

The Simplicity of Identity

A defence of pixelism across space, time, and worlds

Fabio Patrone

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Introduction

This dissertation studies the way entities inhabit our world. Once, I asked my father: “what do you think there is?”. He replied in a very Quinean way. “There is what there is”, he said. This is the right answer to an ambiguous question. But granted that there exists only what exists, one may be led to wonder: *how* does exist what exists? In this case, the answer is more tangled. Of course, we can answer that what exists exists precisely in the way it exists, but, probably, we would remain unsatisfied from this kind of response. My work is devoted to address this question with a more elaborate answer.

My analysis starts with considering three *kinds of things*, namely individuals, groups and events. Individuals are somewhere else called “objects”, “substances”, or simply “things”. Rocks, human beings, ships, microwaves, and so on are individuals. On the other hand, groups are arrangements of individuals. Basketball teams, neighborhoods, encyclopedias, mountain chains, and so on are groups. Events are generally described as “what happens”. Hand-waves, climbings, ageings, smiles, and so on are events. Usually, the main distinction is drawn between physical objects (the conjunction of individuals and groups) and events. In spite of that, many philosophers, from Russell (1927) to Quine (1950), from Goodman (1951) to Lewis (1986) and all the four-dimensionalists like Heller (1990) and Sider (2001b), believe there is not a real distinction. According to them, objects would simply be *monotonous events*, and events would be *unstable objects*¹.

As it will become clear reading this dissertation, I count myself in this group. According to my analysis, there is only one way to exist, i.e. being an arrangements of atomic entities with a five-dimensional shape. I call this thesis “pixelism”.

¹Goodman (1951, 259)

This means that entities do not persist through time and change, nor they spatially compose. This idea clashes with commonsense. After all, we daily have experience of persisting and composite objects. When I brush my teeth and I look into the mirror, I see *me*, the same person I was yesterday and I will be tomorrow. And when I drive my Vespa I think it is the same motorcycle I bought five years ago, and so on. We experience persisting things every day. And it is the same for composite objects. I am sitting on a chair (compound of wooden pieces) now, typing on a computer (a very sophisticated composite object) and eating a sandwich (bread+tuna fish+mayonnaise). I myself am a composite object! How is this possible? The answer is that persistence and composition occur only fictionally.

In the first chapter, I defend two principles, namely the “Generality of identity” and the “Generality of diachronic identity”. According to the former, identity is a simple, general, absolute and basically unproblematic relation. The latter takes into account identity over time, by asserting that it is a general relation that equally applies to different ontological domains. If the two principles are correct, then a metaphysics able to provide a unified treatment of all the phenomena of persistence is needed.

In the second chapter, I claim that this metaphysics corresponds to a radical form of exdurantism. By doing that, I provide reasons to suspect that the other metaphysical theories on the market, namely endurantism and perdurantism, are not good choices: endurantism for it is not able to provide the unified treatment, perdurantism for its characterization of the relation between temporal parts is circular.

In the third chapter, I suggest that a radical exdurantist should embrace the spatial analogue of her thesis, i.e. mereological nihilism. In fact, according to mereological nihilism, entities never compose spatially. What commonsense identifies as composite objects are atomic entities arranged in a particular way. This means that, for example, chairs do not exist. Instead of them, there are atomic entities arranged chair-wise. On the one hand, radical exdurantism claims that there are only instantaneous entities that persist fictionally, on the other mereological nihilism states that there exist only atomic entities that compose fictionally.

I call the conjunction of these thesis “pixelism”, and the fourth chapter is

devoted to its analysis. In the first part, I describe two geometrical models for pixelism. Both are four-dimensional Euclidean spaces, composed of the three spatial dimensions and the temporal one. Within these models, in the second part, I depict in a very transparent manner the modal relations between entities, by adding a fifth dimension, namely the modal one. Ultimately, according to pixelism, everything is simple. In fact, entities persist, compose and exist in different worlds in the same way, namely as pixels in a five-dimensional space, which consists in the three spatial coordinates, the temporal one and the modal one.

Chapter 1

The Complexity of Identity

«The "paradox" is only a conflict between reality and your feeling of what reality "ought to be"». Feynman et al. (1965, 18)

Frege argues that there is a significant difference between claiming that the morning star is identical to the evening star, and that the morning star is identical to itself. He aims at explaining why identity statements differ from self-identity ones, within the distinction between “sense” and “reference”¹. Frege’s issue of informativeness of identity statements awakens a further philosophical question. In fact, one can wonder how is it possible that the morning star is identical to the evening star, given that the first appears in the east before sunrise and the second is visible in the western sky only at nightfall? As Heraclitus pointed out, how can one and the same thing have different properties?

The latter question lays the foundation of the metaphysical study of persistence through time and change. To persist means to be the same entity at different times, and with different properties. Therefore, “identity” and “change” become central to the metaphysical research. In the remainder of the chapter, I will present these basic concepts, defending the idea that identity is a general matter, and introducing the principle of the “Generality of Identity”. Following this line of reasoning, generality can be described in two ways: (i) general as *common*; (ii)

¹Cf. Frege (1892).

general as *elementary*. *Common* for the same concept of identity belongs to all things, and *elementary* since, as Lewis (1986) states, there cannot be real problems about identity, because identity is basically unproblematic. Nevertheless, as Quine (1982, 208) points out, «despite its simplicity, identity invites confusion».

From a formal point of view, identity is an uncomplicated concept: everything is identical to itself (and to nothing else) – *pace* Priest et al. (1997) and Routley (1980). To support the idea of generality, in the first section I will introduce three examples of persisting entities, namely objects, groups and events. In the second section, I will present four of the classical puzzles of identity through time and change, which will be helpful along all the following chapters. In the last part of the chapter, after having introduced a further principle, namely the “Generality of Diachronic Identity”, I will consider the classic debate about persistence through time. I will depict the difference between the three thesis on the market – endurantism, perdurantism and exdurantism – in order to defend, in the second chapter, the exdurantist position via the principle of the generality of diachronic identity.

1.1 Three cases

Consider the world you live in, and start to enumerate what there is. You may probably begin with a broad list of *items*: persons, houses, showers, computers, cats, books and so on and so forth. In principle, if you had enough time and will, you would finish naming all these sorts of objects. And what then? Maybe you will start thinking that also other kinds of things do exist. If persons exist, shouldn’t also groups of persons, like soccer teams, be counted in our catalogue? Following this intuition, you might start to count not only soccer teams, but also nations, companies, flocks, neighborhoods, sheafs, etc.

But then, one might argue that all the things you have counted also *do things*. Ficus benjamin trees grow up, sheep flocks go around grazing, some people play games, some others occupy areas by force of arms. At the end of the day, you will probably be eager to count yet another kind of things, namely what we usually call *events*. For this reason, you will enumerate also basketball games, lives of

prawns, aging of parents, and so on.

Even if this catalogue does not appear to be entirely accurate, it shows that three *kinds* of things might be taken under consideration: individuals, groups and events. This is in line with our everyday experience. Outside the Philosophy Department, we always experience these three kinds of things, without doubting whether trees exist, soccer teams endure or concerts take place. Even though we unproblematically accept these entities in our common ontology, the persistence of these entities raises many interesting philosophical questions. For example, is a person the same if she changes her somatic traits? Is a company the same if it merges with another? Or, will the soccer game that has been suspended yesterday be the same game as the remaining part that will be played tomorrow? To pursue the argument, it is worth providing for each of the aforementioned ontological categories, some illustrative examples. Hopefully, the reader will be driven to consider the idea that identity is a general matter among events (“The game”), groups (“The band”) and individuals (“The morning star”).

1.1.1 The game

Jeff: “It’s unbelievable Mike! The game *has completely changed* in the last two minutes.”

Mike: “You’re right Jeff. In the first quarters the Knicks and Heats have been so close. Few but good shots.”

Jeff: “The game *has been quite boring* though, until LeBron decided *to turn it into* a completely different thing.”

Mike: “He got 23 points in ten minutes, crazy!”

Jeff: “Yeah, oh yeah. Let me tell you something: *there have been two different games*. One from the beginning to the half of the third quarter and the other from that very moment on.”

Mike: “Definitely. And, at a closer look, *in the first part of the game there have been at least three different parts*: the one in which Melo scored

three baskets in a row (and when it seemed everything was going good for the Knicks), the one immediately after, when an amazing defense of Miami...”

Jeff: “Yeah Mike, 0 points for the Knicks in four minutes”

Mike: “Exactly! And the last one in which J.R. Smith did enter the field and scored two three-points shots”

Jeff: “If we want to be extremely precise we should say that, *within the second section of the first part of the game, there has been...*”

Mike: “Don’t philosophize too much Jeff and let’s get back to the game. Look at that crossover! It seems Melo does not agree and wants to start *a completely different game...*”

1.1.2 The band

The Sugababes are a British pop girl group, formed in 1998. As of 2010 they had sold just under 8 million records in the UK only. In 2006, British Hit Singles & Albums named the Sugababes as the most successful female act of the 21st century with six UK number one singles and eighteen UK top ten hits. They racked up six number-one singles, "Freak like Me", "Round Round", "Hole in the Head", "Push the Button", "Walk This Way" and "About You Now"; the Spice Girls are the only British girl group to have had more. Sugababes also released five UK top ten albums, four of which reached at least platinum certification in the UK, and have been nominated for six Brit Awards, winning one for Best British Dance Act in 2003. They have been a long-term fixture in the British tabloids due to their several line-up changes and alleged group infighting.

