanticist perspective, once ontological frameworks are understood as semantic specifications for names, the role of language is to describe reality through this or that ontological framework. Ontological frameworks are indeed parts of languages. From this idea, Carnap drew a prescription for

the theoretical activity of ontology: there is no language that allows ontological disagreement, for every language needs an ontological framework.

The *OR*-paradigm, however, does not understand *OR*-theories as parts of languages, but as descriptive objects that express their content *through* a language. This fact blocks Carnap's ban on the possibility of articulating ontological disagreement. Rather, we now feel the need of understanding how language has to be deployed by *OR*-theories and how the paradigm should develop a language for evaluating *OR*-theories, and so articulate ontological disagreement. This can be described through Carnap's own distinction between internal and external use of language: there is an internal use of language of *OR*-theories, and an external use of language that should allow the communication between different *OR*-theories. Crucially, the *OR*-paradigm does not draw a methodological prescription from the internal/external distinction.

5. *Ontological Realism and the Language-first Methodology*

§1 *Introduction: OR and the Language-first Methodology*

In this chapter, I am going to focus on the methodological role of language within the *OR*-paradigm. I will focus on a precise aspect, i.e. the incompatibility of what I call *the language-first methodology* with the *OR*-paradigm. The effect of such incompatibility is that this methodology ought not to be endorsed by *OR*. This is due to the fact that the regulative aim of *OR* requires *OR*-theory to describe reality as it is independently of the language deployed to express the description. Hence, if *OR* endorsed this methodology, it would end up contravening its own regulative aim.

The first step of the above analysis is to start from a notable example of the language-first methodology: Quine's view of regimenting scientific theories.[44] According to Quine's methodology, if we want to develop ontologies, i.e. catalogues of existing things, we should proceed by translating the language of scientific theories into the formal language of first-order predicate logic and analyzing the semantics of existential quantification. This is how we regiment scientific theories. Not all scientific theories, however, are equally good. Indeed, for Quine, the best catalogue of existing things is the one we gather by regimenting the language of physics.[45] So, Quine's methodology crucially revolves around there being the best scientific theory regimented through the best language, i.e., respectively, physics and first-order predicate logic. I analyze these aspects of Quine's methodology - and how they are related to other Quinean ideas about ontology - in §2.

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[44] In the present context, when I speak of scientific theories I mean theories coming from natural or social sciences. Namely, I refer to theories that develops their descriptions of reality with a methodology that requires data collection and the possibility of conducting empirical experiments. In this way, I separate these theories from what we may call "pure sciences", like philosophy could be, or like mathematics and mathematical logic are considered to be. This separation is not defined or further characterized, but reflects somehow a widely shared distinction between sciences that can be detected in our commonsensical understanding of culture.

[45] To be precise, this is an early idea of Quine's reflections on metaontology and, more specifically, on how ontology and natural sciences are related to each other. Quine revised to some extent the leading role assigned to physics (see for example his *Epistemology Naturalized* in QUINE 1969). In the present context, I deal mainly with Quine's earlier view - and I explicitly specify when I do otherwise.

Notice: in the previous chapter I highlighted some crucial differences between Quine and Carnap's metaontologies and *OR*. On that occasion, my focus was not methodological as it will be in this chapter. Thus, it is important to keep the linguistic view and the language-first methodology distinct. The former is a view about the nature of descriptions, or theories, about reality; the latter is a methodological view of *how* ontological theorizing has to be pursued. Of course, there is an intimate relation between these two view, and indeed Quine endorsed both and elaborated and overall account on ontology on the basis of both. Still, it is important to keep them distinct, for it is possible to endorse the linguistic view without embracing the language-first methodology.

Going on with the overview of the chapter, in §3 I offer a generalization of Quine's methodology, which exemplifies the general language-first methodology. I do this by abstracting from Quine's specific understanding of how we can read catalogues of existing things off from the semantics of first-order predicate logic. The result is that the root of the language-first methodology is the individuation of the best language for ontology. Once the language is identified and we aim to develop an ontological theory on its basis, we obtain a language-first methodology. No matter how you choose to develop - or derive - an ontological theory from the language, what is crucial is that the development of the theory is methodologically dependent on the identification of a language.

When this methodology is endorsed within the *OR*-paradigm, we end up committing the paradigm to the following idea: the individuation of the best *OR*-theory depends on the individuation of the best language for the entire paradigm. This idea generates two major problems for the paradigm.

The first problem is that this pushes *OR* against its regulative aim. Indeed, if the development of the best *OR*-theory depends on the individuation of the best language, it follows that the best description of reality in itself depends on the individuation of the best language to be deployed to express the description. However, the regulative aim of the paradigm requires *OR* to develop the best description of reality as it is independently of language (setting aside other mental capacities). By subordinating the individuation of the best *OR*-theory to the individuation of the best language, *OR* would be committed to the idea that what counts as the best description of reality in itself is determined by language. This commitment generates a tension with the regulative aim of *OR*, according to which the object to be described is language-independent. The problem is not that an *OR*-theory determined by language is *not actually* describing reality in itself. The problem is, rather, that *OR* cannot play a determinant role in individuating which *OR*-theory counts as the *best* one.

The second problem is due to the idea of endorsing a unique language for the entire *OR*-paradigm prior to the development of *OR*-theories. This fact runs against the optimal execution of the theoretical activity of *OR*. Indeed, by endorsing a unique language for the entire paradigm we let it impose expressive limitations on *OR*-theories. This is methodologically problematic, for inexpressible theories cannot be evaluated as viable descriptions of reality. However, given that *OR*-theories are descriptions of reality in itself, they should not be discarded on a linguistic basis. Indeed, to fulfill its regulative aim, as *OR* should not let the language determine the best theory, it should not let the language to determine what is

not a viable *OR*-theory, i.e. a possible candidate to be the best *OR*-theory. I point out this problem in this chapter, but I will then delve more in-depth into it in the following one.

There is a possible objection to the idea that the language-first methodology is incompatible with *OR*. The objection points out the possibility of individuating the best language for the entire paradigm according to a particular criterion: the best language for the *OR*-paradigm is the best language apt for an ontologically neutral description of reality. If it were possible, we could develop the best language for describing reality as a language that does not contradict the regulative aim of the *OR*-paradigm.

However, in §§4-5, I show that this objection is flawed, for languages, when used to describe reality, are not ontologically neutral. This means that there is no language for the *OR*-paradigm can be the best in virtue of its neutrality. Rather, the best language for the *OR*-paradigm should be the language deployed by the best *OR*-theory. Hence, it is the individuation of the best *OR*-theory that determines which language is the best one. This point will be bolstered in the next chapter, when I will consider the benefits of letting each *OR*-theory to find its own best language, i.e. the one that maximizes its perspicuity.

§2 *Quine's Regimentation of Scientific Theories*

Let us begin by considering Quine's methodology for ontological theorizing. I have already explained Quine's main idea that ontology is the enquiry on what there is and it deals with domains of languages of scientific theories. At this point, I want to give more details about *how* the process of finding the best ontological theory works from a Quinean point of view. This is basically explained by Quine's methodology of *regimentation* of scientific theories through a specific formal language, i.e. first-order predicate logic.

To outline Quine's methodology, I follow Schaffer, who gives a clear and structural articulation of Quine's methodology through steps (SCHAFFER 2009, p. 366):

Step 1. Identify the best scientific theory
Step 2. Identify the best formal language (first-order predicate logic, according to Quine)
Step 3. Translate the scientific theory into the formal language
Step 4. Determine the domain of quantification that makes translated sentences true
Step 5. Read ontological commitments off the elements of the domain

The basic idea of this methodology is that it leads us to the understanding of our best ontological theory, which, according to Quine is actually a catalogue of existing things. To do this, we have to identify our best scientific theory (*Step* 1), which according to Quine is physics. Then, we have to identify our best formal language, which Quine believes is first-order predicate logic (*Step* 2). We use the formal language to regiment the language of physics, i.e. we translate the description of reality offered by physics from its language to the language of first-order predicate logic (*Step* 3). Once the translation is completed, we look at the semantics of the quantifiers and we extrapolate the catalogue of existing things that physics

is committed to (*Step* 4). Once this has been done, we can read the catalogue and obtain a description of all the existing things (*Step* 5). Let me say something more about how this methodology works.

Let me set aside *Steps* 3, 4 and 5. These are the technical steps, namely, the technicalities relative of the regimentation of the language of physics with first-order predicate logic. I am here more interested in *Steps* 1 and 2, for they reveal the crucial features of Quine's methodology to be compared with *OR*.

So, let me focus on *Steps* 1 and 2, for they actually exemplify the two core features of Quine's meta-ontology. Let us start from *Step* 2, according to which it is possible to identify the *best* language for ontology, i.e. first-order predicate logic. Then let us consider *Step* 1, according to which we can identify our best scientific theory, i.e. physics.

To get the importance of *Step* 2, it is essential to recognize the overall *semanticist* approach of Quine's methodology. Indeed, in the ultimate analysis, ontology is outlined through the semantics of existential quantifications of the language of physics. These semantics conditions become perspicuous when our best physical theory is formalized through first-order predicate logic. This fact marks an important difference with Carnap's view. Indeed, according to Carnap, different ontological frameworks determine different languages, for they are different ways of developing the semantics of the language. Instead, according to Quine, there is a unique privileged language the semantic specifications of which are capable of analyzing the natural language deployed by our best scientific theory.

The crucial idea of Quine's semanticist approach is the idea of a privileged unique language for ontology. This makes *Step* 2 an essential step of Quine's methodology, for it imposes on ontological theorizing that there is a unique language that guides its theoretical activity. Unavoidably, the best ontological theory (or catalogue in Quine's case) is determined by the semantics of the best language.

This point is the root of the incompatibility between Quine's methodology and *OR*. Indeed, if *OR* follows Quine's methodology, it subordinates the development of the best ontological theory to the individuation of a unique best language for the entire paradigm. By doing this, the paradigm ends up contradicting its own regulative aim, i.e. developing the best *OR*-theory of reality in itself, i.e. reality as it is independently of the language deployed to operate the description. Quine's methodology, instead, subordinates the development of the best ontological theory to the identification of the best language. Hence, what counts as the best *OR*-theory would be dependent upon the individuation of best language.

Let me further specify this last point. My claim is that when the language-first methodology, exemplified by Quine's own methodology, is endorsed by *OR*, the paradigm ends up facing an internal tension. This tension is generated by two opposite forces: on the one hand, the regulative aim of the paradigm pushes it to uncover the best true and complete *OR*-theory, i.e. the best true and complete description of a language-independent reality; on the other hand, the methodology pushes the paradigm to individuate the best *OR*-theory on the basis of the language deployed to express descriptions of reality, i.e. the best language, which is individuated before the development of *OR*-theories. This is problematic, for what counts as the best description of the language-independent reality cannot be determined by the language deployed to express the description.

Now let us focus on *Step* 1: according to Quine, to identify our best ontology we must start with our best scientific theory. This means two things. First, differently from Carnap, Quine believes there is a best ontology and that this is obtained from our best scientific theory by translating the theory into the language of first-order predicate logic. So, Quine is committed to the idea that there is a best ontology. If we regiment different scientific theories, we could obtain different ontologies. For example, if we regiment a sociological theory, we could end up producing a different catalogue of existing things than the one that physics is committed to. Nonetheless, Quine believes that physics gives us a better description of reality than sociology does.

Thus, the upshot of Quine's methodology is that there is a catalogue of existing things that is the best one, and this depends on two factors: 1. It is the best one because it is derived from fundamental physics; 2. It is the best one because it is obtained through a regimentation of a physical theory with first-order predicate logic. Thus, on the one hand, the best ontological description of reality depends on scientific descriptions of reality. On the other hand, it depends on the language. These features are problematic in two different ways for Quine's meta-ontology. The dependence of ontological descriptions on scientific theories conflicts with some other Quinean ideas on ontology. The second feature, i.e. the dependence of ontological descriptions on first-order predicate logic, leads to the core of the methodological problem under examination. Indeed, this feature makes it possible to generalize Quine's methodology to a methodology that is incompatible with *OR*.

Notice: the fact that we can outline our best ontology from our best scientific theory means that the development of ontological theories is *not* an autonomous theoretical activity. According to Quine's methodology, there is no activity as developing a description of reality like *OR*-theories. Ontologies are catalogues of existing things and they are derivative from descriptions of reality pursued through scientific methods. Science describes reality, philosophy reads ontology off from scientific descriptions of reality, and it does this by regimenting scientific languages through first-order predicate logic. So, the theoretical activity pushed by ontology is both relative to the development of scientific theories (physics above all) and relative to the application of a single language to scientific theories.

As regards the problem generated by the dependence of the best ontological theory on our best scientific theory, this idea somehow conflicts with Quine's defense of something similar to an *OR*-theory. Indeed, Quine defended the view that perdurantism is the best way of conceiving of material objects (QUINE 1950, 1976); he also endorsed the reality of universals (QUINE 1966, p. 244, 1981, p. 182). If anything, perdurants and universals *are* ontological categories that we already encountered in the discussion of *OR*.[46] In particular, they do not belong to the theoretical activity of any form of inquiry that Quine would take to be a science: physics, which is our best scientific theory, for example, neither deploys the categories of endurants or universal, nor it takes categories as its object of inquiry.

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46 'Endurant' is another name for 'Continuants' and 'Events', i.e. the category of being encountered while discussing *Basic Formal Ontology*.

From the perspective of *OR*, when Quine defends perdurantism and the reality of universals, he is defending a precise *OR*-theory, i.e. a dualistic *OR*-theory that deploys two categories of being. It also has an ideology, in the sense that *OR* assigns to this term. Indeed, Quine understands universals *as* sets, and continuants are taken to be *elements* of these sets. As any type of element is related to any type of set through the relation of *belonging to*, so endurants belong to this or that universal.[47] So, for example, a purple statue is understood as a perdurant (the statue) that belongs to a set (i.e. the set of purple things).

Thus, even if Quine believes that the theoretical activity of ontology should be subordinated to language, he also elaborates something along the line of an *OR*-theory. However, following the above articulation of the *OR*-paradigm (Chapter 1), *OR*-theories should be taken as descriptions of reality that are not offered by scientific theories. Rather, they should be taken as outcomes of an autonomous theoretical activity of describing reality through a categorization and an ideology (none of which are objects of inquiry of other sciences).

As regards the problem generated by the dependence of the best ontological theory on language, let me discuss it by generalizing it to a general linguistic methodology for *OR*. By focusing on this form of dependence we can isolate a general methodology for the linguistic view that cannot be deployed by *OR*.

§3 *OR* and *The Language-First Methodology*

The general form of the language-first methodology can be generalized in the following way:

Step 1. Identify the best language
Step 2. Identify a body of scientific theories
Step 3. Derive an ontological view from a scientific theory through the application of the best language

Following this methodology we firstly identify (or develop) the best language, and then use this language to derive an ontological theory. Through this methodology, we obtain the best ontological theory through the identification of the best language.

Of course, language alone is not sufficient to derive a full-fledged ontological theory. Instead, we also need to identify a body of theories that we take to be correct. Once theories are regimented through the best language, we can derive an ontological theory. So, language plays an essential role, but not the whole role. Still, as I will show, what generates the tension between this methodology and the *OR*-paradigm is this essential role played by language, no matter if partial.

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[47] I follow here Ingvar Johanssen interpretation (see JOHANSSEN 2016). More on Quine's elaboration of ontological categories and how this is related to his linguistic approach to ontology can be found in LOWE 2013.

This methodology can be specified in different ways, for at each step there is room for disagreement. At *Step* 1 it is possible to disagree over the best language. You could believe that the best language is first-order predicate logic, or you could believe that higher-order predicate logic is such a language, or even believe that it is higher-order modal logic. In the same way, it is possible, at *Step* 2, to disagree over *how* we should derive an ontological view from the language. We could follow Quine's early view, and believe that we need only one theory, i.e. our best available theory of fundamental physics; or we could follow Carnap and be fully pluralists, to the effect that we derive as many ontological views as available theories. Moreover, it is possible, at *Step* 3, to disagree over the procedure of derivation of the ontological view. Quine told us to look at the semantics of quantifiers, while Carnap would tell us to look at the referents of names to uncover the ontological framework of a language.

Now, the crucial question is: is this methodology compatible with *OR*? Namely, is this methodology viable and useful to the *OR*-paradigm to fulfill its theoretical activity? Intuitively, we should already suspect that it is not. Indeed, recall what is the ultimate aim of *OR*, i.e. developing the best *OR*-theory, which is the best description of reality in itself. One condition to describe reality in itself is that the description of reality must not be determined by the language deployed to express the description. Namely, the choice of the language ought not to impose the categorization and the ideology of the best *OR*-theory. So, the language-first methodology should not be compatible with such a theoretical task, for every description of reality developed following this methodology is derived from a language, and so the description depends on the language.

To get this point, let us consider the language-first methodology from the point of view of the *OR*-paradigm. If the paradigm endorses this methodology, it would be following this methodology:

Step 1. Identify the best language for the *OR*-paradigm
Step 2. Identify a body of *OR*-theories
Step 3. Identify the best *OR*-theory among those expressible through the best language

As you may notice, the language-first methodology looks different when endorsed by the *OR*-paradigm. In general, the language-first methodology looks different when endorsed by the *OR*-paradigm to make it fit the peculiar theoretical features of the paradigm. Indeed, methodologies have to be tailored to the theoretical goals of different forms of inquiry.

Step 1 tells us something more specific than before. It tells us that once the best language is identified, this language has to be the best language for describing reality. This is because to *OR*, the best language should amount to the best language for the fulfillment of its theoretical goal. If the language is actually the *best* one, it follows that this is the *unique* language of the paradigm. Once a language is endorsed as the unique language of the paradigm, the methodology requires *OR*-theories to be expressible through the best, and so unique, language.

Also *Step* 2 tells us something more specific, for it demands the identification of a body of only *OR*-theories. This is due to the fact that the theoretical activity of the *OR*-paradigm is taken to be autonomous, and independent from the elaboration of other (scientific) theories. As already explained, *OR*-theories should be evaluated for their peculiar virtues. Ockham's razor and Lowe's implementation of it are examples of these virtues. Dasgupta's scientific ontology is another example (see above Chapter 1, §2). In particular, as suggested by Dasgupta's (and also Lowe's) idea, *OR*-theories could be evaluated on their being aligned with other scientific theories. Still, to be aligned with other scientific theories, OR-theories have to be autonomously developed, and not dependently on other scientific theories.

Step 3 displays two differences. First, in accordance with *Step* 2, it demands the identification of the best *OR*-theory. This theory has to be identified within the pool of theories identified as *Step* 2. More precisely, given that *Step* 1 demands the identification of a unique language for the paradigm, the best *OR*-theory must be individuated within the pool of *OR*-theories expressible through the best language. Indeed, theories that are not expressible through the best language must be discarded from the pool of viable *OR*-theories, for they are inexpressible. If they are not able to express their description of reality, we cannot even evaluate them.

The second difference displayed at *Step* 3 is that we now speak of 'Expressibility' in place of 'Translating (or regimenting)' scientific theories with our best language. This difference is due to the fact that we are now dealing with *OR*-theories that have to express their description of reality, while before we were dealing with the semantics of scientific theories. *OR*-theories specifically aim at describing reality from an ontological point of view, while scientific theories aim at describing reality from their peculiar perspectives. Thus, the methodology should now demand the possibility of expressing a description of reality in place of the possibility of deriving such a description through the translation of a scientific theory into the best language for the ontological activity.

With these differences in place, let us have an overall look at the methodology to show its incompatibility with the *OR*-paradigm. Recall the regulative aim of the paradigm: it seeks the *best OR*-theory. The best *OR*-theory is the best description of reality in itself, i.e. reality as it is independently of the language deployed to describe it. The regulative aim of the paradigm determines the criterion for the evaluation of the theoretical activity of the paradigm. As long as the *OR*-paradigm follows its regulative aim, its theoretical activity is successful. However, if the *OR*-paradigm does not follow this aim, its theoretical activity is compromised.

My point against the language-first methodology is that, when it is endorsed by the *OR*-paradigm, it pushes it against its regulative aim. Thus, the language-first methodology compromises the theoretical activity of the *OR*-paradigm. Indeed, given that the entire methodology demands to subordinate the theoretical activity of the paradigm to the identification of the best language, it follows that the identification of the best *OR*-theory depends on the identification of the language. In other words, the best *OR*-theory is the best relative to the identification of the best language.

We face a tension here: the best *OR*-theory should be the best description of reality as it is independently of the language deployed to express the description; however, once the language-first methodology is endorsed, the best *OR*-theory is identified on a linguistic basis. This is the crux of the incompatibility between the theoretical activity of the *OR*-paradigm and the language-first methodology.

Two objections can be moved against my point. The first one is that the identification of the best language has only a *partial* impact on the identification of the best *OR*-theory. The objector could show this through an example: let us assume that there are three competitor *OR*-theories that are expressible through the best language for *OR*; there is still room for the theoretical activity of the paradigm, i.e. understanding which is the best *OR*-theory among the three competitors. Thus, the language-first methodology does not compromise the theoretical activity of the *OR*-paradigm.

This objection is unsuccessful. Indeed, even in the case described by the objector, there is reason to think that the language-first methodology is incompatible with the theoretical aim of the *OR*-paradigm. This is due to the fact that, even if the identification of the best *OR*-theory is not fully determined by the best language, still, the pool of viable *OR*-theories is set by the language. So, the best *OR*-theory is nonetheless indirectly determined by the language, for the language fully determines among which group of theories the best one *must* be. If the pool of competitor theories is determined by language, then the best *OR*-theory cannot be outside this pool. The fact that the best language has only a partial impact on the identification of the best *OR*-theory does not change the fact that this impact is essential.

Again, this methodology cannot be endorsed by *OR*, for it compromises the fulfillment of its regulative aim. Indeed, if the paradigm evaluates the best *OR*-theory on the basis of its being expressible from the best language, it ends up committing to a description of reality that depends on this language. Hence, the paradigm violates its regulative aim of developing the best description of reality as it is independently of the language deployed to express the description.

There is a second objection that the linguist philosopher could advance to my point. The objection runs as follows: "I see your point, but you can only prove that what is wrong with the language-first methodology is that the criterion for the identification of the *best* language is unspecified. Indeed, I can follow this methodology and meet the theoretical demand of *OR* if I evaluate the best language as *the best language for the description of reality in itself*".

This objection raises a crucial point, and I would reply to it that there is no such language, so it cannot be identified. Indeed, the best language for the description of reality is the best language for the expression of our best *OR*-theory. In other words, it is impossible to identify the best language for the description of reality in a neutral way and prior to the development of *OR*-theories. So, unless we develop our best *OR*-theory first, we cannot identify the best language for the description of reality. Hence, if this objection is raised to defend the methodology of the linguistic view under examination, it fails, for the development of the best *OR*-theory *precedes* the identification of the best language.

This reply to the objection assumes one vital idea: not every language is apt for the expression of every *OR*-theory. Indeed, by showing that languages can impose expressive limitations on *OR*-theories, it is proved that there are languages that are not apt for the expression of some theories. In the next chapter, I will show this point in its minimal form by relying on a precise case, i.e. the case of standard first-order predicate logic and how it constrains the expression of a particular *OR*-theory. So, the point I will prove is minimal in the sense that I show that there is at least one language that is not apt for the expression of an *OR*-theory.

Incidentally, this immediately implies that there is at least one language that cannot express every *OR*-theory, for there is at least one theory on which it thrust expressive limitations. First result: this runs specifically against Quine's articulation of the language-first methodology, for he takes first-order predicate logic to be a language apt for the development of the best *OR*-theory.

Thus, the reply takes the following form: when languages are used to describe reality, they are not ontologically neutral, and so each language is apt for the expression of some but not every *OR*-theory. Indeed, when a language is not designed to specifically express an *OR*-theory (or a pool of *OR*-theories), it imposes expressive limitations over some *OR*-theories. Given this, a unique language for the *OR*-paradigm cannot be developed without a previous elaboration of the best *OR*-theory. Indeed, by imposing a unique language for the entire *OR*-paradigm, we end up imposing expressive limitations on *OR*-theories, and so we exclude them from the pool of viable theories, among which the best *OR*-theory has to be selected.

Given all of this, let me now show that formal languages are not ontologically neutral, i.e. when languages are used to describe reality they lead to some precise ontological ideas. In other words, when describing reality, languages are correlated with some specific ontological views but not with others. This fact immediately runs against the idea that the *OR*-paradigm can endorse a unique language that it can be deployed to express every *OR*-theory.

§4 *Formal Languages and Describing Reality*

In this section, let us specifically focus on formal languages more than on *OR*-theories. I want to show how different expressive tools reveal differences in the ontological understanding of reality. This means that formal languages are not ontologically neutral. This is important to weaken the objection of a defender of the language-first methodology, according to which we can find the best language for the description of reality first, and *then* use this language to identify our best *OR*-theory. However, given that formal languages are not ontologically neutral, it follows that the choice of a language and its peculiar expressive resources is useful to express some ontological ideas, but not others.

In the next chapter, I will bolster this point by showing *how* a specific language, i.e. standard predicate logic, imposes expressive limitations on *OR*-theories. I will also show

some benefits of *not* endorsing the language-first methodology and letting *OR*-theories find their own expressive resources. In this way, I want to show how much endorsing a language-first methodology can push the *OR*-paradigm against its regulative aim, and how much we gain if, instead, we drop this methodology. Hence, take the analysis below as a general point against the methodology of the language-first approach, and take the next chapter as a deeper analysis of the point raised here.

Recall: The fact that *OR* aims at a description of reality itself does not imply that *OR* can produce these descriptions without a language. Rather, *OR*-theories have to be expressed through a language. So, there is a sense in which *OR*-theories have to describe reality as it is independently of the language they deploy to express the description; but there is also a sense in which *OR*-theories depend on the possibility of being expressed through a language. This fact requires *OR* to accurately select a language - or more languages - for the production of different descriptions or reality.

Thus, let me outline the essential linguistic aspects that *OR* should take care of. My aim is to show that different ways of understanding syntactical, semantical and logical aspects of a language have an impact on the ways in which reality is described. So, there are features of language that are not ontologically neutral. This does not mean that reality is modified or determined by language; it means that languages push us to describe reality in different ways accordingly to some of their features.

Given this, it follows that *OR* must carefully reflect on the linguistic choices it operates. In particular, from the ontological weight of some linguistic choices I conclude that there is at least one methodological attitude that *OR* must avoid. This attitude is the one of endorsing a unique language for the entire paradigm without being guaranteed that this language does not impose expressive limitations on *OR*-theories.

Before delving into these linguistic aspects, recall that I am here referring to linguistic features of *formal* languages. A formal language is a symbolic language that makes it possible to define and regiment linguistic functions that are used also in natural (or "commonsense") languages. This makes formal languages also artificial languages, which are built around three essential features: 1. a syntax that allows us to produce sentences in the language; 2. a semantic that makes it possible to understand the meaning of these sentences and to evaluate the of truth or falsity of sentences; 3. some rules of inference that set the standards for valid forms of reasoning with the language.[48]

The fact that formal languages are artificial languages allows us to take care of the process of their development, and this is extremely important. Indeed, by monitoring the building process of languages we have a way to design them in accordance with our theoretical aim of describing reality. This is much harder to be obtained in a natural language, for natural languages have been developed through millennia with more than one theoretical aim. This is part of the reason why they are full of ambiguities that we should avoid in developing the language for *OR*. Let me go through examples that explain how to deal with

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48 Every aspect of formal languages I am going to deal with can be found in the majority of logic textbooks. In particular, my cornerstone is SIDER 2011.

points 1-3, so I can sketch the way in which *OR* has to deal with formal languages (§§4.1-4.3).

More precisely, with these examples, I want to show how different ways of understanding features of formal languages have an impact on the way in which reality is described. Once this is done, I draw the methodological conclusion that *OR* cannot assume this or that formal language for the expression of *OR*-theories and presuppose that the language is adequate for the theoretical activity of the entire paradigm.

§4.1 *Syntax*

First, let us consider an example dealing with syntax. As already said, *OR* aims to produce a true description of reality. So, ontological claims of *OR*-theories should describe reality somehow. Imagine we want to describe a very simple state of affairs obtaining in reality, like the fact that a particular ball is red. Now, suppose that our ontological understanding of the red ball is such that we can isolate two different existing entities: an object, which is the ball; and a property, which is the redness of the ball. Assume further that we endorse the formal language of standard predicate logic. Namely, assume that it is through this formal apparatus that we symbolize the ontological description of the red ball. According to standard predicate logic, we use a name to symbolize the object and a predicate to symbolize the property. Then the following sentence describes the ball being red:

(1) Ra

Where 'a' is the name for the ball and 'R' is the predicate standing for the property of redness.

(1) is not the only sentence we can produce about the ball and its redness. Rather, there are more interesting sentences we can produce, e.g. a sentence claiming that there *exists* a ball that it is red. To do this, we must rely on a linguistic tool to express the concept of existence. In standard predicate logic we can express existence through the existential quantifier together with the identity sign. To use quantification, we must also introduce variables ('x, y, z,…'), which stands for objects whatsoever. In this way, we obtain the sentence:

(2) $\exists x\,(x = a \,\&\, Rx)$

(2) claims that there exists a ball and that is red. This sentence is complex, and can be analyzed in the following way: the expression '$\exists x\,(x = a)$' - literally 'there is something that is identical to a' - claims the existence of a, which is the ball; the expression 'Rx' expresses the fact that the same thing that exists is red; the syntactic element '&' stands for the conjunction of the two expressions.

Since our understanding of the state of affairs is such that there are two existing entities, we can also produce a more complex sentence that expresses the existence of both

entities. So, we can assert that there exists a ball and there exists a property of redness, and that they are related in a certain way. To assert the existence of the property, some understandings of standard predicate logic suggest the use of second-order quantifiers. In this way, the quantifier expressing the existence of an object like the ball is clearly distinguished from the one deployed to state the existence of a property like redness. This difference is graphically marked by the presence of capitalized variables (*X*, *Y*, *Z*,…). In this way, we can explicitly express the existence of both *a* and *R*:

(3) $\exists x \exists X (x = b \,\&\, X = R \,\&\, Xx)$

Compare (2) and (3). (2) expresses the existence of *a* ('$\exists x (x = b)$') and its relation to *R* ('*Rx*'); (3) expresses also the existence of *R* ('$\exists X (X = R)$') and its relation to *a* is now symbolized by variables ('*Xx*' in place of '*Rx*').[49]

(1), (2) and (3) are different sentences expressed through the formal language of standard predicate logic. They deploy different concepts that are captured by different symbols. Inquiring the language for *OR* requires the production of a formal apparatus that appropriately symbolize ontological descriptions of reality. The example just exposed shows a possible way to offer such a symbolization through standard predicate logic: we use names for objects, predicates for properties and the existential quantifier with identity to express existence. This is an example of how to deal with the syntax of a formal language for *OR*. However, as I will show, standard predicate logic is not the only option on the table. Moreover, consider the fact that (1), (2) and (3) must be somehow related to each other, for they all describe in different ways the same real state of affairs: the existence of a red ball.