Nonetheless, the discographical success is inelastic to the metaphysical worries one can have towards the Sugababes. But let’s take a closer look at their biography. The band was originally formed by Siobhán Donaghy, Mutya Buena and Keisha Buchanan. Their debut album achieved moderate success, peaking at number 26 in April 2001 and eventually being certified Gold. In 2001, Donaghy departed the group amid rumors of a rift with Buchanan and the group were dropped by their

record label. With the introduction of Heidi Range, the group began to experience a higher level of commercial success whilst keeping the critical acclaim they had achieved with their debut album. They released three studio albums before Buena announced her departure in December 2005, leading to Amelle Berrabah being brought in to replace her. Following the release of their first greatest hits album, the new line-up released two studio albums. In September 2009, after 11 years in the Sugababes, Buchanan, the last original member, was replaced by former UK Eurovision entry Jade Ewen. Range, Berrabah and Ewen released the group's seventh studio album, *Sweet 7*, in 2010, after which they signed to RCA Records, before announcing an indefinite hiatus in 2011.

So far, it would seem like the same old pop-group story, if the following had not happened: the original line-up of the band reformed in 2011 and announced to release their *debut* album in 2014. To sum up this unlikely turn of events, the band was formed by three girls who were gradually replaced by other members. In eleven years the band changed all its components. But, a couple of years ago, the original members of Sugababes formed *another* band. It is not a coincidence though, that the Sugababes' most famous song lyrics goes "Can we bring yesterday back around?" and that this very song is contained in a record called "Change"².

1.1.3 The morning star³

The idea was very simple: filming a documentary on Leonardo DiCaprio's life. But not the Leonardo DiCaprio the public has seen so far. The real one. The one off camera. The one brushing his teeth, the one playing with his dogs. And the actor agreed, provided that profits would be given to charity. Given his full agenda, Leo – he told the film maker they can call him Leo, said that the documentary could be filmed in two moments only: the evenings and the mornings.

After the shooting went on, rigorously during the evenings and the mornings only, the producer started to notice some inconsistencies in the film. When he took a closer look, he realized that the inconsistencies were between the mornings

²The facts about Sugababes biography are based on their Wikipedia page: <http://en.wikipedia.org/wiki/Sugababes>.

³Thanks to Achille Varzi for the tip about this section.

scenes and the evenings ones. “Isn’t it weird?” asked the producer. “Look here: every evening, when he gets home, he’s like in one of his movies. It seems he’s still acting”. The director agreed: “Yep, absolutely true. And it’s not the only difference. If you carefully look at all the evening scenes, you can see he’s still wearing make-up, with his perfectly tidy hair. Mmmh... It’s not working”. “What? What is not working?”. “The documentary won’t work. I was reviewing all the morning scenes and he’s *totally different!* From a physical point of view he seems 10 years older... and also his attitude towards the cameras is very different. If I was not filming these scenes myself, I would swear they were two different persons!”. “Got it! Oh yeah, I got it!” shouted the producer out. “What do you have in mind?”. “The documentary will be based on this difference: the star in the evening and the star in the morning. I also have the new title for the documentary! Have you ever read Frege?”. “Who the heck is Frege?”. “Never mind... we’ll call it “The morning star and the evening star. The real story of one and the same star: Leonardo DiCaprio”.

1.2 Four puzzles

The examples provided in the last section underline the many faces of survival through time and change. Our linguistic practice discloses some of our pre-philosophical intuitions: we usually acknowledge that individuals, groups and events can change despite the fact that they remain the same. Nevertheless, our intuitions are not immune to the philosophical analysis. In the next chapter, I will present arguments in favor of the idea that nothing persists identical over time.

In this section, I will present four puzzles inspired by the classical literature of the metaphysics of identity through time. They will be useful across the following chapters, in order to analyze and critique classic and non-classic approaches to identity. They are usually discussed to challenge some of our intuitions. The role of the puzzles become substantial in so far as they provide reasons to support a certain metaphysics more than another.

1.2.1 The ship of Theseus

After the sensational return from Crete to Athens, Theseus' successful mission inspires the Athenians to keep his ship seaworthy, as a memorial to honor Apollo. Call t_1 the time Theseus' ship arrived at Piraeus, the port of Athens. Over time any wood that wore out or got ruined was gradually replaced with a new one of the same type. Finally, at t_n , there is a ship composed of entirely different planks. Call it *Replacement*. Now suppose that a greedy collector got all the old planks that have been substituted and stored them in a safe place, far from peekers. At t_n , he decides to built *another* ship, composed by all and only the planks that belonged to the original ship. Call it *Reassembly*. Once Reassembly was ready, the collector went to the Athenians authorities. "The ship you're worshipping" said the collector "is not Theseus' one. Actually, I am in possess of the original. Look at the wood your ship is made of: it is brand new. It's only a copy, though very faithful. You're dishonoring Apollo! But don't worry, I am a good man. For a modest price I can sell you the *original* ship...". "Calm down, calm down" answered the celebrations supervisor "Ships, like all the other artifacts, survive small changes. This means that a ship keeps its identity even if a small piece of it, let say a plank, is replaced. I will explain to you why the original ship is the one we have preserved at Piraeus. Consider Ship 1, Ship 2, Ship 3, ..., as Theseus' ship with respectively one, two, three planks replaced, and Ship n as Theseus' ship with all the planks replaced, namely Replacement.

Theseus' ship = Ship1

Ship 1 = Ship 2

Ship 2 = Ship 3

...

Ship n-1 = Ship n (Replacement)

Therefore, if you accept the fact that a ship can survive small changes, given the transitivity of identity, you have to admit that *we* have Theseus' ship, and you're

only a fraud!”. “I see your point, Supervisor, but you are wrong, and I will prove it without using any math. Do you accept that a ship, like all the other artifact, preserve its identity even if it is disassembled and reassembled?”. “Of course I do, But I don’t see what you are trying to...”, “Let me finish” replied the collector. “If you accept that a ship does maintain its identity when it is disassembled and reassembled, then you are forced to say that my ship is the original. After all, I got all and only the original planks of Theseus’ ship, and I’ve reassembled them in the exact same way they were when Theseus brought the ship back to Athens”.

This scenario suggests that both the collector and the supervisor are right, therefore that both Replacement and Reassembly are identical to Theseus’ ship. Nevertheless, we cannot accept this conclusion, because it is not the case that a thing is identical to two distinct things (or that the same thing is in two places at once). This paradox is maybe the best known puzzle case of diachronic identity and has been discussed since Plutarcus (*Parallel Lives*, Theseus, 23.1) has introduced it⁴.

1.2.2 The wax museum

The curator of the world-famous London’s Wax Museum decides to renovate some statues. In particular, Michael Jackson’s one is the most ruined: too many people handled it, recklessly hugged it and hung on it to have a picture with the copy of their idol. So, the official sculptor of the museum is appointed to replace the worn statues with new ones as accurate as possible. At time t_1 the work is carried out and there is a brand new wax statue of Michael Jackson, ready to be exhibited. While the sculptor is cherishing his masterpiece, he realizes the horrible mistake he has just done. He has no more lumps of wax to create the last statue on the list and this one is a priority: Queen Elizabeth II. The museum will reopen in 12 hours and there is no time to order new wax. There is only one thing to do: destroy Michael Jackson’s statue and use its wax to shape Elizabeth II’ one. At t_2 the sculptor liquefies Michael Jackson’s and at t_3 finalizes the Queen’s statue. The curator will not be happy about the inconvenience (neither the visitors, of course), but, at least, the sculptor has saved the Queen.

⁴Hobbes (1655), <check references>.

At t_1 , after the creation of Michael Jackson's statue, the statue and the lump of wax, shaped in statue form, intuitively seem to be one and the same object. In fact, they occupy the same region of space and apparently they share all their properties: they have the exact same shape, weight, mass, and even the same atomical (and subatomical) structure. We cannot, at t_1 , tell the statue apart from the lump of wax and *viceversa*. But it seems that the statue and the lump of wax do not share *all* their properties. Let t_0 be a time before the sculptor shaped the lump of wax into the statue. At t_0 the statue did not exist, while the piece of wax did. Or consider the time t_2 , when the Michael Jackson's statue is liquified in order to shape Elizabeth II's one. In these two cases, the lump of wax still exists, even if not in statue form, and we have no reasons to claim it is not the same lump of wax as at t_1 . So, the different properties that the statue and the wax have at t_0 , t_1 and t_2 suggest that they are not the one and the same object⁵. But how is it possible that there exist two things like Michael Jackson's statue and the wax that composes it? How can two distinct objects occupy exactly the same portion of space at the same time? This is the so-called "puzzle of constitution",⁶.