§4.2 *Semantics*

Now, let us move to consider an example from semantics. In particular, let us focus on how two different semantic choices can produce two different pictures of reality. This is relevant for *OR*, for it means that the semantic of the language has interesting ontological upshots. To get this point, consider two formal languages differently expressing the existence of entities. There are at least two ways of conceiving existence within a formal language for *OR*. One option, which is the nowadays dominant view, is to interpret existence as quantification following Quine[50]. According to this view, to exist amounts to be the value of a variable that is bounded to the existential quantifier. So, to formalize the sentence '*a* exists'

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[49] The role of quantification in expressing ontological claims is crucial if you interpret existence towards quantification. The difference between using first- and second-order quantification to express the existence of properties has been examined by Nicholas Jones (see JONES 2018).

[50] See QUINE 1948. This is the option already deployed in the previous example about syntax. In particular, it is the option endorsed in the case of first-order quantification, for Quine did not accept second-order quantification. I set aside the discussion about first and second-order quantification.

- where '*a*' is an entity whatsoever - we deploy quantification together with the identity sign, as follows

(4) $\exists x\,(x = a)$

This is not the only option on the table, indeed we could follow the so-called *Meinongian* view, according to which to exist amounts to possessing a specific property.[51] If we accept the further assumption that properties are formalized in standard predicate logic through predicates, it follows that the above sentence should be differently formalized, i.e. as

(5) Ea

Where '*E*' is the predicate standing for the property of existence. The crucial difference between (4) and (5) is not merely formal, it is instead truly ontological. Indeed, (4) is not committed to the existence of a property, while (5) claims that there really is a property that is captured by '*E*'. For the sake of precision, here some clarifications are due, but they do not change the fact that how to formalize the concept of existence in a first-order language has some ontological outcomes.[52]

The semantic difference between (4) and (5) can be further specified to show another ontological difference between these two sentences. Let us assume again that we are accepting standard predicate logic as the language of *OR*. Then, (4) and (5) have different truth-conditions. In standard predicate logic, these conditions are described through a set-theoretic model, which sharply differentiates the semantic of a quantifier and of a predicate. What is crucial is that quantifiers, like the one contained in (4), are associated with the *domain* of the language, while predicates, like the '*E*' in (5) are associated with an *extension*, which is a *subset* of the domain. Precisely, the domain is the set of *all* things that can be replaced to a variable. Namely, it is the set of all things that sentences of the language can be about. Instead, extensions of predicates are subsets of the domain. This means that every element of the extension of a predicate is also an element of the domain, but not every element of the domain is also an element of a subset of the domain.

Following the classic semantics rules for standard predicate logic, (4) is true if *a* is an element of the domain, while (5) is true if *a* is an element of a specific subset of the domain. This difference is ontologically significant. Indeed, if we think that (4) is the best way to express existence, it follows that any element of the domain exist; instead, if we follow meinongians, it follows that not every element of the domain is an existent thing. So, the two options have a different incidence on the expressive power of the entire language. In-

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[51] See MEINONG 1904, PRIEST 2005, and BERTO 2012.

[52] For example, the situation gets more complicated if we consider that, even if we follow Quine, we could define a special predicate '*E*' $=_{df}$ '$\lambda x.\exists y(x = y)$', and even if we have a predicate in our formal language, we are not committing ourselves to the existence of a certain property (see SALMON 1987). However, even in this case, the reason why we are accepting a *special* predicate in our language is because of its ontological import. The point I am highlighting is exactly that even in the case of first-order predicate logic we must take care of ontological outcomes. I am not defending this or that view or figuring the best account of existence out.

deed, if we follow the quantificational semantics, it seems that we are not allowed to speak about non-existing things, for everything that falls inside the domain of the language exists.

Instead, if we follow meinongians, talking about non-existent things seems allowed with no difficulty, for not everything in our domain exists. This is due to the fact that existence is a predicate, and so it is associated with an extension, which is a subset of the domain. Namely, following meinongianism, the set of existing things is a subset of the domain. This means that variables can be replaced by existent and non-existent things. So, a sentence like (4), from the perspective of meinongianism, can be true even if *a* does not exist. Indeed, the fact that *a* falls within the scope of the quantifier does not imply that *a* exists.[53] Hence, semantics choices have an impact on *OR* expressive resources.

§4.3 *Logical Relations*

In the end, let us consider an example of logical relations connecting sentences. In particular, let us focus on how sentences are related in inferences. Inferences are processes through which we derive a sentence from another. So, for example, from the sentence 'The car is green' I can derive the sentence 'Something is green'. Indeed, if it is true that the apple is red, and since the apple is something, then it is true that something is red. We can write inferences using the following graphic arrangement

The car is green

———————————

Something is green

Inferences can be valid or invalid. They are valid when it is impossible that the derived sentence ('Something is green' in the example) is false and its premises are true (in the example there is only one premise: 'The car is green'). Valid inferences are vital features of a logic, for different logics allow different valid inferences. With this point in mind, let us now consider how valid inferences can be connected to ontology. This should show why it matters to have a clear understanding of the logico-formal features of a language for *OR*.

Consider again the case of the green car. Let us follow standard predicate logic again, according to which the sentence 'The car is green' is formalized as

(6) Gc

Now, standard predicate logic usually accepts the principle that there are no vacuous names. Namely, if c refers to anything at all, then the referent of the name must exist. This means that from (6) logically follows the existence of c, i.e. the referent of 'c'. Also, we al-

53 This is a big on-going debate (see BERTO 2012 for a survey of it), which starts from Russell's critique of Meinong's view (see RUSSELL 1905). An important specification is due. Adherents to the quantificational view actually have a way of speaking of non-existent things, a view that is due to Quine's development of Russell's attack against Meinong (see QUINE 1948).

ready explained that from the fact that the car is green we can infer that something is green. So, we can conjoin these two logical consequences of (6) in the sentence 'There exist something that is identical to *c* and that is green'. In standard predicate logic this can be formalized as

(7) $\exists x\,(x = c \,\&\, Gx)$

Putting things together in the inferential form we obtain

$$\frac{Gc}{\exists x\,(x = c \,\&\, Gx)}$$

The inference is logically valid, for it cannot be the case that 'Gc' is true and '$\exists x\,(x = c \,\&\, Gx)$' is false. Indeed, if it is true that *c* is *G*, it must be the case that there exists something that is *G*. This is due to acceptance of the fact that if '*c*' refers to anything, then *c* exists. The sentence '$\exists x\,(x = c \,\&\, Gx)$' claims that there exists *c* and that it is *G*. Hence, from a simple sentence about an object and a property, we are inferring an existential claim, which is an ontological claim.

However, there is room for disagreement about the validity and the ontological nature of this inference. One alternative option is to endorse *free logic* instead of the standard one. Free logic is characterized by the refusal of the principle that there are no vacuous name. Rather, names can refer to anything whatsoever. This means that free logic refuse the idea that the existence of a referent is a necessary condition for reference. So, once this logic is endorsed, it is possible to refuse the idea that '*c*' must refer to something that exists. In this way, free logic gives the chance to endorse the idea that names like '*c*' can refer to non-existent things. Hence, from the perspective of free logic, a quantified claim expressing the existence of *c* cannot be inferred from the fact that *c* is *G*. So, the above inference would be invalid, for it can be the case that 'Gc' is true, while '$\exists x\,(x = c \,\&\, Gx)$' is false. This can happen, for example, when *c* is *G* but *c* does not exist. Notable examples of this sort are fictional entities: 'Gc' can be a sentence describing a car from a novel.

Again, another alternative option is to endorse a meinongian point of view on existence. Indeed, meinongianism would deny that the above inference is ontologically substantial. This is due to the fact that the inferred sentence '$\exists x\,(x = c \,\&\, Gx)$' is not a claim about the existence of *c*. Indeed, recall that for meinongians existence is a real property that is expressed through a predicate '*E*'. This does not mean that meinongians do not accept quantified claims. However, they reject the idea that these claims have an existential, and so ontological, import. This is what happens in this case: meinongians deny the ontological nature of the claim; thus the inference does not tell us anything about the existence of *c*. At the very best, the inference shows us that *c* is an element of the domain, and not that *c* exists.

§5 *Methodological Consequences*

What I have just argued is that formal languages are not ontologically neutral. Namely, different expressive resources of formal languages have different interactions with descriptions of reality offered by different *OR*-theories. This means that each formal language is adequate for the expression of some but not every *OR*-theory, and this fact has an impact on the methodology of evaluation of *OR*-theories. This impact is twofold.

On the one hand, it reinforces the idea that there is a bad methodological attitude to be avoided, i.e. endorsing a unique formal language for the entire *OR*-paradigm and using it as an evaluation meter for *OR*-theories. This is what happens, for example, if we believe that the formal apparatus of first-order standard predicate logic is an adequate formal language for the entire *OR*-paradigm. The reason has been already anticipated in the previous chapter. If we endorse a unique language for the paradigm and this language imposes expressive limitations over some *OR*-theories, it follows that the pool of viable *OR*-theories depends on the choice of the language. The result is that when the best theory is obtained from a language-driven pool, this theory would not be the one the *OR*-paradigm is looking for, for it would not be evaluated as the best theory independently of the language it deploys.

On the other hand, the fact that formal languages are not ontologically neutral points toward a positive methodological attitude for the *OR*-paradigm, i.e. letting every theory express its description of reality through the most appropriate language. The development of specific languages for *OR*-theories guarantees that each theory can perspicuously express its own description of reality, and *then* it can be evaluated for its ontological descriptive virtues, if any. I will say more on this when I draw my conclusions in §6.

The conjunction of these negative and positive prescriptions due to the non-neutrality of languages should cast some doubts on the objection that the defenders of the language-first methodology could advance. Recall the objection: "Maybe there is a unique and best language for the paradigm, and this language is the best in virtue of being the best language for describing reality in itself". The non-neutrality of languages, however, motivates the idea that every language will be suited for the expression of this or that *OR*-theory, to the effect that the best language for describing reality is the best language for the best *OR*-theory. Thus, unless the best *OR*-theory is available, the best language for the description of reality cannot be available.

To bolster this point against the language-first approach, let me show what are the problems raised by a language that imposes expressive limitations over *OR*-theories. To get an idea of what expressive limitations are, consider the following case.

Consider again Campbell and Heil's *OR*-theories described above (Chapter 4, §2). Recall that, on the one hand, Campbell endorses a single category of being, i.e. tropes, together with the formal relation of co-location. On the other hand, Heil endorses a dualism of tropes and substances together with the formal relation of mutual dependence. Moreover, recall how they differently understand an entity like my laptop. According to Campbell, my laptop is a collection of co-located tropes. According to Heil, it is a substance.

With this in mind, imagine now that *OR* endorses a language for the entire paradigm. Let us assume that this language is adequate to express *only* Campbell's theory, and, so, it is inadequate to express Heil's theory. This means that *L* is developed in such a way that it can express only Campbell's theory and no other *OR*-theory. Call this language '*L*', for it does not matter what language it exactly is. Now, Heil's theory cannot be expressed through *L*. In particular, let us focus on a precise aspect of *L* when it is so-designed, like the set of individual constants - i.e. {*a*, *b*, *c*, …} - it deploys to refer to tropes. Suppose *L* uses individual constants to refer only to tropes, and sets of individual constants to refer to collections of tropes. So, when Campbell describes my laptop, which is a collection of tropes, it uses a string of symbols like this: '{*a*, *b*, *c*, *d*, *e*}'. This set stands for my laptop, and each individual constant in the set (i.e. '*a*', '*b*', '*c*', and so on) stands for a single trope. For example, '*a*' refers to the particular grey of my laptop, and '*b*' to the particular black of its keys, and so on.

If *L* is so-designed *and* it is endorsed as the unique language of the entire *OR*-paradigm, it follows that every *OR*-theory must speak this language. So, Heil's theory must be expressed through *L* too. However, when Heil's theory deploys *L* to express its description of reality, it suffers the way in which the language interferes with the content of its theory. To see how this happens, consider the string of symbols '{*a*, *b*, *c*, *d*, *e*}'. When deployed by Campbell's theory, this string of symbols refers to my laptop, i.e. a collection of tropes, and each individual constant stands for a trope. However, Heil's theory does not consider my laptop a collection of tropes; rather, it considers my laptop as a substance. So, Heil's theory cannot express its point of view on reality through '{*a*, *b*, *c*, *d*, *e*}'. Indeed, the entire *OR*-paradigm takes Heil's theory to be speaking of a *collection* of tropes, while, instead, the theory is talking about a *simple* substance. Ideally, Heil's theory should deploy a single name for the simple substance. But if the theory uses *L* in this way, i.e. if it deploys '*a*' to refer to my laptop, the *OR*-paradigm would take it to be referring to a single trope. So, Heil's theory has strong difficulties in expressing its theory within the paradigm.

The conclusion I draw from this example is this: if *L* is designed for the expression of an *OR*-theory, *and* it is elevated to the language of the entire *OR*-paradigm, then we expose alternative *OR*-theories to the risk of being unable to express their content. This implies that the entire *OR*-paradigm is unable to accept the theory as a possibly true theory, i.e. the theory is excluded from the pool of viable *OR*-theories, among which there is the best *OR*-theory. Indeed, *OR*-theories that are not able to express their description of reality are not evaluable. Hence, *OR* would be ruling out the theory *because* of *L*.

However, the *OR*-paradigm is driven by the regulative aim of finding a true theory of reality as it is independently of *L*. Thus the paradigm is limiting its theoretical activity on the basis of some prior and unjustified assumptions about the language to be deployed. Inside the *OR*-paradigm, *L* should allow the expression of *OR*-theories without being elevated to a paradigm for the evaluation of *OR*-theories.

Notice: the impact of formal linguistic choices on the expression of *OR*-theories does not exclude the possibility of developing a unique formal language for the entire *OR*-paradigm. This option is left open. However, the non-neutrality of formal languages tells us something about how this project should be pursued. Given that not every formal lan-

guage is adequate for the expression of every *OR*-theory, we should let each *OR*-theory free from deploying its formal language. Once this is allowed, we can develop a formal language that is able to offer adequate translations of all the different languages of *OR*-theories. Namely, this unique language must be developed as a tool developed *on the basis* of different languages for different *OR*-theories. What is precluded by the non-neutrality of formal languages is the other way round of this process, i.e. developing a unique language first and then imposing on *OR*-theory that they must express their description of reality through this language.