1.2.3 Tibbles the cat

Consider at t_1 Tibbles, a cat very eager for purring every time one passes by. Tibbles is very cute: he is a yellow-eyed white cat, except for his splendid black tail. Now, take a proper part of Tibbles, called Tib, which consists of the entirety of Tibbles except for the tail. There are no reasons to doubt that Tibbles and his proper part Tib are distinct objects. At t_2 Tibbles is wondering outside by night, looking for some food. He recklessly jaywalks while a truck is passing at high speed; thanks to his feline reflexes he is able to dodge the impact with the truck but not to prevent losing all of his tale in the accident. Even if Tibbles and Tib are distinct at t_1 , they coincide at t_2 . In fact, given Tibbles survives the loss of his tail and that we have defined Tib as a proper part of Tibbles composed

⁵We cannot claim identity between things that do not share all their properties because this would violate Leibniz' Indiscernibility of Identicals Principle. I will analyze the relation of identity in section 1.3.

⁶<check references> Gallois (1998); Hawley (2001); Koslicki (2008); Sattig (2008); Sider (2001a); Van Inwagen (1990).

by all of Tibbles except for the tail, Tibbles and Tib are identical at t_2 . As in the other puzzle cases I have presented, the story seems to lead to the conclusion that a thing can be identical to another at a time, while being distinct at another. Tibbles' story is also known as the paradox of undetached parts⁷.

1.2.4 Amoebic division

Derek enters a space-age machinery called "The Duplicator" that is able to duplicate his body. The theory behind the process is not so complicated as it is the mechanic version of amoebic division. The device splits Derek's body in two halves and creates for each half the perfect copy of the remaining part of Derek's body. As soon as Derek presses the duplication button, two persons appear in his place. Call them Derek₁ and Derek₂. The unique feature of the Duplicator is that it duplicates not only the physical characteristic of the object that undergoes the fission. Instead, in the case of people, the Duplicator reproduces also all the psychological traits. If Derek was madly in love with his wife, then both Derek₁ and Derek₂ would be in love with her. If the very moment before the duplication he wanted a giant pepperoni pizza, then his clones would crave a giant pepperoni pizza, and so on. Both Derek₁ and Derek₂ are sufficiently similar to Derek to claim identity. If so, we would have that Derek₁ is identical to Derek and that Derek₂ is identical to Derek. But, as I show in the *Ship of Theseus*, this is impossible because Derek₁ and Derek₂ are distinct, and it is not the case that one and the same thing is identical to two different things. This paradox is known as the fission case⁸.

1.3 Identity as a general matter

Asserting the identity of things should not be problematic in so far as all the discussions about identity can be summarized in one line: everything is identical to itself and to nothing else. It is true, though, that in our everyday language

⁷<check references>Geach (1972); Wiggins (1980); Sider (2001a)

⁸Lewis (1983); Noonan (2003); Parfit (1984); Perry (1972); Shoemaker (1984); Sider (2001a); Unger (1990).

we use the term “same” (or “identical”) meaning two very different concepts, for example when we say: “You and your mother have the *same* sweater!” and “It’s me, the *same* person you met 5 years ago”. In fact, there are two different kinds of identity: *qualitative* and *numerical*. Being qualitatively identical means to share all properties. Numerical identity, on the other hand, can only hold between a thing and itself. In fact, it could be the case that two things are distinct even if they share all their properties⁹. Consider two Fender Telecaster guitars, built at the same time, with the same equipment and in the same factory. They are both flame red, they have exactly the same shape and the same weight and, of course, they both sound great. Nonetheless they are distinct. One of them might be smashed on stage at the end of a concert in Beijing, while the other one is played by a Norwegian jazz band in Harlem. In this case, the two guitars are qualitatively identical (considering the moment before they are shipped out of the factory) but numerically distinct.

Given this premise, my work is devoted to analyze numerical identity (henceforth, identity). The analyses of the formal concept of identity, provided in the next section, will clarify my claim that identity is a general, simple and fundamental relation, i.e. the principle of the “Generality of identity”. In spite of the general characterization of identity as unproblematic, the aforementioned puzzle cases seem to question this idea. In this respect, I will support the idea that this attitude concerns metaphysical rather than formal issues.

1.3.1 Identity

Identity is a cornerstone of philosophy. It has been a significant concept since Heraclitus’ “ $\pi\acute{\alpha}\nu\tau\alpha \rho\acute{\epsilon}\tilde{\iota}$ ”, passing through Aristoteles to our days, and it has been extensively analyzed both in logic and metaphysics. The current analysis of identity begins with Gottfried Wilhelm von Leibniz’s work. Leibniz (1686) provided a well-known principle, namely “Indiscernibility of identicals”. According to it, if two things share all their properties, then they are identical¹⁰.

⁹Consider, for example, Black (1952)’s indiscernibles spheres.

¹⁰This principle is also known as one of the so-called “Leibniz’s Laws”, along with its converse, namely the “Identity of indiscernibles”. According to the identity of indiscernibles principle, if two things are identical, then they share all their properties. As opposed to Indiscernibility of

As generally intended, identity is not affected by the nature of *relata*¹¹. This means that regardless of the *kinds of things* we are considering, identity is always the same relation. In fact, in spite of identity being a relation between *things* in the world, it is a formal matter. Identity is also considered not to be affected by extrinsic factors¹²: whether the original Theseus' ship is identical to Reassembly is true only in virtue of the properties of the original Theseus' ship and Reassembly. It cannot be the case that an external thing, i.e. case Replacement, makes the identity statement true or false¹³.

From a strictly formal point of view, identity is expressed as follows, regardless of the ontological domain:

$$(1) \quad a = b$$

and it is characterized by the following properties:

- (a) Reflexivity: Everything is identical to itself.
- (b) Symmetry: If $a = b$, then $b = a$.
- (c) Transitivity: If $a = b$ and $b = c$, then $a = c$.
- (d) Indiscernibility of Identicals: If $a = b$, then a and b have the same properties.
- (e) No degrees: $a = b$ or $a \neq b$. Identity does not admit degrees.

On the other hand, the concept of identity as described by (a), (b), (c), (d) and (e) is not widely accepted. For example, reflexivity has been criticized by Routley (1980) and Priest et al. (1997); the principle of transitivity by Geach (1972); the Indiscernibility of identicals by Gallois (1998); Heller (1990); Johnston (1987) and

Identicals, it is a quite controversial statement, which is usually not taken into account – except for multi-locationist bundle theorist, i.e. the ones who believe that the entities that constitute the world are bundles of universals. See O'Leary-Hawthorne (1995).

¹¹Varzi (2005, 118)

¹²Wiggins (2001, 95-6), Williams (1976, 1-18), Noonan (1985).

¹³That is the core of the paradox. In fact, until Replacement takes place, there is no paradox at all: if we consider that an artifact like a ship can gradually be subjected to the substitution of its part, then we can claim identity between the original Theseus' ship and Reassembly. If not, we consider them two distinct things.

so on and so forth. The “No degree” principle has been discussed by Parfit (1971, 1984) within the subject of identity of persons and we can intuitively pair it with (a), (b), (c), (d). In fact, the morning Leonardo DiCaprio cannot be 80% identical to the evening Leonardo DiCaprio, keeping in mind that we are now considering numerical identity. While one could share 80% of the properties of someone else (i.e. being 80% qualitative identical), according to the no degrees principle one is either 100% identical or not.

As Quine stresses out, identity is a simple relation, $a = b$, despite inviting confusion about its characteristic and its application. While the simplicity of identity is described by its formal character, the ambiguity it creates is highlighted by the puzzles.

1.3.2 The Generality of Identity

Within the statements concerning identity, in addition to the qualitative/numerical one there is a further distinction. Diachronic identity, or identity over time, is opposed to synchronic identity. Synchronic identity is what Frege has in mind when he considers that the morning star is identical to the evening star. It literally means “identity at the same time”, and it is usually intended as identity of a same thing under different descriptions, e.g. when we say that Barack Obama = the 44th president of the United States, or that the tree heath = erica arborea, Bruto’s stabbing = Caesar’s death, and so on. Diachronic identity, on the other hand, is what we refer to when we enquire about persistence of entities through time and change. To recall the examples provided above, diachronic identity refers to the following kind of questions: is Derek identical to Derek₁ after the fission? Are the Sugababes formed in 1998 the same band as the re-formed one in 2011?

This is a general distinction. Sometimes we imply synchronic identity, some other diachronic identity. It is interesting noting that the relation between synchronic and diachronic identity can at least be controversial. In fact, when time is taken into account in the identity scenario, the complexity strengthens. Claiming that the same thing changes, as I have introduced before, is a paradoxical albeit commonsensical statement. But if we want a metaphysics according to which things endure and remain the same through time and change, we must attempt

to fix the problem. Alternatively, we can solve the issue of change by adopting different metaphysics, at the cost of re-thinking persistence under a new light. This new light involves the abandonment of the commonsensical concept of “being the same through time”, by going as far as to say that diachronic identity is not a genuine case of identity, because things do not persist being literally identical through time¹⁴.

I will proceed as follows. First I will introduce the “Generality of Identity” principle. Second I will present and reject its main three critiques. Finally, I will adduce a further principle, the “Generality of Diachronic Identity” for if diachronic identity is a genuine case of persistence, then the generality of identity spreads to diachronic identity. As a consequence, also diachronic identity is general, i.e. “being identical through time” is the same relation for individuals, groups and events.

Let define the “Generality of Identity” principle as the following.

GoI Identity is a general, absolute and fundamental relation that pertains to different metaphysical questions and ontological domains.