Furthermore, if a language for a *OR*-theory cannot be developed in such a way that it meets standards for formal languages - as having a clear syntax, semantics and a logic - and this is the *only* language that can express the theory, then you have an argument against the viability of the theory. Namely, if a formal language for the expression of an *OR*-theory cannot be developed, then you have reason to think that the *OR*-theory is *inexpressible*. If so, you can negatively evaluate the *OR*-theory on the basis of its inexpressibility, and so declare it unviable. Still, this fact does not imply that if you *assume* a unique language for the *OR*-paradigm, then this can be used to rule theories out.

§6 *Conclusion*

In this chapter, I showed the incompatibility of the language-first methodology with the *OR*-paradigm. I did this by considering Quine's development of this methodology first, and then I moved to consider the general form of the language-first methodology. The conclusion I reached is that this methodology is incompatible with *OR* because it pushes the paradigm against its own regulative aim. This is due to the fact that the language-first methodology requires the paradigm to identify the best *OR*-theory on the basis of the best, and so unique, language for the entire paradigm. However, the regulative aim of *OR* requires the paradigm to develop the best description of reality as it is independently of the language deployed to express the description.

The core of the language-first methodology is to identify the best unique language for the entire *OR*-paradigm and then to identify an *OR*-theory on its basis. This *OR*-theory is the best one in virtue of being expressible with the best language. It does not matter if more than one *OR*-theory can be expressible with the same language, for this changes the situation from a quantitative point of view. Indeed, even if a plurality of *OR*-theories is expressible with the best language, the paradigm must accept the fact that the best *OR*-theory has to be isolated within the pool of theories expressible with the best language. Hence, one way or another, we let the best language drive the theoretical activity of *OR*, and this is what pushes the paradigm against its regulative aim.

To this line of reasoning, a defender of the language-first methodology who wants to be a realist can advance an objection: we could endorse the language-first methodology if the best language for the entire paradigm were the best language apt for describing reality in itself. If the best language is individuated in such a way, the objection proceeds, we

could make the regulative aim of *OR* compatible with the language-first methodology. However, I showed that this objection is flawed. The reason is that such a language should be ontologically neutral, i.e. it should not determine the best *OR*-theory (or the pool of viable *OR*-theories). In other words, it must not impose any limitation on the development of viable *OR*-theories.

This objection is problematic, for languages, when used to describe reality, are not ontologically neutral, for not every language is apt for the expression of every ontological description of reality. Hence, given that languages are not ontologically neutral, it follows that there is no best language that can be developed and endorsed by the *OR*-paradigm prior to the development of *OR*-theories. Hence, the objection does not succeed in establishing a compatibility between the language-first methodology and *OR*.

The incompatibility of the language-first methodology with *OR* and the ontological load of languages leads to some crucial methodological consequences. First of all, *OR* ought not to endorse the language-first methodology. This fact marks a radical difference between the metaontology proposed by the *OR*-paradigm and the language-first methodology. In the previous chapter, I showed how the two views differently conceives ontological descriptions of reality. In the present chapter, I showed further that these views cannot share the same methodology.

A second methodological consequence of the above analysis is that *OR* should let each *OR*-theory to express its description of reality through its own language. Indeed, once we drop the idea that a unique language for the *OR*-paradigm has to be endorsed to express every viable *OR*-theory, it follows that the best way to meet the regulative aim of the paradigm is to let each *OR*-theory find *its* own best way to express its description. In this way, we deprive the language from the power of driving the theoretical activity of the paradigm.

Once this idea is accepted, it follows a third consequence: the best language for the *OR*-paradigm is the best language for the best *OR*-theory, where what counts as the best language is determined by the best *OR*-theory, and not vice-versa. This fact does not preclude the possibility of developing also a language for the entire paradigm, i.e. a language that allows the exchange of information among different *OR*-theories. However, once this methodological idea is endorsed, we can acknowledge that a unique language for the paradigm is not a language deployed to drive the development of *OR*-theories, but simply to allow communication between them.

Notice: I am not defending these methodological consequences as unproblematic. Rather, they require further development and critical scrutiny. My aim was to show this different perspective on language when we work within the *OR*-paradigm. To bolster this perspective, and the methodological consequence of the above analysis, I will deal with a specific case in the next chapter. In particular, let me analyze how the endorsement of a unique language for the entire paradigm thrust expressive limitations on *OR*-theories and what problems this generates. The specific language I take into account is first-order predicate logic, and I am going to test its expressive power with a specific *OR*-theory. I will further show some benefits we enjoy when we drop the idea that first-order predicate logic is the unique language for the entire *OR*-paradigm.

6. *Ontological Realism and First-Order Predicate Logic*

§1 *Introduction: OR and First-Order Predicate Logic*

In this chapter, I analyze the way in which first-order predicate logic can impose expressive limitations on the *OR*-paradigm. In particular, I show this by explaining how this language is inadequate for the expression of a specific *OR*-theory. This study case proves that there is at least an *OR*-theory that cannot be expressed through first-order predicate logic. This fact sustains the main methodological conclusion of the previous chapter, i.e. that *OR* ought not to endorse a unique formal language for the entire paradigm. Namely, the language-first methodology is incompatible with *OR*, for it demands the endorsement of a unique language.

In §2, I deal with syntactic problems. By doing this, I show how first-order predicate logic is inadequate to express the description of reality elaborated by the *OR*-theory under examination. I explain how this problem is rooted in the lack of syntactic resources of the language, mostly due to the absence of enough sets of constants to capture the categorization endorsed by the *OR*-theory. This fact determines also the absence of a semantic for missing constants and of grammatical forms that allow a clear expression of the description of reality that the theory offers. The overall result is that we can produce only ambiguous claims, to the effect that the *OR*-theory cannot clearly express its description.

In§ 3, I deal with logical problems. I do this by showing how the presence of ambiguous claims does not allow a clear understanding of the logic of the language of the *OR*-theory under examination. To show this point, I develop a specific way to understand the logic of an *OR*-theory by linking it to the ideology of the theory. In particular, I show how the ideology of an *OR*-theory and the logic of the language it deploys should mirror each other. In this way, formal relations of reality are captured by formal relations through sentences. To show this point I isolate a specific class of valid inferences, i.e. ontological inferences, that the logic of languages for *OR*-theories must be able to articulate without ambiguities.

My point against first-order predicate logic, and so against the uniqueness of the language within the *OR*-paradigm, will be implemented in §4, where I show the benefits of endorsing different linguistic resources. In particular, I show how axioms for *OR*-theories can be developed when the limitations of first-order predicate logic are set aside. In this

way, I advance a first development of the inquiry that the *OR*-paradigm has to pursue once linguistic pluralism is endorsed. My proposal is not exempt from difficulties, which will be taken into account. Nonetheless, the development of axioms shows how the difficulties exposed in §2 and §3 are avoided when first-order predicate logic is not endorsed as the unique language of the *OR*-paradigm.

I conclude the chapter with an overview of the analysis developed in the last three chapters of this work (§5).

§2 *Syntactic Problems*

As I said, I want to consider a precise range of *OR*-theories that accept the existence of tropes, universals and substances. The general question I want to answer is: is standard predicate logic adequate for the expression of *OR*-theories that accept this categorization? My answer is negative, for standard predicate logic does not have a syntactic structure that allows to adequately distinguish tropes from substances and universals. The best obtainable result is the production of ambiguous sentences that are not able to clearly represent reality as it is understood by *OR*-theories endorsing tropes together with substances and universals. Let me explain this point.

First of all, let me outline a specific *OR*-theory. I will use this theory to test the expressive power of standard predicate logic. Let us imagine that our *OR*-theory is a Lowe-style theory, i,e, an *OR*-theory is made up of the following categorization and ideology.[54] First, the theory endorses three categories of being: substances, universals and tropes. Second, the theory accepts an ideology of three formal relations, i.e. the one of *exemplification*, the one of *inherence*, and the one of *instantiation*. It follows that universals are exemplified by objects, and tropes inhere objects and are instances of the universal property.

To see how the theory describes reality consider, for example, how it describes a red ball. According to its categorization, the theory isolates three different ontological components: there is the ball, which is a substance; there is its particular redness, i.e. the trope of redness of that very ball; there is a universal property of redness, which is the universal property shared by all red objects. According to the ideology of the theory, these three ontological elements are related in the following way: the ball exemplifies (or it is an exemplification of) the universal property of redness, while it inherits (or it is characterized by) its particular redness; moreover, the particular redness of the ball instantiates (or it is an instance of) the universal property of redness.

With this *OR*-theory in mind, let us now focus on standard predicate logic and evaluate if this language is a good language for the expression of this theory. I believe that standard predicate logic is not adequate for this task, and this is due to the syntactic struc-

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54 See LOWE 1989, 2013. Lowe's theory is actually a four-category ontology, which accept *kinds* in addition to substances, tropes and universals. However, to show my point I do not need to consider all four Lowe's categories.

ture of the language and the way in which this structure is usually deployed to describe reality. Let me show this point.

Recall that standard predicate logic possess two syntactic elements that can have an ontological correlative, i.e. names and predicates. When both these syntactic elements are used as counterparts of real entities, they are usually related to reality in the following way: names refer to substances, while predicates stand for (or correspond to) universal properties. This way of connecting language to reality is supported by the set-theoretical semantic core of the language. Precisely, it is supported by a structural analogy between the way in which sets and their elements are related and the way in which universals and substances are related. Let me show the analogy using again the example of the red ball.

When we describe the fact that a ball is red through standard predicate logic, we write an atomic sentence of the language, i.e. a sentence containing a predicate and an individual constant: '*Rb*'. The predicate '*R*' stands for the universal property, while '*b*' refers to the substance. The choice of symbolizing a universal property with a predicate and a substance with a name is not casual. Rather, it is motivated by the idea that predicates and universal properties, on the one hand, and names and substances, on the other hand, have some common features. Predicates can be applied to more than one name, like universal properties can be shared by more than one substance. So the universal property *R* possesses a level of generality that resembles the one of the predicate '*R*': as the predicate can be applied to more than one name, the property is exemplified by more than one substance.[55] In the same way, the substance *b* possesses a level of particularity that resembles the one one of the individual constant '*b*': substances are particular and unique things, as well as individual constants are particular and unique syntactic elements that unambiguously refer to only one particular thing.

Given this, it seems that standard predicate logic has at least a reason to associate universal properties to predicates and substances to individual constants. However, recall that we need to evaluate if standard predicate logic is an adequate language for the expression of an *OR*-theory that endorses tropes together with universal properties and substances. This generates a first-intuitive problem: if we have *only two* syntactic elements that possess an ontological counterpart, how are we going to symbolize a *third* category of being? If we delve into this intuitive question, we can uncover that the language does not have a way to do this without facing expressive problems.

Let us now focus on the selected *OR*-theory and how it could be expressed through standard predicate logic. Recall that this theory endorses three categories of being, i.e. substances, universals and tropes. Following the usual way of deploying standard predicate logic to describe reality, we should accept the idea that substances and universals are respectively symbolized by the language through individual constants and predicates. So far so good, but now we should find a way to represent tropes. However, the language does not have other syntactic elements apt to represent tropes.

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55 This idea is so rooted in our use of standard predicate logic that even people like Shamik Dasgupta, who believes in the existence of universal properties *only*, uses predicates as linguistic counterpart of this category of being. So, even when someone does not accept the existence of substances, still she uses predicates to symbolize universal property to capture their level of generality (see DASGUPTA 2009).

The best we can do is to use predicates or individual constants. But this is problematic, for two reasons. First, we cannot use semantic consideration to motivate the choice of using individual constants or predicates, as in the case of universal properties and substances. Second, even if we find a way to motivate our choice, we end up producing ambiguous sentences. These sentences are ambiguous in such a way that disqualifies them as good sentences for the description of reality. Let us consider these two issues in order.

Tropes are broadly conceived of as particularized properties[56]. On the one hand, they are similar to substances, in the sense that they are particular and unique entities. On the other hand, they are similar to universal properties, for they have a general nature that can be analyzed through the concept of similarity. Consider again the case of the red ball. According to a trope theorist, the redness of the ball is a trope, i.e. it is the particular redness of exactly that ball. In this sense, tropes are particular things. However, the redness of the ball is similar to other particularized redresses, e.g. the redness of a car or the redness of a scarf. So, different substances can be similar in virtue of the fact that they possess similar tropes. This means that tropes have something in common with universals, i.e. they are features of substances that can be shared with other substances. When different substances share the same universal property, we can generalize and talk about the set of all the substances sharing that very same property; when different substances possess similar tropes, we can generalize and talk about the set of all the substances possessing similar tropes. So, to sum up, tropes are in-between substances and universal properties, for they are particular things as substances, but they also have a degree of generality as universal properties.

Now, given their in-between nature, it is hard to find a place for tropes within the syntactic structure of standard first-order predicate logic. If we interpret tropes as particulars, we would symbolize them through individual constants; if we interpret them as universals, we would symbolize them through predicates. However, either way, we end up facing an unwelcome result: some sentences of standard predicate logic would end up being irremediably ambiguous. This, in turn, means that these sentences are unable to clearly communicate the description of reality proposed by the *OR*-theory under examination.

Let us suppose that tropes have to be symbolized by individual constants. So, we accept that individual constants can represent both substances and tropes. Now, let us focus on a simple atomic sentence of standard predicate logic. In particular, let us focus on an atomic sentence already encountered, which describes the presence of a red ball:

(1) Rb

Now, we already know that this sentence can express the fact that there is a universal property that is exemplified by a substance. So, the sentence perspicuously represents the fact

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56 For basic accounts of tropes see WILLIAMS 1953 and CAMPBELL 1997.

that two categories of being are related through a formal ideological relation.[57] Namely, (1) tells us that *R* is exemplified by *b*. However, we are now testing standard predicate logic with the assumption that individual constants can represent both substances and tropes. This generates an ambiguity: is (1) telling us that *R* is *exemplified* by *b* or is it telling us that *R* is *instantiated* by *b*? Namely, is (1) depicting the presence of a universal and a substance that are related by the exemplification relation, or is it depicting the presence of a universal and a trope related by the instantiation relation? The big trouble is that there is no way to distinguish these two different descriptions of reality. Hence, (1) is ambiguous.

If we now consider the case in which tropes are represented by predicates, we obtain the same result: (1) is ambiguous. Indeed, when we face it we have two different ways to interpret it: is (1) describing a universal property exemplified by a substance, or is it describing a trope that inherits a substance? Again, we have no way to distinguish these two interpretations of the sentence and understand which description of reality is the one advanced by the sentence.

To stress the point, consider how much the expression of the *OR*-theory under examination would be improved if it was possible to avoid the above ambiguities. One way in which this result can be obtained is by dedicating a set of individual constants for tropes and one for substances, the former in greek letters (α, β, γ…) and the latter in latin ones (*a*, *b*, *c*…).[58] So, following this strategy, we decide to use individual constants to represent both tropes and substances. However, unlike the case of standard predicate logic, we differentiate two kinds of individual constants.[59] In this way, we obtain the syntactic resources needed to dissolve the ambiguity encapsulated in (9). To do this, let us use 'β' to refer to the tropes of the particular redness of the ball. Then, from (9) we obtain the following two claims

(2) $R\beta$

(3) βb[60]

Now, (2) and (3) would easily describe two different descriptions of reality. (2) describes the fact that a universal property (*R*) is instantiated by a trope (β); (3) describes the fact that a trope (β) inherits a substance (*b*). So, by differentiating different sets of constants we have

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[57] I am here assuming that we are able to understand the ideological relation holding between *R* and *b* even if there is no syntactic element that explicitly represents this relation. I will deal with this point in §3.3, while, for now, my focus is simply on the numbers of category of being involved in the description of reality.

[58] This idea has been also advanced in SMITH 2005 and LOWE 2013.

[59] This strategy would require also to set a different semantics for atomic sentences of the form 'βb' and '$R\beta$'. Namely, it would require to regiment in a semantic model sentences that relates universals and substances with tropes. However, this technical point sounds like a hard philosophical challenge and goes beyond the point I am establishing here.

[60] The way in which I am writing these claims is purely illustrative. Namely, I am choosing to concatenate the syntactic elements of these sentences in a merely convenient form. I could have written them swapping the elements, like this: '$b\beta$' and 'βR'. The point to keep in mind is simply that having more set of constants is a viable strategy to dissolve the ambiguity of (9).

(at least on the syntactic level of the language) a way to dissolve the ambiguities generated by standard predicate logic when it comes to expressing the tester *OR*-theory. But, unfortunately, this is not a feature of the formal apparatus of standard predicate logic.

To conclude, if you believe that the presence of ambiguities in a formal language is problematic, then you should accept that standard predicate logic is inadequate for the expression of the *OR*-theories assumed at the beginning of the section. It follows that standard predicate logic cannot be the formal language of the entire *OR*-paradigm. Indeed, the fact that is not adequate for the expression of every *OR*-theory would push us to commit a methodological mistake. The mistake is that we would end up discarding possibly true theories because they are not expressible. So, we would end up contravening the regulative aim of the paradigm of finding a true description of reality as it is independently of the language deployed to express the description. However, if standard predicate logic were the only language of the paradigm, we would be missing a possibly true *OR*-theory *because* of the fact that the language is not able to express it. Hence, the language is somehow limiting and directing our research of reality, and this is contrary to the result we are aiming to.

Instead, if you do not believe, or you are not convinced, that the presence of ambiguities is problematic, there is still room for you to resist my argument. This is why, in the next subsection, I want to show how ambiguities can spread within the logic of the language, making it impossible for us to understand the logical relations holding among sentences. If I am right, this must convince you that ambiguities are problematic.

§3 *Inferential Issues*

Let me now show why an ambiguous language can be so problematic when it comes to expressing the content of *OR*-theories. In a nutshell, my point is that ambiguous sentences do not allow us to understand the *logic* of the language of ontology (or "ontological reasoning"), i.e. the formal relations holding between sentences of a language that describes reality. In particular, my point is to show that the presence of ambiguous sentences makes it impossible to evaluate the validity of some inferences. I call these inferences '*ontological inferences*', and I intend them as a subset of valid inferences, i.e. valid inferences about the existence of entities and the way they are related. My first step will be explaining their importance so that it can be understood why a language hiding these inferences is inadequate.

The fact that the production of ambiguous sentences prevents us from evaluating the validity of ontological inferences is particularly problematic, for two reasons. First, from a linguistic point of view, formal languages like standard predicate logic are praised for their ability to highlight formal features held between sentences. Among these features, logical validity is essential. So, if a formal language fails to make us understand logical validity, then it is not a good language for our theoretical purpose. From an ontological point of view, such an adequate language would impede the possibility of outlining logically valid reasoning about reality. Namely, it would obscure the formal relations holding among sentences. Second, if we assume that there is a correspondence between the formal features

of the language and the formal features of reality, then the fact that standard predicate logic is not able to represent the formal features that an *OR*-theory recognizes as real means that the language cannot fully express the description of reality elaborated by the theory.

§3.1 *Ideology and Ontological Dependence*

Let me start by showing a bit more about the ideology of *OR*-theories. So far, I have focused a lot on the interaction between formal languages and the categorization of *OR*-theories. However, ideology interacts with formal languages too, and so the expressive power of a language should be evaluated also on the basis of how it interacts with ideologies. Ideology can be characterized as the set of formal relations that an *OR*-theory uses to describe the ways in which different beings are related. I have already mentioned (in §2) that a famous example of an ideological relation is ontological dependence. We also encountered other ideological relations, like instantiation, inheritance and exemplification. In this section, I would like to focus on ontological dependence. So, let me say a bit more about it.

Ontological (or existential) dependence, is a formal relation that *OR*-theories can use to outline the way in which different entities are existentially related. This relation holds between entities when the existence of one them depends on the existence of another. For example, consider the case of a yellow cube and its reflection through a mirror. The reflection of the cube exists *because* it exists the cube. More precisely, the reflection of the cube *cannot exist* if the cube does not exist.[61] This means that the reflection of the cube ontologically depends on the cube, i.e. the cube and its reflection are related by the formal relation of ontological dependence. As this example shows, ontological dependence is an *asymmetric* relation.[62] Indeed, the existence of a reflection of the cube depends on the existence of the cube, but the existence of the cube does not depend on the existence of its reflection.

This ideological relation is particularly useful, for it is somehow connected to other ideological relations. Recall Campbell's theory of tropes. According to Campbell, any existing thing that is not a trope is a collection of co-located tropes. So, Campbell's *OR*-theory revolves around the ideological relation of *co-location*. However, this ideological relation is related to ontological dependence. Indeed, anytime a collection of tropes exist, the existence of this collection depends on the existence of tropes. Without tropes there is no collection of co-located tropes. Another example comes from Lowe's *OR*-theory. Indeed, according to Lowe, anytime a trope inherits a substance, the existence of the trope depends on the existence of the substance. This is due to the fact that the identity of the trope is essentially connected to the identity of the substance. For example, the particular redness of a

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[61] To be extremely precise, a reflection is *doubly* dependent, for its existence does not depend only on there being a cube, but also on there being a reflective surface, like a mirror. Given that I am using this case only as an illustrative example, I set aside the problem of double ontological dependence.

[62] I set aside if there are cases of mutual ontological dependence and if these amount to cases of symmetric ontological dependence.

ball exists insofar as the ball exists. Indeed, if the ball does not exist, the redness *of that* ball cannot exist.

Given this, let us consider how ontological dependence works in the *OR*-theory under examination. But let me be clear about one thing: I am relying on a particular *OR*-theory simply for explanatory purposes. Indeed, the result I want to establish can be generalized to every *OR*-theory that endorses the ideological relations of ontological dependence or that allows the possibility of analyzing this relation through another ideological relation (as in the case of Campbell's *OR*-theory shown above).

The *OR*-theory I am deploying to test the expressive power of predicate logic is characterized by three categories of being (substances, tropes and universal properties) and four ideological relations (inheritance, exemplification, instantiation and ontological dependence). According to this theory, substances exemplifies universal properties, tropes inherit substances and are instances of universal properties. As already mentioned, this is a Lowe-style *OR*-theory, and now this becomes particularly important, for Lowe clearly outlines relationships of ontological dependence between entities of different categories that determines an existential hierarchy. According to this hierarchy, substances are the most basic kind of entities, so they do not existentially depend on anything. Tropes, instead, existentially depend on substances. Universals, in turn, existentially depend on tropes.[63]

To see how this hierarchy works, consider again the yellow cube. According to the Lowe-style *OR*-theory that we endorsed, there is a cube (the substance), there is the particular yellowness of the cube (the trope) and the universal property of yellowness that the cube share with other substances. As regards the ontological relations holding among this theory, the cube, which is the substance, is the most basic entity, and its particular yellowness depends on the existence of the cube, while the universal property of yellowness depends on the existence of the particular yellowness of the cube.

Now that the relation of ontological dependence has been outlined, let us consider the way in which this should be related to a formal language. In particular, I would like to consider the way in which it is related to the logical features of a formal language. More precisely, I would like to show that there is a relation between ontological dependence and the presence of some inferences that formal languages expressing *OR*-theories must be able to clearly represent.

My crucial point is this: a formal language apt for the expression of *OR*-theories must allow the evaluation of ontological valid inferences; otherwise, the language is imposing expressive limitations on the *OR*-paradigm. Ontological valid inferences are inferences that show what an *OR*-theory takes to be true of reality on the basis of formal features alone. So, as in the case of purely logical valid inferences, these inferences are valid on a purely formal ground.

Ontological inferences show the formal features of reality. Valid ontological inferences show necessarily features of reality. This is due to the fact that ideological relations are necessitation relations - if they hold, they hold necessarily and without no possible exception. This is why logical validity seems to be a perfect notion to capture the necessita-

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63 See again LOWE 1989, 2013.

tion aspect of formal features of reality. Indeed, logical validity is a necessitation formal relation among sentences. In this way, we can *mirror* necessitation formal relations among things in the world through a necessitation relation holding among sentences. Sentences of *OR*-theories related throng validity in a validity inference are sentences composing a valid ontological inference.[64]

However, these inferences are only a subset of purely logical ones, for they are inferences that focus only on sentences that disclose the ontological structure of reality. This means that ontological valid inferences tell us what valid forms of reasoning are allowed by different *OR*-theories. These forms of reasoning are peculiar to ontology because they depend on the formal features that *OR*-theories assign to reality. Let me explain this through some examples and then show how standard predicate logic does not allow a clear evaluation of ontologically valid inferences. I will then explain how this depends on the point established in §4.1, i.e. the fact that standard predicate logic is inadequate for the expression of some *OR*-theories. In the end, I will show why this is problematic for the *OR*-paradigm.

§3.2 *Valid Inferences*

As usual, let us assume standard predicate logic as an adequate language for the expression of every *OR*-theory. Now, let me consider an example of a logically valid inference of this language. The most notable example of valid inference is a *modus ponens* inference, which has the following form:

$$\begin{array}{l} A \rightarrow B \\ A \\ \hline B \end{array}$$

To read this inference let me clarify two terminological points. First, we call 'A → B' and 'A', i.e. the sentences above the horizontal line, the *premises* of the inference, while 'B', i.e. the sentence below the line, is called the *conclusion* of the inference. Second, the letters 'A' and 'B' in this inference are *meta-variables*, i.e. variables that we use to generalize to any sentence whatsoever that the language can produce. So, according to standard predicate logic, if the premises of this inference are true, it cannot be the case that the conclusion is false. This is true for any sentence that the language can produce and that can be replaced with the meta-variables 'A' and 'B'. This fact tells us that the inference is logically valid. What is important to understand is that the validity of the inference is a matter of pure formal fea-

[64] I am here deploying the concept of *mirroring* in an intuitive way. However, this point can be further developed by following Wittgenstein and Russell's elaboration of it (WITTGENSTEIN 1921). A contemporary attempt to do this can be found in TURNER 2016. However, developing this point more in-depth goes far beyond the scope of this thesis.

tures of the language. Indeed, the inference does not care about the content of sentences that we put in place of 'A' and 'B'. Every substitution will give a logically valid inference.

Let us now move considering an example of what I take to be an ontologically valid inference. To do this, we need a *OR*-theory that endorses an ideology, i.e. a set of formal relations that holds between entities. According to our tester *OR*-theory, there is at least one ideological relation in reality, i.e. the relation of ontological dependence. This is relation is understood in such a way that if a trope exists, then it must exist a substance. Indeed, tropes ontologically depend on substances. So, if there is the particular yellowness of a cube, there must exist the cube. This gives the intuitive idea of an ontologically valid inference, which we can write in an informal language in the following way:

A trope exists

A substance (to which the trope inheres) exists

As in the case of logically valid inferences, this inference is valid for formal reasons. Indeed, no matter *which* trope exists, *if* a trope exists, it must be the case that a substance exists. So, if the premise 'A trope exists' is true, it cannot be the case that 'A substance (to which the trope inheres) exists' is false. Indeed, a trope cannot exist if a substance does not exist, for tropes ontologically depend on substances.

As in the case of logically valid inferences, every particular instance of this form of inference must give a case of ontologically valid inference. So, for example, let us specify the existence of a particular trope, like the existence of the yellowness of a particular cube. If the particular yellowness of a cube exists, then, according to our *OR*-theory, it follows that the cube exists. Namely, the following inference should be valid:

The yellowness of a cube exists

A cube (to which the yellowness inheres) exists

Again, this particular inference is valid in virtue of the formal features of reality, i.e. those features that an *OR*-theory describes through its ideology. Since the yellowness of a cube is a trope, and the cube is a substance, and the theory describes reality in such a way that the existence of a trope depends on the existence of a substance, it follows that the existence of the trope implies the existence of the substance.

Once this is accepted, however, we face a problem with standard predicate logic. To see this problem, recall that, as showed in the previous section, standard predicate logic is not adequate for the expression of our *OR*-theory. Indeed, through this language, we end up producing ambiguous sentences. The presence of ambiguous sentences is now highly problematic, for it impedes an adequate formalization of the above inference (which was written in English, i.e. a natural language). So, let us try to formalize the sentences of the above inference to see the results of this attempt. To do this, let us assume that we can represent tropes in the language through individual constants.

At this point, we face problems raised by the syntactic structure of standard first-order predicate logic. First problem: we cannot unambiguously formalize the premise of the inference, i.e. 'The yellowness of a cube exists'. Second problem, which is a direct consequence of the first one: we do not have the expressive power required to capture the inheritance relation contained in the conclusion of the inference. Namely, we do not have a syntactic structure able to formalize the idea that a trope inherits a cube. The overall result is the general problem I am outlining here: since there is no way to unambiguously and clearly formalize the above sentences, we are not able to evaluate the inference on purely formal grounds. Therefore, the formal features of sentences of the language do not mirror the formal features of reality. Let me illustrate this.

As regards the first problem, consider how we can formalize the sentence 'The yellowness of the cube exists'. This is an existential claim about a particular trope. First, according to standard predicate logic, we express existence through quantification and the identity sign. Second, since we assumed that tropes are represented in the language through individual constants, let us represent the trope through the individual constant '*a*'. It follows that we formalize the sentence 'The yellowness of a cube exists' in the following way:

(4) $\exists x\,(x = a)$

This is the best we can do, i.e. is the most accurate expression of *a*'s existence that we can offer through standard predicate logic. We now face the problem raised in the previous section: what's (12) about? Since we deploy individual constants both for substances and tropes, we do not get from the formal shape of the sentence if it is about a trope or about a substance. This problem is by itself sufficient to conclude that we are not in a position to evaluate the inference. Indeed, if we cannot distinguish if we are talking about a trope or a substance, we cannot understand what a valid inference would look like. Indeed, the existence of a trope and the existence of a substance have two different implications according to our *OR*-theory. If a trope exists it follows that a substance exists, but if a substance exists nothing follows, for we understand substances as ontologically independent.

Following the same process, we can formalize the conclusion of the inference in the following way:

(5) $\exists x\,(x = b)$

Where '*b*' stands for the substance to which the trope *a* inheres. Now, as before, we face a problem of ambiguity: what is the formal feature of the language showing that *b* is a substance and not a trope? We lack this expressive resource. Moreover, if we put together (4) and (5) in the inference, we obtain

$\exists x\,(x = a)$

$\exists x\,(x = b)$

We know that the inference, when phrased in English, is valid, for we know the description of reality pushed forward by our *OR*-theory. However, the language is unable to show the validity of the inference because of the ambiguity of the sentences composing it. If '*a*' and '*b*' are referring to substances, the inference is invalid, for substances are existentially independent. If '*b*' refers to a trope, the inference is invalid again, for from the existence of a trope there is no formal feature of reality allowing us to conclude that another trope exists. But this means that the inference being valid or invalid depends on the content of the sentences, while we are looking for formal validity, i.e. validity in virtue of formal features alone. Conclusion: the formal features of reality are not displayed through the formal features of the language.