The generality of identity is based on the formal character of identity I have described in the previous section. Consequently, the concept of identity adopted by the metaphysical inquiry is the one expressed by (1), and governed by (a), (b), (c), (d) and (e). Whether the Sugababes in 1998 are identical to the Sugabebes in 2011 is a case of (1). And so do the other questions presented in the puzzles.

However, it is not necessary to accept *in toto* (a), (b), (c), (d) and (e) to agree with the generality of identity. For instance, even without accepting (c), the generality of identity principle would still hold as the general, absolute and fundamental relation described only by (a), (b), (d) and (e). And the same dialectic can be iterated for every principle. The generality does not depend on the the above-mentioned properties.

We avail of identity to state that Leonardo DiCaprio is dressed exactly the same as he was yesterday. We use identity to affirm that a soccer team is the same even

¹⁴I will present all these metaphysical scenarios in section 1.5.

if it changes five players of the first team, and we need identity to inquire whether an event, like a basketball game, is the same. All these statements involve the same concept of identity, namely the formal concept of identity. Similarly, there is only one concept of identity at stake in questions regarding personal identity, meta-metaphysical principles, discussions about tropes, or about the existence of subatomical particles, and so on.

As so characterized, **GoI** is embraced by many philosophers. This is not to say that **GoI** is a general truth or that it is unquestionable. In the next chapter, I will face three different critiques to **GoI**, addressed by supporters of *different kinds of identity*.

1.4 Denying Generality

I have presented **GoI** as an intuitive and almost commonplace principle. But, as well as in every philosophical debate, even the most unruffled intuitions are not exempt from critiques. And we are not allowed to reject a thesis on the grounds of its counterintuitiveness.

In this section, I will analyze three critiques to the generality of identity. The first one is the famous “Relative Identity thesis”, which criticizes the basis of my portrait of generality, i.e. the fact that identity is characterized as a univocal relation. The second is André Gallois’ attempt to solve the classic puzzles by using a different notion of identity: the “Occasional Identity”, according to which a thing can be identical to another at a time, and distinct at another. Finally, I will present a third position by Alan Gibbard, the “Contingent Identity”. Gibbard argues that identity statements containing two co-referential terms with different sense could be contingent, and so identity would not be necessary.

1.4.1 Against GoI: Relative Identity

Peter Geach (1962, 1972, § 7) affirms that identity is relative. Geach’s point is that we cannot simply say that $a = b$, because there is no such thing as a «strict, absolute, unqualified identity» (Geach, 1972, 241). According to him, every time we express an identity statement like

(1) $a = b$

we literally mean “ a is the same F as b ”, where F is a sortal concept¹⁵, i.e., a *kind of things*. In this light, according to Geach, it is possible that a is the same F as b and that a is not the same G as b .

R.I. a and b are the same F , but a and b are not the same G .

An example is required here. Take the Wax Museum puzzle. In this process of renovation of some statues, the wax of Michael Jackson’s statue is used to shape Elizabeth II’s one. According to the thesis of relative identity, we can assert that:

(*) Elizabeth II’s statue *is identical to* Michael Jackson’s one *under the sortal* “wax”

and

(**) Elizabeth II’s statue *is not identical to* Michael Jackson’s one *under the sortal* “statue”

Quine (1964) criticizes **R.I.** by showing that Geach does not treat genuine cases of identity (p. 102). In this respect, the relativity of identity is questioned because all the problems raised by Geach are issues of coincidence rather than identity. In fact, the wax *constitutes* the statue, it is not identical to it.

Geach’s position has been extensively discussed over the last century, but it has rarely found champions in the philosophical community, not only because it collides with the commonsensical principle of the generality of identity. Let examine the reason to endorse the relative identity thesis. Considering sortals as a viable way to treat identity statements does not imply being committed to relative identity¹⁶. In fact, relative identity is based on sortals but it is not a

¹⁵The same dialectic can be seen in Wiggins (1967), in the context of his reconstruction of Geach’s thesis.

¹⁶In any case, this attitude is not widely accepted. Even if sortals are considered to play an important metaphysical role, they are characterized in many ways and the only (almost) uncontroversial application of sortals is their work as a criterion to count *things* of the same kind (“How many F are there?”). Other applications are: gives a criterion of identity and non-identity among items of that kind; gives a criterion for the continued existence of an item of that kind; answers the question “what is it?” for things of that kind; specifies the essence of things of that kind; does not apply to parts of things of that kind (cf. Grandy (2014)).

consequence of accepting sortals: one can embrace the first without holding the latter. Consider, for example, Wiggins (1967, 1980)'s account. Even if he supports the idea that identity must always be considered as identity under a sortal, he strongly believes that identity is absolute:

The fact that there are many different sortal concepts under which one may single out some individual a does not in itself imply relative identity. [...] The reflexivity and congruence of identity provide logically compelling reasons why, if a is b , or if a is the same something or other as b (same horse, same tree, same planet, or whatever), then all different procedures of individuating a (provided they really do individuate a) must, if they yield any answer at all, yield the same answer with respect to a 's coincidence with b . Wiggins (2001, 24-5)

Here is his formal argument. The premises are:

$$(P1) \quad (\forall x) \left(f(x) \rightarrow \left(\frac{x=x}{f} \right) \right)^{17}$$

$$(P2) \quad (\forall x) (\forall y) \left(\left(\frac{x=y}{f} \right) \rightarrow \phi x \leftrightarrow \phi y \right)$$

(P1) and (P2) are respectively the principle of reflexivity of identity and the principle of Indiscernibility of Identical applied to relative identity. In fact, relative identity is supposed to be reflexive and to agree with Leibniz's Law. From the thesis of relative identity

$$(RI) \quad \left(\frac{a=b}{f} \right) \wedge \neg \left(\frac{a=b}{g} \right)$$

follows

$$(I) \quad \left(\frac{a=b}{f} \right) \wedge \neg \left(\frac{a=b}{g} \right) \wedge g(a).$$

Now, considering the first conjunct of (RI) and (P2), we have

$$(II) \quad \left(\frac{a=b}{f} \right) \rightarrow \phi a \leftrightarrow \phi b.$$

Take ϕ to be $\frac{a=x}{g}$, then we have

¹⁷The formalism " $\frac{x=x}{f}$ " means " $x=x$ under the concept f ."

$$(III) \quad \left(\frac{a=b}{f}\right) \rightarrow \left(\left(\frac{a=a}{g}\right) \leftrightarrow \left(\frac{a=b}{g}\right)\right).$$

But, by *modus ponens* and the supposition that a is identical to b under the concept f , we have

$$(IV) \quad \left(\frac{a=a}{g}\right) \leftrightarrow \left(\frac{a=b}{g}\right).$$

By (P1) and (I), we have

$$(V) \quad \left(\frac{a=a}{g}\right)$$

and, by *modus ponens* and (IV)

$$(VI) \quad \left(\frac{a=b}{g}\right)$$

which contradicts (RI)¹⁸.

The only way the advocates of Relative Identity have is to deny Indiscernibility of identicals, in order to save their theory. Again, Wiggins (2001, 27-8) offers four strong reasons to support the Indiscernibility of identicals principle. (i) Reflexivity, symmetry and transitivity are not sufficient to define identity, in fact there are plenty of other relations that are reflexive, symmetric and transitive (exact similarity, weighing the same, ...). (ii) If two things are identical, how is it possible that they have different properties? This is a very intuitive claim, but difficult to rebut. (iii) If we drop Leibniz's Law, we need another principle able to justify all the instances of intersubstitution of identicals that we know are valid. (iv) Let suppose that two terms, a and b , refer to an object o , and that there is a predicate P such as Pa is true and Pb is false. Suppose again that the predicate P instantiate a property Q . How is it possible that o has and does not have the same property?¹⁹

Geach's attempt to solve the paradox of identity fails. Quine and Wiggins provide very good reasons to reject his thesis, both from a formal and a conceptual

¹⁸For other formal critiques to Relative Identity cf.. Perry (1970); Stevenson (1972).

¹⁹«Suppose there were terms $t1$ and $t2$ both designating z , one and the same donkey, and suppose there were a context $\phi()$ such that the result of supplying $t1$ to it was true and the result of supplying $t2$ was false. What ought we to say if it were suggested that the open sentence $\phi(x)$ determined a property? Call the putative property Q . We ought to ask: How can the donkey both have and lack the property Q ? The question is unanswerable». Wiggins (2001, 28).

point of view. Nevertheless, Relative Identity thesis has deeply influenced the debate about identity and persistence, opening the door to other ways to deny the generality of identity.

1.4.2 Against GoI: Occasional Identity

André Gallois (1990, 1998) argues that identity is not an eternal nor a necessary relation. His view is opposed to the generality of identity, given that *occasionalists* state that a thing can be identical to another at a time, and distinct at another. Occasional identity is a kind of contingent identity²⁰ – in fact Gallois’ defense of occasional identity leads to a defense of contingent identity, although the opposite is not true: identity of things is not relative to a world, but to a certain time. With this move, Gallois aims to provide a better solution to the puzzle cases of identity, avoiding the paradoxes that the general view seems to generate.