§3.3 *A Remark on the Above Problems*

In §3.1, I have shown that a good way out from the problem of ambiguity is to distinguish different sets of variables for things belonging to different categories. For example, we can avoid the ambiguities affecting (4) and (5) by producing sentences like this

(4)* $\exists x\,(x = \alpha)$

(5)* $\exists x\,(x = b)$

Where 'α' stands for a trope α and '*b*' for a substance *b*. Let us now ask: if we implement the syntactic structure of standard predicate logic by distinguishing different sets of individual constants to avoid the ambiguity of (4) of (5), are we able to evaluate the ontological inference under examination? Namely, is it sufficient to simply adopt a different syntax to solve the problem? The answer is negative.

Once (4)* and (5)* are put in place of (4) and (5), our ontological inference assumes the following form

$$\frac{\exists x\,(x = \alpha)}{\exists x\,(x = b)}$$

Namely, from the existence of a trope α we conclude the existence of a substance *b*. This formalization, however, does not still capture the idea disclosed by the original inference. Indeed, according to the *OR*-theory we endorsed, from the existence of a trope α we can infer that there exists a substance to which the trope inheres. This would be a valid ontological inference. However, in the inference just formalized, we do not know if *b* is such a substance. So, again, the inference is valid only if we know the content of *b*, i.e. only if we know that *b* is the substance to which α inheres. Hence, to be able to evaluate the inference on purely formal grounds, we need to explicitly state that α inheres *b*. This means that the

syntactic structure of the language should allow us to produce well-formed sentences that express the formal relation between α and *b*.

How would we state that α inheres *b* through the syntax of standard predicate logic? We cannot produce a *predicational* sentence. Indeed, α is not a predicate, and so we cannot produce an atomic sentence of the form '*Fb*', where '*F*' is a predicate applied to *b*. Rather, α is an individual constant, and the syntax of standard predicate logic does not allow the production of well-formed sentences obtained through a concatenation of names. Namely, standard predicate logic does not allow the production of a sentence of the form

(6) αb

which would express that a trope α inheres to a substance *b*. However, in order to understand the inference under examination, this sentence is needed. Hence, we need to implement the syntax both by differentiating two sets of individual constants *and* allowing the production of claims that describe how entities of different categories are related to each other.

One way standard predicate logic could obviate the problem is by introducing a predicate for the inherence relation. In this way, we could produce the sentence

(7) $I(\alpha, b)$

where '*I*' stands for the inherence relation holding between α and *b*. But this solution is problematic in a twofold way.

If we use '*I*' to represent, it stands for some real entity *I* recognized by the *OR*-theory. This exposes the *OR*-theory to face a problematic regress. Indeed, if *I* is a real entity, it falls under a category of being. Under the assumption that representational elements of language can only represent things belonging to this or that category of being, then the problem of letting '*I*' represent is that we now need an ideological relation that explains how *I*, α and *b* are related to each other. Suppose that they are related through an ideological relation that is expressed through the relational predicate '*M*'. We can thus claim that

(8) $M(I, \alpha, b)$

Once this is accepted, we ignite a regress. Indeed, by parity of reasoning, '*M*', like '*I*', is representational. Thus it stands for a real entity. If so, we need an ideological relation explaining how *M*, *I*, α and *b*. Suppose this ideological relation is represented by the relational predicate '*T*'. Then we should be able to claim

(9) $T(M, I, \alpha, b)$

Hence, we find ourselves in the same situation as before: we need a relational predicate to express the ideological relation. But if we take the relational predicate to be representational, we will produce another sentence that asks for an ideological relation that can explain

how things are represented by the sentence. Through this route, we enter into a regress of ideological relations needed to explain how represented entities are related to each other, *ad libitum*.

Notice, the problem just raised may resemble the case of the so-called *Bradley regress*, where we face problem related to a regress of instantiation-type relations that is ignited by relational predicates.[65] However, in Bradley's problem we end up positing a *hierarchy* of instantiation-type relations. Namely, Bradley's original problem wants to show that by moving from (7) to (9) we progressively admit the presence of higher-order relations that can describe how lower-order entities are related to each other. So, for example, when we introduce '*M*' to describe how *I,* α, *b* are related to each other, we end up committing to '*M*' being a predicate of higher-order if compared to '*I*', which was meant to describe in which way α and *b* are related. While '*I*' would be interpreted as a first-order relational predicate, i.e. a predicate for individuals, '*M*' would be interpreted as a second-order relational predicate, for it is predicated also of first-order predicate. In the same way, when considering (9), '*T*' would be introduced as a third-order predicate, for it is would relational predicate applied to a first-order and second-order predicate.

The same does not happen with the regress here under examination. An *OR*-theory endorsing standard predicate logic is not committed to a hierarchy of ideological relations when introducing predicates for these relations. Namely, the problem just presented does not imply neither that '*M*' is a predicate of a higher-order than '*I*' nor that *M* is a more general ideological relation than *I*.

The problem under examination is, rather, that once '*I*' is introduced as representational, we commit the *OR*-theory to introduce a real entity *I*. Under the assumption that representational elements of language can only represent things belonging to this or that category of being, and under the assumption that real entities are related to an ideological relation, it follows that there must be an ideological relation that describes how *I*, α and *b* are related to each other. Therefore, following the strategy of introducing predicates for ideological relations, it follows that we should now introduce the predicate '*M*' to describe this relation. It follows that we now commit the *OR*-theory to there being a real entity *M*, which in turns belong to a category of being, and so on.

As you may notice, there is no need to intend '*M*' as an higher-order predicate, for it is simply a descriptive tool as '*I*', 'α' and '*b*', and it represent a real entity *I*. In the same way, there is no need to intend *M* as a more general relational entity than *I*, for it is simply an entity as *I*, α and *b*. If there is an hierarchy is a matter of the description offered by the *OR*-theory, but nothing implied by language. What language is pushing us to do, under some assumptions about its deployment, is to commit to the reality of further entities. However, it is not pushing us towards a hierarchy of different types of predicates or a hierarchy of entities. In this sense the problem just raised is different from Bradley regress, despite it highlights a similar problem.

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[65] The first formulation is due to Raymond Bradley (BRADLEY 1893). See further RUSSELL 1910 and, for a contemporary reading of the problem, MAURIN 2010.

Consider further that the *OR*-theory under examination does not allow the understanding of an ideological relation like *M*. Namely, the theory does not endorse an ideological relation that is able to explain how *I*, α and *b* are related to each other. represents anything, this should be by some ideological relations to both a trope α and a substance *b*. The same can be said about *T*. So, by introducing *M* in the attempt to save the representational nature of predicates for ideological relations, we would outbound the description of reality that we can offer with our theory. Therefore, this option cannot be pursued by someone endorsing our *OR*-theory and the formal apparatus of standard predicate logic.

So, the idea of introducing a relational predicate to express the inherence relation between α and *b* is problematic. It follows that it is not an adequate strategy to save standard predicate logic from the charge of imposing expressive limitations on the *OR*-theory under examination. First, there is a problem of unambiguously expressing the existence of tropes and substances. Second, even if we adopt a *prima facie* viable strategy for the language - i.e. implementing it with different sets of individual constants - we are still in trouble. Indeed, the language lacks the expressive resources necessary to express the inherence of a particular trope to a particular substance. Conclusion: standard predicate logic is inadequate to capture the formal relations of reality proposed by the *OR*-theory under examination. This is due to the fact that the formal apparatus we are deploying to express our description of reality is not adequate to mirror the formal relations of reality.

Before moving on, let me just stress the point of how formal relations of the language should mirror formal relations of reality. So far, I have shown that standard predicate logic is unable to fulfill the requirements for mirroring. What would be a good way to meet this requirement? First, we need to avoid ambiguities, So, we formalize the existence of α in this way:

(10) $\exists x\,(x = \alpha)$

Second, we need to express the idea that a trope inheres a substance *b*. We can do this by the following sentence:

(11) αb

From (17) we can apply the rule of existential generalization and obtain

(12) $\exists y\,(\alpha y)$

Which can be translated as 'A substance to which the trope α inhere exists'. This is the sentence we were looking for in the attempt of formalizing the ontological inference under examination through the formal language of standard predicate logic. A sentence that is, however, non-well formed in standard predicate logic. But if we have a language capable of expressing it, we could formalize our ontological inference in this way

$\exists x\,(x = \alpha)$

$\exists y\ (\alpha y)$

This is what the inference should look like when expressed through an adequate formal language.

The development of languages apt to clearly express *OR*-theories requires time and more philosophical effort than the one displayed in this chapter. However, my point was to motivate that this has to be done if we want to allow a clear and complete expression of descriptions of reality offered by *OR*-theories. The proposal just sketched, i.e. the idea of deploying sets of constants and letting the form of sentences mirror the ideological relations of reality, is just an initial proposal. Still, it is a proposal that does not push the *OR*-paradigm against its regulative aim, as standard predicate logic does when it is endorsed as the unique language for the entire paradigm.

Summing up, standard predicate logic is unable to express the description of reality advanced by an *OR*-theory that accepts three categories of being (substances, tropes and universal properties) and four ideological relations (inheritance, exemplification, instantiation and ontological dependence). This means that standard predicate logic is not apt for the expression of every *OR*-theory. So, if this language is endorsed as the only language of the entire *OR*-paradigm, we end up imposing expressive limitations on the paradigm. Indeed, we would deny the possibility of a clear expression of some theories, as the one under examination, and, in turn, negatively evaluate the theory as inexpressible. This would amount to evaluating a theory on a linguistic basis, to the effect that the regulative aim of the paradigm is contravened.

If we think that it is acceptable to discharge *OR*-theories on the basis of their inexpressibility, we would be using a formal language as the guide for the evaluation of possibly true *OR*-theory. But, if so, we are letting the language be the criterion for the evaluation of possibly true *OR*-theories. This is methodologically bad for the *OR*-paradigm, for it is driven by the regulative aim of finding the best description of reality as it is independently of the language. Thus the paradigm would be limiting its theoretical activity on the basis of some prior and unjustified assumptions about the language to be deployed.

§4 *Axioms for OR-theories*

So far, I have showed that when a unique language like standard predicate logic is endorsed as the unique language for *OR*, it imposes expressive limitations on *OR*-theories. I showed this with a particular example of a specific *OR*-theory, but given that formal languages are not ontologically neutral, the lesson can be generalized to every *OR*-theory. This fact motivates the idea that *OR* should let every *OR*-theory within the paradigm express its description of reality through its peculiar language. Call this idea *linguistic pluralism*. This sets a point on the philosophical agenda, i.e. developing these languages for available *OR*-theories - and keep developing them with new *OR*-theories.

In this section, I would like to expose a benefit of linguistic pluralism: the articulation of *ontological systems*. In a nutshell, the idea of ontological systems is that every *OR*-theory can elaborate its own axioms, thanks to which the theory displays the formal features of reality. These features are necessary features of reality, i.e. structural and immutable features. It follows that the language should capture these features through axioms. These axioms are crucial to showing which ontological valid inferences are allowed by this or that *OR*-theory. As shown, a clear and unambiguous development of ontological inferences demands syntactic and semantic perspicuity. So, let me show how axioms could be developed assuming that we possess such syntactic and semantic clarity.

To show this point, I am going to take three different *OR*-theories and offer a way to formalize the formal features they assign to reality. Thus, axioms show us the interplay between categorization and ideology in *OR*-theories. Hence, by axiomatizing *OR*-theories we have a clear view of how a theory is structured, and, in turn, we gain a clear vision of how the structure of reality is described by the theory. Let me start with some preliminary clarifications, then I will offer the axiomatization for three theories, and, in the end, I will discuss some crucial upshots of these axioms. In particular, I will explain how different *OR*-theories with different axioms can disagree about their principles and still be part of the *OR* paradigm.

The three theories I am going to take into account are, again, the *OR*-theories elaborated by Heil, Campbell and Lowe (I will use again a Lowe-style theory rather than his full-fledged theory). From now on I will refer to them with a name that matches the initial of their creator: '*H*', '*C*' and '*L*'. These theories share the fact that they all accept the existence of tropes. However, they are very different. First, they do not share the same categorization: *C* exclusively accepts the existence of tropes; *H* accepts also the existence of substances; *L* further endorses the existence of universals. It follows that they do not share the same ideology: *C* revolves around the ideological relation of *co-location* (or *compresence*); *H* is built around the ideological relation of *ontological interdependence*; as already explained, *L* deploys *ontological dependence*.

Let us begin by noticing that axiomatizing *OR*-theories requires developing an appropriate formal apparatus. The formal tools we need are those that allow, on the one hand, to capture generality, and, on the other hand, to express the belonging of entities to this or that category. The first need can be covered by deploying quantification. Indeed, quantification has a double benefit: it incorporates generality and it is also useful to express existence. In particular, I am thinking about *existential* - or *particular* - quantification. In this context, it seems an adequate tool. Indeed, axioms for *OR*-theories are not only general but also axioms for theories describing reality through the lens of existential concepts.

As regards categorical membership, instead, I propose to use predication so to obtain what Lowe calls *categorical predication*, i.e. sentences that tell us about something belonging to this or that category of being (LOWE 2013). To do this, let us outline three categorical predicates for the theories under examination: a predicate '*T*' for *being a trope*, a predicate '*S*' for being a substance and a predicate '*U*' for *being a universal*. With these predicates we can produce sentences of the following form:

$$\exists x\,(Sx)$$

Through this sentence, we claim that there is (or there exists) an x (i.e. an entity) that is a substance (i.e. that belongs to the category of substance). A particular instance of this sentence could be

$$Sa$$

Where *a* is a specific substance.

Categorical predication would require more to be specified. Indeed, if '*Sa*' was a descriptive claim, *S* would be representing something real, i.e. something that exists as other entities do. However this is not the case: categories are formal tools and not worldly entities. If '*Sa*' is true, then *a* is *S*, i.e. *a* is a real thing and it is a substance. What is crucial is to find a formal way to deploy predication without producing a descriptive claim about reality. Solving this problem is not easy, for it demands a way to deploy a descriptive language in a non-descriptive way.[66] Let me consider two strategies.

One strategy could be adopting a basic linguistic device from set theory, i.e. the predicate of *belonging to*: '∈'. Thanks to this predicate we could define categorical predicates as a shorthand for claims of the form

$$a \in S$$

A claim like this specifies that *a* belongs to the class of substances, so that '*S*' is a name for a class, i.e. an abstract object. So, in a sense '*S*' is representational, for it stands for a class. However, the overall claim expressed through '∈' does not represent reality, but it explains something about the formal tools deployed to describe reality, i.e. it explains that a particular thing (*a*) belongs to a category of being (*S*). trough an *OR*-theory that takes *a* to belong to the class of substances.

If we accept this idea, then the claim '*Sa*' is *analyzed* through the claim '$a \in S$', which is not a descriptive claim. At the same time, '*Sa*' is *equivalent* to the claim

$$\exists x\,(x = a)$$

Namely, it is equivalent to a claim expressing the existence of *a*. This sentence displays the fact that *a* is a substance by deploying an individual constant that represents substances alone. Indeed, tropes would be represented by greek letters (α, β, γ…), and predicates through capital latin letters (*A*, *B*, *C*…).