Occasional identity can be characterized as following:

$$(OI) \quad (\exists x) (\exists y) (\exists t) (\exists t') (at\ t: x = y \wedge at\ t': x \neq y)$$

Consider the fission case. Gallois’ solution is the following: Derek₁ and Derek₂ existed before the division as identical, while they are distinct after the fission occurred. Suppose that at *t*2 Derek₁ is swimming in the pool and Derek₂ is reading a book. Considering a time *t*1 before the fission, occasionalists can affirm that

$$(i) \quad at\ t1\ Derek_1 = Derek$$

$$(ii) \quad at\ t1\ Derek = Derek_2$$

and for transitivity of identity

$$(iii) \quad at\ t1: Derek_1 = Derek_2$$

But consider now Derek₁ and Derek₂ at *t*2. They are clearly two distinct objects: Derek₁ is in the pool while Derek₂ is inside reading the book. So, we also have

$$(iv) \quad at\ t2: Derek_1 \neq Derek_2$$

²⁰See §1.4.3.

Gallois treats $Derek_1$ and $Derek_2$ as *temporally quasi-rigid designators*. The term “quasi-rigid designator” has been introduced by Lewis (1986, 256) for this counterpart-theoretic semantic notion. Following Kripke (1980)²¹, Gallois consider quasi-rigid designators as a name that designates x at some time, and y at some other time. He is led to introduce it because if $Derek_1$ and $Derek_2$ were rigid designator, then (iii) and (iv) would be incompatible, while if they were non-rigid designator, there would be no reason to draw upon occasional identity. In fact, if $Derek_1$ is a synonym for a temporal non-rigid designator like “the tallest man in the pool”, then (iii) and (iv) could be true both because $Derek_2$ is actually the tallest man in the pool at $t1$, and because some other man became the largest man in the pool once $Derek_2$ started reading the book. That is to say that (iii) and (iv) can be true even if there is nothing like an amoeba identical to another at a time, and distinct at another; if $Derek_1$ and $Derek_2$ were non-rigid designator, (iii) and (iv) does not entail (OI) .

Occasional identity raises some perplexities. Gallois’ poses his argument as a conditional: «If the thesis that there are occasional and contingent identities is coherent, the examples in question are best thought of as examples of occasional identities»²², but there is no way to make the antecedent true. In fact, occasional identity is affected by two serious issues: the characterization of the temporally quasi-rigid designator is not as clear as it should be, and it is not a transitive relation.

Varzi (2001b) notes that quasi-rigid designators are problematic. How can we make sense of statements like

(v) at $t1$: $a = b$

if a and b are quasi-rigid designators? Given that the designator Gallois has in mind are temporally-bounded, we have identity statements of the form

²¹Kripke in *Naming and Necessity* sets the classic distinction between rigid and non-rigid designator. He defines a rigid designator as a term that designates the same object in all possible worlds in which that object exists and never designates anything else. Usually, proper names are always rigid designators. On the other hand, descriptions like “the tallest man on earth” or “the King of France” are non-rigid designators, because they do not identify the same individual in all possible worlds.

²²Gallois (1998, 6)

(vi) at $t1$: a at $t1 = b$ at $t2$.

It is not clear how we should manage cases like (v) and, hence, the real consistency of the quasi-rigid designators. In this case, the truth of (vi) does not depend only on whether we take those objects to be the ones denoted by a and b at $t1$. Furthermore, we cannot take a and b to be the object denoted by the relevant names at the time of utterance because by doing so, we would attribute a truth-value to (i)-(iv) only on the assumption that $Derek_1$ and $Derek_2$ exist at the time of utterance (p. 293-4).

Consider transitivity and take a closer look to (i), (ii), (iii) and (iv). Given that (iii) and (iv) collide with transitivity, Gallois adopt a temporally qualified version of transitivity:

(T_t) $(x)(y)(z)(t)((at\ t: x=y \wedge at\ t: y=z) \rightarrow at\ t: x=z)$

Since that transitivity should be considered at a certain time, the fact that at $t1$: $Derek_1 = Derek_2$ and at $t2$: $Derek_1 \neq Derek_2$ does not undermine transitivity (as described in (T_t)). But, even if occasionalists did face this problem, this does not prevent them from a further transitivity issue. Bader (2012) presents a double-fission plus fusion case with the purpose of criticizing occasional identity. Let start with recalling Derek's fission case. At $t1$ Derek is ready for the fission; at $t2$ the fission occurs and two persons, $Derek_1$ and $Derek_2$, enter the scene. Now, suppose that Derek has a twin, $Derek^*$, who decides to undergo fission too. So, Derek and $Derek^*$ enter the Duplicator together. At $t2$, three persons come out of the machine: $Derek_1$, $Derek_{2^*}$ and $Derek_3$. $Derek_{2^*}$ is the fusion of a product of Derek's fission and a product of $Derek^*$'s one²³.

²³Note that the fusion occurs simultaneously with the fission.

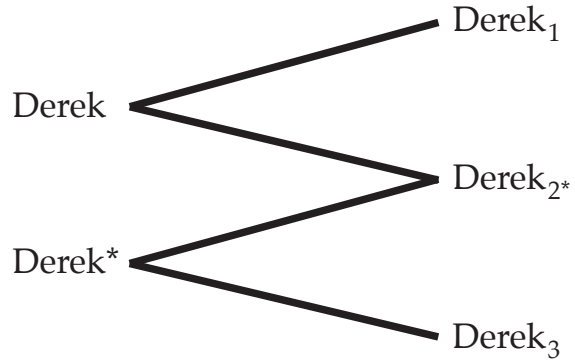


Figure 1.2: Double-fission plus fusion

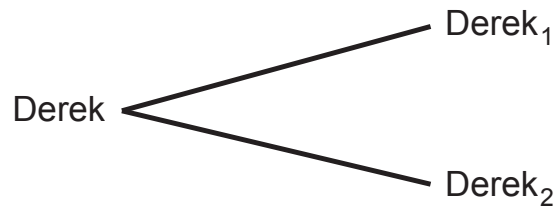


Figure 1.1: Fission

Consider the figure 1.2. We have:

- (i) at $t1$: $Derek \neq Derek^*$
- (ii) at $t1$: $Derek = Derek_{2^*}$
- (ii) at $t1$: $Derek_{2^*} = Derek^*$.

But, given (T_t) , we also have:

- (iii) at $t1$: $Derek = Derek^*$,

which contradicts (i)²⁴.

Recently Langford and Ramachandran (2013) have argued in favor of a kind of occasionalism immune to the transitivity argument. Their “creative view” consists of stating that fissions involve objects really dividing, namely the process creates objects which could not otherwise exist. The creative view allows to block the transitivity argument as so far as (ii) and (iii) are false. As a matter of fact, while avoiding the transitivity problem, Langford and Ramachandran’s solution brings along a well-discussed issue: the intrinsicity of identity. What happens to Derek and Derek*? Is the fission comparable to death? Consider this case. Derek and Derek* enter the Duplicator. Unfortunately, it does not work properly. In fact, at the end of the process, only two people come out from the machine. Call them Derek_n and Derek_m. Derek_n is sufficiently similar to Derek to claim identity: he has not only the same body Derek had, but also all his psychological features. Equally, Derek_m is sufficiently similar to Derek* to claim identity. Derek = Derek_n and Derek* = Derek_m. What is the difference between this case and ones described in figures 1.1 and 1.2? In the previous cases there is more than one person equally similar to Derek and Derek* to claim identity. But it is not acceptable that the identity between Derek and Derek₁ depends on some other thing, like Derek₂. This is because, as I recall in section 1.3, identity is an intrinsic relation, namely it can depend only on the things involved in the relation. Otherwise, identity could be something very different from the relation we are familiar to.

²⁴One way to avoid this critique is to reject the possibility that a fusion and a fission occur simultaneously. In this case, (OI) would not have a transitivity problem in so far as it does not allow cases like the one described in figure 1.2. Why should an occasionalist accept simple fusion and simple fission, and not a combination of them? Once she accepts the formers, she seems, in a way, bounded to accept the latter. If the thought experiment pictured in the figure 1.1 is acceptable, then the occasionalist countenances the possibility of fusion and fission. Maybe because she thinks they are conceivable (and then possible), or because she has no problem agreeing upon the use of thought experiments that violate physical possibility. In both cases, the occasionalist should accept also the experiments involving fission and fusion: it is conceivable as well as the fissions or the fusions alone, and it violates physical possibility too. Thanks to Carlo Penco for this note.