A second strategy could be endorsing *quantifier variance*, i.e. the idea that there are different quantifiers for different categories of being (McDaniel 2009). In this way, we

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[66] Lowe also introduces a special term '*e*', conceived of as an empty name that stands for any entity whatsoever. I do not see any reason for adding this further element in this context, and, actually, having an empty name that works as a special free variable complicates things above and beyond. In particular because I am here deploying quantification and bounded variables. Anyways, as regards Lowe's strategy see Lowe 2013.

could omit categorical predicates and let the sentence display which category of being is deployed in the sentence through its specific quantifier. For example, we differentiate existential quantification for substances, tropes and universals:

(*S*) $\exists^{S}x\,(x = y)$
(*T*) $\exists^{T}x\,(x = y)$
(*U*) $\exists^{U}x\,(x = y)$[67]

The result is that (*S*) says that there exists a substance, while (*T*) says that there exists a trope, and (*U*) says that there exists a universal property. In both sentences, the quantifiers are restricted respectively to the class of substances (*S*) and to the class of tropes (*T*). This means that there is no element of *S* that can satisfy claim (6), for the quantifier in (6) is restricted to the class *T*, and no element of *T* is an element of *S*.

Of these two options, in the present context, endorsing quantifier variance seems the most elegant one. Once we agree on the formal apparatus to be deployed, it is possible to outline the axioms for the *OR*-theories *C*, *H*, and *L*. Let us start from the simplest one, i.e. *C*.

§4.1 *System C*

Campbell's theory is a monist *OR*-theory, for it accepts a single category of being: tropes. In this theory, tropes are conceived of as regions of space-time. Everything that exists is made up of collections of tropes (CAMPBELL 1997). Collections of tropes possess a certain *unity*, and this unity is given by the formal relation of *co-location*. This is the only relation of the ideology of *C*. Given this, it follows that tropes are the basic ontological entities of reality and every other thing that exists is a collection of tropes. So, *C* can be axiomatized as follows:

*C*1. $\exists x\,(x = y) \rightarrow \exists^{T}x\,(x = y)$
*C*2. $\forall x \neg \exists^{T}y\,(x = y) \rightarrow \exists^{T}xx\,(xx = x)$

According to *C*1, if there exists anything whatsoever, then there exists something that is a trope. This captures the idea that everything is dependent upon the existence of tropes. *C*2 is more complicated, and it captures the idea that if there exists anything that is not a trope, then a collection of tropes exists. Let me explain more about these axioms.

*C*1 captures the idea that tropes are, according to *C*, the fundamental units of reality. Everything that exists is a trope or a collection of colocated tropes. So, if anything whatsoever exists, it necessarily follows that *at least* a trope exists. *C*1 captures this feature of

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[67] Notice: I am not deploying second-order quantification for universal properties. This is due the fact that - following LOWE 2013 and SMITH 2005 - I am using names for universals, instead of representing them through predicates.

reality by deploying both an unrestricted quantifier and an unrestricted one. Namely, the antecedent of the conditional

$$\exists x\,(x = y)$$

quantifies over anything whatsoever - both on tropes and collections. The union of the set of tropes and collection of tropes, according to *C*, exhaust everything that exists, for nothing is neither a trope nor a collection of tropes. So, when we quantify over anything whatsoever and it is the case that something whatsoever exists, it follows that

$$\exists^{T} x\,(x = y)$$

Indeed, if anything exists, at least a trope exists. This fact is captured in the consequent with the quantification restricted over tropes.

As regards *C*2, it captures the idea that everything that exists and it is not a trope it is a collection of tropes. To capture this idea, the antecedent combines both restricted and unrestricted quantification

$$\forall x \neg \exists^{T} y\,(x = y)$$

The antecedent deploys both universal unrestricted quantification and particular (or existential) restricted quantification. In this way, it can specify that we are quantifying over everything whatsoever that is *not* (identical to) a trope. Given that *C* takes everything that exits to be a trope or a collection of tropes, if something is not a trope, then it has to be a collection of tropes, and this is captured by the consequent.

The consequent of *C*2 establishes the identity of anything that is not a trope with a collection of tropes. It does this by combining unrestricted universal quantification (the universal quantifier in the antecedent) and plural quantification restricted on tropes, i.e. the existential quantifier in the consequent:

$$\exists^{T} xx\,(xx = x)$$

In this claim, '*x*' is the variable bound to the universal quantifier in the antecedent, and so it can be substituted only by anything that is not a trope. However, there is also a different type of variable, i.e. '*xx*', which is a variable for pluralities or collection of things, and this makes quantification a plural quantification, to the effect that to this variable we can substitute only collections of things. In particolar, given that quantification is restricted to tropes, we can substitute to it only collections of tropes. The overall result is that *C*2 claims that for anything that is not a trope, there is a collection of tropes that is identical to this thing.

There is an important specification to point out. I am here assuming that we can quantify with plural quantification only on collections of tropes that are made of *co-located* tropes. However, this is not the only collection of tropes of which we could be possibly speaking. There are collections of co-located tropes and collections of scattered tropes.

Imagine we want to claim that the paint on the wall of my room is a collection of tropes. According to *C*, this is a collection of co-located tropes. However, imagine further that we want to speak of a particular quality shared by many paints. For example, suppose we want to talk about a particular shade of green that is present in many different paintings. Following *C*, these shades of green are all distinct tropes, but we can refer to them as a collection of similar tropes. When we refer to this plurality of tropes we refer to a scattered collection, for it is a collection made of different tropes, and so they are all *non*-co-located tropes.

Now consider plural quantification restricted to collection of tropes, and consider the claim

$$\exists^{T}xx\,(xx = yy)$$

This claim expresses the existence of a collection of tropes. However, such a claim does not distinguish if we are quantifying over co-located collections of tropes or scattered collections of tropes. I do not want to enter into a resolution of this problem. However, the point just raised shows how much care should be paid to formal languages when expressing *OR*-theories. In this context, I am assuming that *C* does not express anything about scattered collection of tropes, and so plural quantification is deployed only to quantify over co-located collection of tropes.

This assumption has also a technical advantage. Indeed, the consequent of the axiom *C*2 sets an identity between a collection of tropes and a particular thing. Given that only collections of co-located tropes are identical to things that are not tropes, there is no need to specify that plural quantification ranges only over collections of colocated tropes. Scattered collections of tropes are not, according to *C*, things composed of tropes. So, it is not required to specify that values of '*xx*' are not scattered collections of tropes. Still, this technical advantage is in place when it comes to elaborate axioms; when it comes to producing a sentence like the above one, instead, we should feel the need of avoiding the ambiguity it raises.

§4.2 *System H*

Now consider theory *H*. Heil's ideology is shaped around a notion of *mutual dependence* between substances and tropes (HEIL 2012). Substances are conceived of as tropes bearers and tropes as ways substances are. So, the two categories of being are the one defined in terms of the other. This definitional interaction is mirrored in reality by the fact that tropes and substances exist only if elements of the other category exist. So, *H* should contain at least the following axioms:

Ha. $\exists^{T}x\,(x = y) \rightarrow \exists^{S}z\,(z = y)$
Hb. $\exists^{S}z\,(z = y) \rightarrow \exists^{T}x\,(x = y)$

*H*1 claims that the of existence substances is a necessary condition for the existence of tropes; *H*2 claims that the existence of tropes is a necessary condition for the existence of substances. It follows that they can we can capture the ideology of *H* with a single axiom:

*H*1 $\quad \exists^{T}x\,(x = y) \leftrightarrow \exists^{S}x\,(x = y)$

H follows from *Ha* and *Hb* through the definition of the bi-conditional, which is the conjunction of the two conditional displayed in *Ha* and *Hb*. It claims that the existence of tropes is a necessary and sufficient condition for the existence of substances, and vice-versa.

Thus, following *H*1, if at least a trope exists, then at least a substance exists, and if at least a substance exists, then at least a trope exists. This axiom is very general, for it allows us to express something about any trope and substance whatsoever. In particular, from the existence of any trope whatsoever, we can conclude that exists a substance whatsoever, and vice-versa. However, to capture the description of reality offered by *H*, we need two further axioms that better specify how substances and tropes are related in a less general way. Let me explain this point and develop two further axioms.

The mutual dependence of tropes and substances should tell us something more about existing entities. To get this point, suppose that a particular trope exists, and call it α. The existence of this trope has to depend on the existence of a particular substance - call it *s*. Thus it must be the case that if α exists, then *s* exists:

$$\exists^{T}x\,(x = \alpha) \rightarrow \exists^{S}z\,(z = s)$$

Moreover, given the mutual dependence of tropes and substances is specified by *H* in such a way that if the existence of *s* follows from the existence of α, then it is the case that

$$\alpha s$$

Namely, *s* is α. For example, if it exists the trope of the shade of green of the painting on my wall, then I can claim that the painting on my wall is green (or that it has a particular shade of green). The particular shade of green of the painting on my wall depends on the painting for its very identity, i.e. for its being exactly α, and not a distinct shade of green β (where $\alpha \neq \beta$). The same holds for the identity of the substance: the painting on my wall is exactly the substance *s* in virtue of having the particular shade of green α.

Thus, we need axioms to capture this more specific idea that from the existence of a particular substance we can conclude the existence of a particular trope that is specifically related to the painting, and vice-versa, i.e. that from the existence of a particular trope there is a substance that is specifically related to the trope. This can be done in the following way:

*H*2. $\quad \exists^{T}x\,(x = y) \rightarrow \exists^{S}z\,(xz)$
*H*3. $\quad \exists^{S}z\,(z = y) \rightarrow \exists^{T}x\,(xz)$

Hence, we capture the specific ways in which tropes and substances are related by adding the condition '$x\mathcal{Z}$'. With 'x' bounded to quantification restricted on tropes and '$\mathcal{Z}$' bounded to quantification restricted on substances, this condition can only be satisfied by a particular trope that stands in a specific relation with a substance.

The antecedent of both these axioms express the existence of, respectively, a trope and a substance:

$$\exists^{T}x\,(x = y)$$
$$\exists^{S}\mathcal{Z}\,(\mathcal{Z} = y)$$

While the consequent expresses the idea that, respectively, there exists a substance and a trope that are related to each other in a specific way:

$$\exists^{S}\mathcal{Z}\,(x\mathcal{Z})$$
$$\exists^{T}x\,(x\mathcal{Z})$$

So, for example, from the existence of the particular shade of green of the painting on my wall, i.e. α, it follows that there exists a substance that is related in a specific way to α:

$$\exists^{T}x\,(x = \alpha) \rightarrow \exists^{S}\mathcal{Z}\,(\alpha\mathcal{Z})$$

And from the existence of the painting on the wall, i.e. *s*, it follows that there exists a trope that is related to the painting in a specific way:

$$\exists^{S}\mathcal{Z}\,(\mathcal{Z} = s) \rightarrow \exists^{T}x\,(xs)$$

This shows two particular applications of *H*2 and *H*3.

§4.3 *System L*

Let us move to theory *L*, which accepts the existence of substances, tropes and universals. Lowe's ideology is characterized by a relation of ontological dependence, which determines an existential hierarchy between these different categories of being. According to this hierarchy, substances are the most basic kind of entities, so they do not existentially depend on anything. Tropes, instead, existentially depend on substances. Universals, in turn, existentially depend on tropes. So, we can outline the following three axioms for theory *L*:

*L*1. $\exists^{T}x\,(x = y) \rightarrow \exists^{U}\mathcal{Z}\,(\mathcal{Z} = y)$
*L*2. $\exists^{U}x\,(x = y) \rightarrow \exists^{S}\mathcal{Z}\,(\mathcal{Z} = y)$
*L*3. $\exists^{T}x\,(x = y) \rightarrow \exists^{S}\mathcal{Z}\,(\mathcal{Z} = y)$

These axioms mirror the ideology of *L* in the following way: the existence of substances is a necessary condition for the existence of tropes and universals; however, substances do not depend for their existence on anything, so there is no necessary condition for the existence of substances; also, the existence of tropes is a necessary condition for the existence of universals. Thus, substances are independent entities, tropes depend on substances and universals depend on tropes.

Let us consider this picture through an example. Consider how *L* would describe a black guitar. The guitar, i.e. the object, is a substance. It has a particular own color, i.e. the particular black of that very guitar, which is a trope. This particular color, however, is also a particular type of the more general color black, in virtue of which it is similar to other particular blacks of different objects. The general black is a universal property that is shared by different substances, each of which has its own particular shade of black. Following *L*1, *L*2 and *L*3, all these entities are related in a precise way. From the existence of the particular black of the guitar, we can infer the existence of both a substance, i.e. the guitar, and a universal property, i.e. the general color black. Moreover, the existence of a substance also follows from the existence of the universal property.

Following the description of reality proposed by *L*, it is clear that substances are the most fundamental entities. Indeed, the existence of both universals and tropes depends on the existence of substances, while the existence of substances depends neither on the existence of universals nor on the existence of tropes. This fact can be captured by the following axiom:

*L*4. $\exists x\,(x = y) \rightarrow \exists^{s} z\,(z = y)$

Namely, if it exists anything whatsoever, it follows that at least a substance exists. Notice that the antecedent deploys unrestricted quantification. This means that quantification ranges over anything whatsoever, without being restricted to this or that category of being. Now, suppose that the value of '*x*' is a substance. It trivially follows that there exists at least a substance, i.e. the value of '*x*', to the effect that $z = x$ (i.e. the two variables assume the same value). The same happens if we assign to '*x*' a universal or a trope as a value. Indeed, if we assign a universal as a value to '*x*', then a substance exists, for universals ontologically depend on substances. If we assign a trope as a value to '*x*', then a substance exits, for tropes ontologically depend on substances. So, if anything exists, at least a substance exists.

As in the case of *H*, the axioms just outlined are very general, i.e. they trace implications from the existence of things to the existence of other things without specifying any further relation. However, as discussed in §4, *L* deploys more ideological relations than ontological dependence. Recall: universals are *exemplified* by substances; tropes *inhere* substances and they are *instances* of the universal property. This requires specifying some further axioms that describe in less general terms how entities of different categories are related to each other. To do this, we need to specify how sentences can express the above relations.

First, let us recall how to specify different sets of constants: italic letters for substances (a, *b*, *c*, …), greek letters for tropes(α, β, γ…), and capital italic letters for universals

(*A, B, C*…). With three sets of constants, we can specify at least three different forms of sentences:

Fa
*F*α
α*a*

The first sentence claims that a universal property *F* is exemplified by *a*; the second one claims that a universal property *F* is instantiated by a trope α; and the third claims that a trope α inheres a substance *a*. To develop further and more specified axioms for *L*, we must allow the production of these forms of sentences and be able to produce them through variables, in the following way:

*L*5. $\exists^{T}x\,(x = y) \rightarrow \exists^{U}z\,(zx)$
*L*6. $\exists^{U}x\,(x = y) \rightarrow \exists^{S}z\,(xz)$
*L*7. $\exists^{T}x\,(x = y) \rightarrow \exists^{S}z\,(xz)$

*L*5 claims that if a trope exists, then a universal property exists and the trope is an instance of the universal. *L*6 claims that if a universal property exists, then a substance exists and the substance exemplifies the universal. *L*7 claims that if a trope exists, then a substance to which the trope inheres exists.