1.4.3 Against GoI: Contingent Identity

Recall the wax museum example. Consider the statue of Michael Jackson and the lump of wax from which it is composed, and call them STATUE and LUMP. Given that the statue and the wax coincide spatiotemporally, someone might be tempted to say that they are identical. However, even if we come to this conclusion, we might also admit that the statue and the wax *could not* have been one and the same thing. Imagine a world in which both STATUE and LUMP exist, but STATUE is composed from a different lump of wax and the LUMP is shaped in the form of a giant candle; or a world in which STATUE is destroyed but the lump of wax that formed it, namely LUMP, still exists. Alan Gibbard (1975) proposes this scenario in order to support the idea that identity is contingent, i.e. relative to a world. In this case, the identity between STATUE and LUMP is valid in the actual world, but fails in the ones described above.

$$(CI) \quad \diamond (\exists x) (\exists y) (x = y \wedge \diamond (x \neq y))$$

Gibbard's position is in opposition to the famous argument for the necessity of identity by Saul Kripke (1971). According to Kripke, if two things are identical, then they necessarily are so. If STATUE and LUMP are identical, then they are identical in every possible world. The argument is the following.

$$(P1) \quad (\forall x) (\forall y) (x = y \rightarrow (Px \rightarrow Py)),$$

$$(P2) \quad (\forall x) \Box x = x.$$

(P1) is Leibniz's Indiscernibility of identical. (P2) is the placid – at least according to Kripke – truism that everything is necessarily identical to itself. Given (P1),

$$(1) \quad (\forall x) (\forall y) (x = y) \rightarrow (\Box (x = x) \rightarrow \Box (x = y)),$$

where P in (P1) is substituted by the property “being necessarily identical to x”. But if it so, for (P2) and (1) it follows

$$(2) \quad (\forall x) (\forall y) (x = y) \rightarrow \Box (x = y).$$

Although this seems a persuasive argument, it is not a definitive rejection of *contingentism*. Or, at least, it would let advocates of contingent identity answer to Kripke’s proof. Following Noonan (1991), they could object the passage from (P1) to (1) by arguing that modal predicates are “Abelardian”, i.e. they can express different properties when combined with different terms²⁵. Or they can endorse the above-presented Geach’s position, according to which identity must always be relative to a sortal²⁶. Finally, they can appeal to Gallois’ idea that there exist temporally quasi-rigid terms, given that Kripke’s idea regards rigid designator.

I have already answered to Gallois’ quasi-rigid designators and to Geach’s relative identity thesis above. But what about Abelardian predicates? Even if, for sake of discussion, Noonan has hit the mark – for a criticism see Keefe (1995) – there is a further objection to contingent identity, namely a modal version of Bader’s argument against the transitivity of occasional identity. Bader iterates the same dialectics also to (CI).

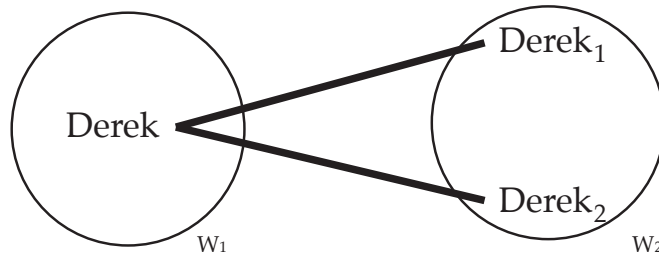


Figure 1.3: Fission in different worlds

The figure 1.3 describes a modal fission, i.e. a case in which a thing in a world W_1 is trans-worldly identical to two distinct things in a different world, W_2 . As in

²⁵ «There are non-controversial of Abelardian examples predicates in present-day philosophical discussions. One such is Quine’s predicate “was so-called because of his size”. Clearly, this predicate is Abelardian: it stands for the property *being called “Giorgione” because his size* when attached to the name “Giorgione” and the property *being called “Barbarelli” because of his size* when attached to the name “Barbarelli”» (Noonan, 1991, 189).

²⁶See Schwarz (2013).

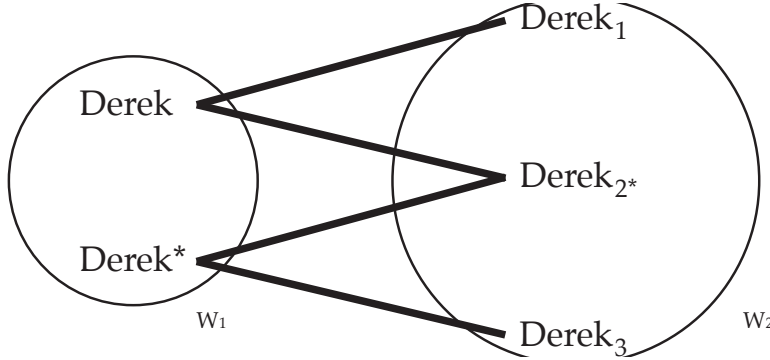


Figure 1.4: Double-fission plus fusion in different world

the occasional identity case, *contingentists* should appeal to a different version of transitivity, namely a world-indexed transitivity:

$$(T_w) \quad (\forall x) (\forall y) (\forall z) (\forall W) ((\text{at } W: x = y \wedge \text{at } W: y = z) \rightarrow \text{at } W: x = z).$$

But this adjustment is not enough to save contingent identity from the transitivity problem. The figure 1.4 shows that if we consider a trans-word fission plus fusion contingent identity fails to be transitive.²⁷

1.5 Diachronic identity and the old debate

So far, I have outlined a purposely neutral metaphysical view. In my analysis of the concept of identity, I have not taken a stand towards the metaphysical worries that crowd persistence. In fact, arguing for the generality of identity does not bound to a particular world view. But this neutrality cannot last for long. In fact, if on the one hand **GoI** can be endorsed regardless of the metaphysics one supports, on the other, the principle I introduce in this section, namely the generality of diachronic identity, leads to confront the metaphysical issues concerning persistence. For

²⁷The only way for a *contingentist* to save in part her thesis is to restrict once more transitivity relation also to the different sortal predicates:

$$(T_{w,qua}) \quad (\forall x) (\forall y) (\forall z) (\forall W) ((\text{at } W: x_{quaF} = y_{quaG} \wedge \text{at } W: y_{quaG} = z_{quaH}) \rightarrow \text{at } W: x_{quaF} = z_{quaH}).$$

This move works for the **STATUE** and **LUMP** case, but fails in the fission case and in all the other ones in which there is only one sortal.

this reason, here I will introduce and discuss the classic metaphysical views, i.e. endurantism, perdurantism and exdurantism.

In section 1.5.3 I will provide some classic arguments against endurantism. My intent here is not to defend, nor to criticize them *tout court*. Instead, my analysis will be limited to enlightening a fact: endurantism is not compatible with the principle of the generality of diachronic identity. As a consequence, if we want to accept the principle, we should advocate a different metaphysics. Following this line of reasoning, perdurantism and exdurantism remain on the scene. As I will consider in the next chapter, while *prima facie* the differences between these two theories appear not to be significant²⁸, they become substantial at a second and closer look. In fact, I will spend the second chapter of my work to support a radical version of exdurantism. This is because I note that perdurantism is not able to provide a non-circular account of the relation between temporal parts. In doing so, I will support the idea that, given the impossibility to give such an account, an exdurantist metaphysics without aggregates of temporal parts is more advisable.

1.5.1 The Generality of Diachronic Identity

As a general understanding, diachronic identity is a *kind* of identity. As opposed to synchronic, diachronic identity considers identity over time and change. If we accept the generality of identity, we should consider general also identity over time, as so far as there is just one concept of identity, i.e. the formal one I described in §1.3.1. When we investigate over the diachronic identity of Theseus' Ship, we enquire whether Ship 1 (the ship with one plank replaced) and Ship 2 (the one with two planks replaced) are the one and the same object, namely Theseus' Ship. The process is different from the one put forward by the question: is Barack Obama the 44th president of United States? It is certainly true that diachronic identity statements like the one about the ship of Theseus are formally different from the synchronic ones. Ultimately, the difference does not concern the concept of identity, because in both cases we are asking whether there is a single object, though qualitatively different in the cases of diachronic identity. According to

²⁸That is the reason why someone considers exdurantism as a version of perdurantism. See Sider (1996, 2001a).

this view, we are allowed to expand the generality of identity also to diachronic identity:

GoDI Identity through time is a general relation that equally applies to different ontological domains.

Imagine identity as a set, and diachronic identity as one of its subsets. If identity is general, given this picture, it is reasonable to admit that the diachronic identity should be general too.

In the previous sections, I have argued in favor of the generality of identity by showing that every case of identity statements have the same form, i.e.

$$(1) \quad a = b.$$

If we substitute a and b with events, groups or individuals, the “=” always means the same thing. In this respect, if we add time to the equation, the result is the same. In fact, in diachronical identity statements we have something of the form:

$$(2) \quad a \text{ at } t_1 = b \text{ at } t_2.$$

Consider the following diachronical identity statements.

- (i) Knicks vs Heat at 10’ of the first quarter = Knicks vs Heat at 3’ of the third quarter,
- (ii) 2001’s Sugababes = 2009’s Sugababes,
- (iii) DiCaprio in the morning = DiCaprio in the evening.

No matter what kind of entity we are considering, (i), (ii) and (iii) are instances of (2).

1.5.2 Endurantism, perdurantism, exdurantism

The generality of identity puts forward more than one metaphysical issues. Saying that identity through time should equally apply to different ontological domains, namely events, groups and individuals, is not a neutral statements. The cases of persistence, I have presented in the first section, enlighten the different ontological

categories and show different aspects of their persistence (how an event can change, to what extent a group can lose and gain components even though remaining the same, or how the one and the same entities can have different properties). The four puzzles, on the other hand, provide a challenge for metaphysicians. How do we treat these metaphysical riddles? Of course they question our commonsensical thoughts about persistence, and of course there are ways to dodge the problems they create. In the last fifty years, philosophers have tried to solve the puzzles either by revising our placid intuitions, or by trying formal adjustments to the puzzles itself. In each case, the question to start with is: “What are our metaphysical options?”.

Generally, the metaphysical views over persistence are three: (i) endurantism, (ii) perdurantism and (iii) exdurantism. According to (i) endurantism – also known as three-dimensionalism – persisting through time consists in existing completely at different times. On the other hand, perdurantism and exdurantism deny that it is possible for numerically one and the same thing to exist at different times. (ii) Perdurantists – known also as four-dimensionalists or worm theorists – claim that things are mereological aggregates of temporal parts, each existing at a time. In this respect, to persist from one time to another means for a thing to have different temporal parts existing at those different times. (iii) Exdurantist’s world view is slightly, yet substantially, different from the perdurantist one. Exdurantism – known also as stage view – maintains that things do not exist at different times. They are not aggregates of temporal parts, in fact they *are* temporal parts.

An early stage of the debate is summarized by Lewis (1986, 202):

Let us say that something *persists* iff, somehow or other, it exists at various times; this is a neutral word. Something *perdures* iff it persists by having different temporal parts, or stages, at different times. Though no one part of it is wholly present at more than one time; whereas it *endures* iff it persists by being wholly present at more than one time.

This characterization of the endurantism vs perdurantism debate has become classic. We can extrapolate two precise definitions from Lewis’ analysis:

(i)**Endurantism**: Entities persist through time by being wholly present at each instant of their existence²⁹;

(ii)**Perdurantism**: Entities are four-dimensional aggregates of temporal parts³⁰.

And, in line with this, we can also formulate the definition of the exdurantist position:

(iii)**Exdurantism**: Entities are instantaneous stages that do not ultimately persist³¹.

(i) Endurantism can be considered as the common sense metaphysics. Out of the philosophy (and physics) departments, it is almost universally accepted that everything persists in a three-dimensional way. In this light, when I say that I am the same person I was ten years ago, I mean that there was a thing, me, ten years ago, which is the same thing I see in the mirror right now. Persons move along the three spatial dimensions and persist through time, and so do trees, cars, clouds and so on. This is what *wholly present* means.

Even if our daily practice suggests otherwise, several philosophers do believe in the existence of temporal parts. There are various reasons for that. The classic lance that perdurantists and exdurantists use against endurantists is the so-called “problem of change”: “How is it possible that one and the same thing has different properties?”. It is possible, as friends of temporal parts say, because the one and the same thing is composed by different temporal parts, each of which having different properties. The fact that Anna is sitting at a time, and standing at another is not problematic. In fact, there is no object having contradictory properties (being sit, and not being sit), but there are two different temporal slices having one the property of being sit and the other not having such a property.

²⁹Cf. Baker (2000); Burke (1992, 1994); Chisholm (1976); Gallois (1998); Geach (1962); Haslanger (1989, 1994); Johnston (1992); Lombard (1994, 1995); Lowe (1987, 1989a, 1998); Mellor (1985); Merricks (1999, 2001); Rea (1997, 1998); Simons (1987); Thomson (1983); Van Inwagen (1987, 1990); Wiggins (1967); Zimmerman (1996).

³⁰Cf. Armstrong (1980); Broad (1923); Carnap (1928); Goodman (1951); Heller (1990); Le Poidevin (2000); Lewis (1983, 1986); Lotze (1884); McTaggart (1927); Quine (1950, 1960); Russell (1927); Smart (1972); Whitehead (1920).

³¹Cf. Hawley (2001); Sider (1996, 1997, 2001a); Varzi (2003a).

By all means, this is not enough. Perdurantism, given his counterintuitive nature, has many detractors. Even if a four-dimensional metaphysics seems to better comply with the world described by physicist, it is considered an extremely absurd attitude³².

Unlike endurantism depicts the commonsensical view, according to perdurantism entities «are a lot like their stories. Just as my story has a part for my childhood, so I have a part consisting just of my childhood. Just as my story has a part describing just this instant, so I have a part that is me-at-this-very-instant»³³. On the other hand, exdurantism can be approximated to the motion picture technique. In fact, in the same way as the dynamic image is an optical illusion created by a series of still images, persistence of entities is only fictional. Nothing persists – in the Lewisian sense. A succession of numerical different instantaneous stages gives us the impression of a continuant entity.

In this section, I have outlined the classic debate about persistence by introducing definitions for endurantism, perdurantism and exdurantism. It is worth nothing that the debate I have presented here is not fully exhaustive, in so far as it takes into account only the main three positions³⁴. In the next section and in the second chapter, I will analyze some reasons against endurantism and perdurantism.

1.5.3 No hope for endurantism

Endurantism is typically characterized as the view according to which entities persist through time by being fully present at different times. There are plenty of critiques and replies, and further replies to replies with regard to the acceptability of endurantism. In the first part of this section, I will present six of the most persuasive problems I think affect the theory. I am aware that, as Sider (2001a) outlines, there is no a unique knocked-out argument. The most powerful argument in favor of endurantism lies on its adequacy to commonsense. However, the perplexities arisen from these critics may lead to reconsider this advantage. In addition, I will

³²Cf. (Lowe (1987); Rea (1998); Thomson (1983); Van Inwagen (1990)).

³³Sider (2001a, 1)

³⁴Recently, theory of location has shed a new light over the debate. See Gilmore (2014, 2008); Parsons (2007); Costa (2014).

put forward a further perplexity, namely the inadequacy of endurantism towards the unified treatment of the phenomena of persistence suggested by the generality of diachronic identity.

There is a prodigious amount of literature about objections to endurantism. Let start with David Lewis (1983, Postscript B to *Survival and Identity*)'s seven-steps argument in favor of the existence of temporal parts:

- First: Consider a person. It is possible that it is divided in person-stages and that, therefore, person-stages exist. We can imagine that they appear out of thin air, then vanish again, or else. But it is a reasonable thought.
- Second: It is possible that two person-stages might exist in succession, one right after the other but without overlap. Further, the qualities and location of the second at its appearance might exactly coincide with those of the first at its disappearance. If it is possible that X happen intrinsically in a spatiotemporal region, and if it is likewise possible that Y happen in a region, then also it is possible that both X and Y happen in two distinct but adjacent regions. There are no necessary incompatibilities between distinct existences. Anything can follow anything.
- Third: Furthermore, it is possible that there might be a world of stages that is exactly like our own world in its point-by-point distribution of intrinsic local qualities over space and time.
- Fourth: This world of stages might also be exactly like our own in its causal relations between local matters of particular facts, for nothing but the distribution of local qualities constrains the pattern of causal relations.
- Fifth: Then, such a world of stages would be exactly like our own *simpliciter*. There are no features of our world except those that supervene on the distribution of local qualities and their causal relations.
- Sixth: Then our own world is a world of stages. In particular, person-stages exist.

Seventh: But persons exist too, and persons (in most cases) are not person-stages. They last too long. Yet persons and person-stages, like tables and table-legs, do not occupy spatiotemporal regions twice over. That can only be because they are not distinct. They are part-identical; in other words, the person-stages are parts of the persons.

So, if temporal parts exist, a four-dimensional world-view is more reasonable than a three-dimensional one.

Theodore Sider (2001a, ch. 4) offers a strong defense of perdurantism by addressing several critiques to the endurantist position. It is worth mentioning three of them. The first considers that endurantist's claim that entities are wholly present is either trivial or false. Trivial in the sense that all the parts an object has at a certain time are present at that time. False because, usually, all the parts that an object ever had or will have are not present at any given time. In fact, if I were a three-dimensional object wholly present at each time of my existence, I should have right now all the parts I had and all the parts I will have. But this is clearly false, because now I am composed by all and only my current parts.

The second is a common objection based on the analogy between time and space. All the physical objects we have experience of are located and move in both time and space. Moreover, there is a common topological and metrical structure between any given spatial dimension and the temporal one³⁵. Besides, this is what physics teaches us: time is no more special than space. And if so, why should we let time apart in our metaphysics of persisting objects?

The third Sider's objection I consider is his reformulation of a powerful argument, namely the one from vagueness³⁶. Consider the question: "Under what conditions do objects come into and go out of existence?". Perdurantists, granted the existence of temporal parts and the principle of unrestricted composition, answer that it always occurs. Endurantists, on the other hand, say that it happens only under certain conditions (for persons, trees, chairs, buildings, and so on) and that these things go out of existence when they cease to be arranged in an appropriate way (when persons die, trees are cut, chairs are broke, building are

³⁵See Schlesinger (1980) for an exhaustive discussion on the analysis .

³⁶See, among the others, Noonan (1982); Heller (1990); Le Poidevin (2000).

destroyed, and so on). Sider shows that this way of thinking – the endurantist one – is subject to countenance vagueness in the world, by way of ontic indeterminacy. The only way to avoid such an indeterminacy would be to accept perdurantist’s claim that any filled region of spacetime is the total career of some objects (Sider (2001a, 120-139)).

Another objection to endurantism is addressed by Achille Varzi (2003a, 394): endurantism is committed to essentialism. He suggests that the only way an endurantist can explain the fact that an entity x can survive a change with respect to a certain property, P_1 , but not with respect to a different property, P_2 , is by making a claim to the effect that P_2 , unlike P_1 , is an essential property of x ³⁷.

The above-mentioned critiques are significant, as so far as they highlight that common sense metaphysics is not as firm as it appears. One of the most powerful argument for endurantists is that their world view is “everyone’s world view”, from children to rocket scientists. This is the view according to which we behave on daily basis. For this reason, even if we can have problems in dealing with the puzzle cases of identity, we should adapt to them. But the question goes deeper: in metaphysics classes, should we lie on a generally accepted theory or should we try to understand the world even at the cost of revising our commonsensical beliefs? I would opt in favor of the second one.