As you may notice, once variables are deployed to formalize claims of the above form (*Fa*, *F*α, α*a*), we cannot immediately perceive the forms of the sentence. Namely, if you look at 'zx' in *L*5 and 'xz' in *L*6 and *L*7, you cannot immediately understand the deep grammatical form of the sentence. However, the presence of restricted quantifiers that ranges over different categories of being gives us the essential contextual restrictions that determine the grammar of the sentence. So, for example, consider *L*5. Given that x is bounded to a quantifier for tropes and z is bounded to a quantifier for universals, it follows that 'zx' means that a universal is instantiated by a trope, for only universals can be assigned as values of 'z' and only tropes can be assigned as values of 'x'. So, 'zx' in *L*5 has the same form as the sentence '*F*α' in the above examples.

§6 *Conclusions*

In this last chapter, I analyzed how first-order predicate logic imposes expressive limitations on the expression of *OR*-theories. To do this, I focused on a precise study case, i.e. on how first-order predicate logic imposes expressive limitations on a Lowe-style *OR*-theory. The conclusion I reach is that there is at least an *OR*-theory that cannot be expressed through first-order predicate logic, and this is due to the fact that the language lacks the expressive resources needed to express the theory. This is why the language imposes expressive limitations on the theory. I then showed how this happens in two relevant respects.

First of all, I showed how first-order predicate logic is inadequate to express the *OR*-theory because it does not have enough syntactic resources. Indeed, the best we can do through this language is to produce ambiguous sentences. These ambiguities are due to to the fact that the language is unable to express the categorization endorsed by a Lowe-style *OR*-theory. Indeed, while the theory endorses three categories of being (i.e. substances, tropes and universal properties), the language distinguishes only two syntactic elements (i.e. names and predicates). This means that the language can at most represent a dualistic categorization of reality. Instead, when it comes to expressing a description shaped through three categories of being, the language pushes us towards ambiguous sentences.

I have then shown how the presence of ambiguous sentences does not allow the evaluation of ontological inferences. These inferences should be based on the ideology of *OR*-theories and they should display how the logic of a language mirrors the ideological relations endorsed by an *OR*-theory. The presence of ambiguities in expressing a description of reality, however, impedes the possibility of developing these inferences. This means that the language is not able to mirror the description of reality offered by the *OR*-theory. Hence, first-order predicate logic is not only unable to produce unambiguous sentences, but it is not even able to express the ideology of an *OR*-theory.

To enhance my point, I showed how the endorsement of languages that meet the expressive desiderata of the *OR*-paradigm allows a clear expression of *OR*-theories. Indeed, once the syntax and the grammar of a language are suited for the specific categorization of an *OR*-theory, we avoid the production of ambiguous sentences. When ambiguities do not obscure the expression of theories, it is possible to produce axioms for each *OR*-theories that clearly display the ideology and allow a clear understanding of ontological inferences. This proves how linguistic pluralism has to be preferred over the endorsement of a unique language for the entire *OR*-paradigm.

The overall conclusion of the above analysis is that *OR* ought not to endorse a language-first methodology. Indeed, the language-first methodology is incompatible with *OR*, for it pushes the paradigm against its own regulative aim of describing reality in itself, i.e. reality as it is independently of the language deployed to express the description.

To reach this conclusion, I firstly introduced a particular way of understanding *OR*, i.e. as a paradigm guided by its specific regulative aim that is populated by a plurality of *OR*-theories. The goal of the paradigm is to develop the best *OR*-theory, i.e. the theory that mostly satisfies the regulative aim of the paradigm. I then compared this metaontological view with the linguistic view of ontology, and this comparison has sown that the *OR*-paradigm needs to inquire about the methodological role that it has to assign to language(s).

In particular, I compared the metaontology of the *OR*-paradigm with Quine and Carnap's semanticist views. These comparisons made us notice how these semanticist metaontologies are different from the one proposed by *OR*. This is mainly due to the fact that *OR* does not understand *OR*-theories as part of or as determined by a language. This fact is crucial, and motivates the need of asking: can the *OR* paradigm endorse a language-first methodology? This question comes from the fact that this methodology is rooted in the semanticist spirit of the linguistic views taken into account.

I argued that the answer to the above question must be negative, for the language-first methodology is incompatible with *OR,* for it conflicts with its regulative aim. The core of this verdict is due to the fact that this methodology pushes the paradigm to develop the best *OR*-theory on the basis of the best, and so unique, language for the entire *OR*-paradigm. However, the best *OR*-theory should be the best description of reality as it is independently of the language it deploys to describe it.

The defender of the linguistic view who wants to endorse a language-first methodology within the *OR*-paradigm could advance an objection to this argument: if the best language for the *OR*-paradigm is conceived of as the best language for describing reality in itself, then we can still endorse the language-first methodology. However, I showed how this objection misfires, for languages are not ontologically neutral when used to describe reality. I then bolstered this point by showing how the endorsement of a particular language for the entire paradigm thrust expressive limitations on *OR*-theories (i.e. by analyzing the case of first-order predicate logic). Endorsing a unique language for the entire paradigm is indeed problematic for *OR*.

In conclusion, I defended the following three methodological points as crucial to the *OR*-paradigm. First, *OR* ought not to endorse the language-first methodology given their incompatibility. Second, *OR* ought to proceed the other way round and let each *OR*-theory to express its description of reality through its own best language. Indeed, in this way, the paradigm does not assign to the language the power of leading the development of OR-theories, and so, the identification of the best *OR*-theory. Third, if there is a best language of the entire *OR*-paradigm, it should be the language of the best *OR*-theory. Namely, it is the best *OR*-theory that determines which language is the best for describing reality in itself, and not vice-versa.

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Conclusion

In this thesis, I analyzed two philosophical problems that challenge our understanding of the different imports of metaphysics, logic and language in the project of describing reality. My goal was to shed light on the different roles played by these three aspects of our cognition of reality. In Part I, I dealt with Nathan Salmon's modal paradox, while in Part II, I dealt with ontological realism and formal languages. Let me offer a recapitulation of the conclusions reached by dealing with these problems.

As regards Part I, I offered an in-depth analysis of Salmon's modal paradox (Chapter 1) and argued in favor of a specific solution to it. I showed how the paradox is due to a problem of consistency when origin essentialism - together with the necessity of identity (and distinctness) - is understood in tolerant terms. I defended the idea that the crux of the paradox is exactly the tolerant understanding of origin essentialism. To show this point, I dealt with three major solutions to the paradox and argued that they are unsuccessful, for they do not solve alternative elaborations of the paradox (Chapters 2 and 3). This way of analyzing solutions to the paradox led to a clear view of how metaphysical and logico-linguistic ideas have different imports on the problem.

Through the development of my alternative version of Salmon's paradox, I showed how the modal system *S*4 is not responsible for the arising of the paradox, as Salmon originally thought. This means that the paradox is not rooted in our lack of understanding of the correct logic for metaphysical modality. Thus, the contradiction we face in Salmon's paradox and its alternative versions has to do with the metaphysical picture pushed forward when origin essentialism is embraced together with modal tolerance. This motivates the idea that the paradox can be solved by refining such a metaphysical picture, and this is what a Forbes-style solution and Leslie's solution try to do. The former is based on a replacement of transworld identity with counterparthood, while the latter proposes an alternative understanding of tolerant essentialism. However, I argued that these proposals both face some metaphysical difficulties. In particular, a Forbes-style proposal pushes us to accept the odd idea that a material object can come into existence while it is co-located with two numerically distinct hunks of matter. Moreover, Forbes's solution is useless to solve one of the three versions of the paradox, for this version is elaborated without assumptions on identity to be translated in terms of counterparthood. Leslie's proposal, instead, allows the possibility of a single artifact that entirely originates from two distinct hunks of matter.

Hence, the development of the revenge of Salmon's paradox shows that all the solutions so far advanced are inadequate to solve Salmon's paradox. Most importantly, it makes us understand the different roles played by logic (and language) and metaphysics in the development of the paradox. Indeed, the fact that the paradox does not depend on the acceptance of this or that logical system for metaphysical modality motivates the idea that the paradox is due to an inconsistent metaphysical picture.

To solve the problem of consistency, I advanced the idea that the best viable solution is to reject modal tolerance and embrace a form of intolerant essentialism. This solution is motivated by the failure of all the other available solutions and by the fact that by rejecting a modal tolerant we avoid all the different elaborations of Salmon's modal paradox. This solution is rooted on a controversial assumption: modal tolerance comes with the idea that we should accept that an artifact might have been originally made by the 50% of its original matter. Thus, my analysis ends with a defense of this idea.

Overall, the analysis of Salmon's modal paradox showed how our understanding of a paradox can be weakened when the role played by logic (and language) is not distinguished with enough clarity from the metaphysical picture underlying it. In the case of Salmon's original elaboration of the paradox, this happens when the role of the modal system *S*4 is overrated. Indeed, when this system is endorsed it is also hard to notice the metaphysical problem underlying a Forbes-style solution and Leslie's one, given that their discussion of the paradox is based on Salmon's original elaboration of it. Instead, once it can be proved that the paradox does not depend on this or that modal system, it is possible to analyze the paradox in a metaphysically more perspicuous way and understand its metaphysical complexity. In this way, a proper and more effective solution can be advanced.

In Part II, I analyzed how formal languages (and their logics) interact with the development of ontological theories from a realist point of view. The main goal of this Part was to analyze the methodological role that formal languages can and cannot play in the development of ontological theories. In particular, I showed how a language-first methodology is incompatible with ontological realism (*OR*), for it is in tension with the main theoretical aim of a realist perspective on ontology.

The starting point of this analysis has been the introduction of a particular perspective on *OR*. In particular, I proposed to understand ontological realism as a philosophical paradigm (the *OR*-paradigm) populated by different ontological theories (*OR*-theories) that cooperate to develop the best description of reality in itself (Chapter 4). To describe reality in itself, *OR*-theories should be able to describe reality as it is independently of the language they deploy to express their description. They do this through the development of a categorization of reality and a set of ideological relations.

I clarified the philosophical perspective of the *OR*-paradigm through a series of comparisons. I showed how this metaontological view is broader, but also in line with, Schaffer's Aristotelean view - to the effect that Schaffer's view can be understood as a particular way of articulating a particular *OR*-theory. This comparison was motivated by the fact that Schaffer himself opposed his view to the one promoted by the linguistic approach to ontology, which he mainly associates with Carnap and Quine's metaontological views.

This is why I compared further the metaontology of the *OR*-paradigm to some crucial features of Carnap and Quine's accounts.

These comparisons highlighted the following crucial feature of the *OR*-paradigm. First, contrary to Quine's understanding of ontology, the *OR*-paradigm takes *OR*-theories to be different descriptions that deploy different categorizations of reality in itself and that understand ideological relations as worldly relations, not as linguistic items (like predicates). Second, contrary to Carnap's view, the *OR*-paradigm, does not understand *OR*-theories as parts of languages, but as descriptive objects that express their content through a language. This fact is important to block Carnap's ban on the possibility of articulating ontological disagreement, which Carnap takes to be inexpressible in a meaningful way. Crucially, where Carnap imposes a ban, the *OR*-paradigm faces a philosophical challenge, i.e. the development of a language apt for the articulation of disagreement.

When this understanding of the *OR*-paradigm is endorsed, it is crucial to determine the methodological role language can play in this theoretical enterprise (Chapter 5). The main point I showed is that a language-first methodology is incompatible with the *OR*-paradigm, for it pushes it against its regulative aim of describing reality as it is independently of the language deployed to express the description. I showed this by considering Quine's methodology as a notable example of a language-first methodology, and then I tried to generalize it to a more general methodology for the *OR*-paradigm.

The kernel of the language-first methodology is the identification of the best - and thus unique - language for the entire *OR*-paradigm. This identification of the language precedes the development of viable *OR*-theories, among which there is the best *OR*-theory that the paradigm should be looking for. This *OR*-theory is the best one in virtue of being expressible with the best language, and this is what pushes the paradigm against its regulative aim. Indeed, the development of the best *OR*-theory would not be independent from the identification of the best language, and, so, the description of reality it offers depends on the language deployed to express it.

I considered a possible reply to this line of thought: if the best language for the *OR*-paradigm were the best language apt for describing reality in itself, we could endorse the language-first methodology compatibly with the regulative aim of the paradigm. I showed that this objection is flawed, for such a language should be ontologically neutral, i.e. it should not determine the best *OR*-theory (or the pool of viable *OR*-theories). However, this fact is problematic (mainly) because not every language is apt for the expression of every ontological description of reality. Hence, there is no best language that the *OR*-paradigm can identify prior to the development of *OR*-theories. Hence, the objection does not succeed in establishing compatibility between the language-first methodology and *OR*.

The incompatibility of the language-first methodology with *OR* led to the following methodological consequences. First, *OR* ought not to endorse the language-first methodology. Second, *OR* should let each *OR*-theory express its description of reality through its peculiar language. Third, the best language for the *OR*-paradigm is the best language for the best *OR*-theory, where what counts as the best language is determined by the best *OR*-theory, and not vice-versa.

To bolster the commitment of *OR* to these methodological ideas, I analyzed more in-depth how first-order predicate logic imposes expressive limitations on the expression of *OR*-theories (Chapter 6). I focused on a particular study case, i.e. on how this language imposes expressive limitations on a Lowe-style *OR*-theory. This showed how the endorsement of a unique language prior to the development of *OR*-theories can lead the *OR*-paradigm into technical problems that run against the fulfillment of its regulative aim.

I showed that first-order predicate logic is inadequate to express a Lowe-style *OR*-theory because it lacks syntactic resources. So, by deploying this language, the best this *OR*-theory can do is to produce ambiguous sentences. Indeed, this language is unable to express sentences that perspicuously display the categorization of reality endorsed by the *OR*-theory. In turn, the presence of ambiguous sentences impedes the evaluation of ontological inferences, which should be able to display the ideology of the *OR*-theory. Thus, the overall result is that first-order predicate logic is inadequate for the expression of both the categorization and the ideology of a Lowe-style *OR*-theory, and so is unable to express the description of reality offered by the theory.

To enhance my point, I showed that these problems are avoided once we proceed the other way round. Namely, once the syntax and the grammar of a language are suited for the expression of a specific categorization of reality, ambiguous sentences are avoided. In turn, when ambiguities do not obscure the expression of theories, we can produce axioms for each *OR*-theory that perspicuously display ideological relations and allow a clear understanding of ontological inferences.

Overall, the analysis conducted on the methodology of *OR* revealed the importance of having a clear understanding of the role to be assigned to language and logic in the theoretical enterprise of describing reality. Even if *OR*-theories aim to describe reality as it is independently of the language deployed to describe it, they cannot avoid expressing their content through a language. So, while, on the one hand, *OR*-theories aim to be language-independent, on the other hand, their success in describing reality depends on there being a language for their expression. I aimed to clarify this twofold relation holding between language and *OR*-theories: the fact that *OR*-theories need a language (and a logic) should not be understood as the need for a unique language (and logic) for the entire *OR*-paradigm. I thus tried to show that, in our understanding of reality, the role of language (and logic) is vital, but this should not lead us to assign too much power to it, otherwise we end up imposing limitations on the development of ontological (and so metaphysical) ideas, and this is a price that we cannot pay from a realist point of view.