Although every argument against endurantism should be replied to, here I am not exhausting the whole debate. The point I want to address is different. Taking the generality of diachronic identity into account, endurantism is not able to comply with it. If one accepts **GoDI** on the basis of the acceptance of **GoI**, she should treat identity through time as a general relation that equally applies to different ontological domains. But, according to endurantism, diachronic identity does not behave that way. Endurantists claim that there is an ontological difference between events and the other entities. In fact, endurantism states individuals are *wholly present* at any time they exist. For many endurantists, the very notion of temporal part is unclear or unacceptable when dealing with individuals³⁸ This means individuals are considered as *continuants*, i.e. entities that do not persist

³⁷Of course, this is an objection to endurantism for whom does not think that essentialism is a plausible thesis.

³⁸Cf. Lowe (1987); Thomson (1983); Van Inwagen (1987, 1990).

being composed by temporal parts. While endurantists grant the events having temporal parts.

Roughly speaking, identity through time of events would consist in a relation between temporal parts. Take, for example, the basketball game. It persists through time having temporal parts, and the relation between temporal parts is what matters for its diachronic identity. On the other hand, Leonardo DiCaprio's persistence is grounded on his three-dimensional character, given he is a continuant³⁹. This ontological difference leads to deny **GoDI**.

From a formal point of view, the relations between temporal parts and continuants, are extremely different. Indeed, the relation between temporal parts is not an identity relation, rather a genidentity relation⁴⁰, while for continuants there is identity between the same entity at different times. The ontological form and the formal character are different. There cannot be a general relation that applies to these two different ontological domains, so endurantism cannot maintain the generality of diachronic identity.

This is a conditional argument, of course. It applies only under the circumstances that one accepts the generality of diachronic identity as described above. Otherwise, the debate remains open. But if one does, there is left room for discussion: she should abandon endurantism.

³⁹I will argue in details this argument in section 2.1.2.

⁴⁰Genidentity relation is comparable to the counterpart relation. It is, in Sider (2001a, 194)'s words: «the relation used by the worm theorist to unite the stages of spacetime worms». See Carnap (1958); Reichenbach (1958); Perry (1975); Lewis (1983); Sattig (2008) .

Chapter 2

From Identity to Things

«It's no use to go back to yesterday, because I was a different person then». Carroll (1865)

In the first chapter I have argued in favor of the thesis that identity is a general matter. Maintaining the generality of identity does not require any commitment to a particular metaphysical view about persistence through time. On the other hand, the principle of the generality of diachronic identity has metaphysical implications. If identity through time is general, then it must equally apply to every ontological domain. I have provided reasons to assert that endurantism is incompatible with the generality of diachronic identity, in so far as it is not able to provide such a unified treatment.

The link between the generality of identity and the generality of diachronic identity constitutes the basis of what I call “The Simple View”. A simple viewer accepts that identity and identity through time are general relations. Both perdurantism and exdurantism are able to provide the unified treatment **GoDI** requires. In the first part of the chapter, I will discuss two of the arguments the opponents of the Simple View (the “Complex Viewers”) employ to criticize the transition from **GoI** to **GoDI**.

In the remainder of the chapter, I will support my claim that the exdurantist position is more advisable than perdurantism. In fact, according to my analysis, perdurantism is not able to provide a non-circular and informative definition of

the relation between temporal parts. As a consequence of this argument, in the last part of the chapter, I argue in favor of a “deworming” exdurantism, namely a radical stage view with no aggregates of temporal parts.

2.1 Ontological complexity

In the first chapter I have answered to the critiques to **GoI**. In this section, I will present and reply to two critiques to **GoDI**. Call “The Complex View” the perspective according to which the ontological difference between events, groups and individuals, leads to a metaphysical one. The complex viewers may or may not accept the generality of identity. Of course, they can deny, as I have introduced in the first section of this chapter, that diachronic identity is a kind of identity¹. What they do not accept is that diachronic identity is general, namely that every phenomena of persistence through time should be treated univocally.

There are basically two approaches to deny **GoDI**. The first is usually addressed by endurantists, and it is related to the concept of temporal parts. In fact, if one does not accept that individuals and group are composed by temporal parts, then a unified treatment of the persistence of individuals, groups and events is impossible, given that, on the other hand, events are composed by temporal parts. The second is a specific kind of perdurantism, namely naturalistic perdurantism. A naturalistic perdurantist maintains that some aggregates of temporal parts are natural and some others are not. On this basis, she could argue that the persistence of natural aggregates is based on some natural facts, while the persistence of the other is just a matter of conventionality.

2.1.1 The Simple View

What does **GoDI** imply? Take *The Game Case*, *The Band Case* and *The Morning Star*. In an event like a basketball game, the commentators are discussing whether

¹It can be argued, for example, that we are led to identify diachronic identity as a kind of identity only in virtue of the fact we call it diachronic *identity*. From the fact that Pluto is a dwarf planet we cannot infer that it is a planet too. In fact, Pluto *is not a planet*. This line of reasoning is perfectly coherent: even if we are used to call something *x*, we are not granted that it is *x*.

the game has changed. If we consider a group of people, a band, and we face the gradual replacement of its members, we want to know whether this change makes the band a different thing. Finally, whether Leonardo DiCaprio is the same person during the mornings and the evenings is true according to our concept of person, i.e. to what extent a person can change though remaining the same.

Diachronic identity remains the same relation for events, groups and individuals. By all means, the reason why an event is the same at different times could diverge from groups or individuals. I am not considering criteria of identity here, the generality of diachronic identity is a wider concept². The generality of diachronic identity does not imply that there is no ontological difference among events, groups and individuals. One can also support more fine-grained ontology without discharging **GoDI**. For example, one can argue in favor of sortals, and still thinking that identity through time is the same relation for different sortals. This is because, again, **GoDI** does not imply a further generality about criteria of identity – which are usually considered in order to set ontological differences among things³.

Moreover, the fact that diachronic identity is general does not imply that we can investigate different metaphysical aspects of events, groups and individual either. We can deepen the questions about the relation between parts and whole in groups. We can look for a criterion of personal identity for *The Morning Star*. Or, we can analyze the relation between events and their participants, and so on and so forth.

2.1.2 The enemies of temporal parts

Every basketball game is characteristically divided in four quarters, like every soccer game is divided in two halves, the life cycle of a plant is divided in germination, flowering, fruits' maturation, senescence, and so on. Also groups and individuals are divided in parts. Sugababes can be divided according to its component, and we can take the components of the band apart from one another. Moreover, a

²In fact, the generality of diachronic identity does not depend on criteria of identity. For further reading on criteria of identity, see Lowe (1997, 1989b); Williamson (1990); Dummett (1981).

³Cf. Loux (2006, ch. 8)

person has parts too. Your hand is a part of your body, and so is your head. The leaves are part of the branches, which are part of the tree. And, of course, a consistent number of trees forms a forest.

Everything we have experience of has parts. But there is an important distinction to draw. When we say “the game is composed by four quarters” and “the tree is composed by roots, trunk, branches and leaves” we are talking about two different kinds of parts, namely temporal parts and spatial parts. Temporal parts extend in time while spatial parts extend in space. First of all, let clarify what a temporal part is. Commonly, the fact that events are composed by temporal parts is nearly undisputed. However, in the last fifty years this qualification has been questioned. A large number of philosophers opt for extending the temporal parts also to individuals and groups.

«Persistence through time is like extension through space. A road has spatial parts in the subregions of the region of space it occupies; likewise, an object that exists in time has temporal parts in the various subregions of the total region of time it occupies.» Sider (1997, 197).

The analogy between time and space is helpful to understand what a temporal part of an individual is. Many authors illustrate the topic this way⁴. These friends of temporal parts usually endorses the so-called “four-dimensional” world-view, namely the metaphysics according to which objects are aggregates of temporal as well as spatial parts. The fact that individuals and groups have temporal parts is strenuously criticized by the advocates of the opposite metaphysical view, namely three-dimensionalism. According to three-dimensionalists, only the events have temporal parts⁵, while the other things persist by being *wholly present*. Wiggins (1980, 2001), for example, maintains this ontological gap between events and the other entities by arguing that the former *occupy* periods of time, while the latter *persist* through time. Another strong aversion to the four-dimensional conception of temporal parts comes from Van Inwagen (1981), who claims that the very notion

⁴Cf. Varzi (2003a); Hawley (2001); Sider (2001b) <add others>

⁵*Pace* Chisholm (1973) and few others.

of temporal part is unclear⁶. Let's follow this line of reasoning and assume, for sake of discussion, the critics of temporal parts are right. If so, events have temporal parts and individuals and groups have only spatial parts. In conclusion, suppose that they endorse **GoDI**. Take the following instances of identity over time

(*) Heat-Knicks game *at* t_1 = Heat-Knick game *at* t_2 ;

(**) Leonardo DiCaprio *at* t_1 = Leonardo DiCaprio *at* t_2 .

It seems that (*) and (**) are instances of the schema of diachronic I have introduced in the first chapter:

(2) a *at* t_1 = b *at* t_2 .

But, at a closer look, if we support thesis similar to Wiggins' one, they are not. Let make some substitutions. In (*), take t_1 to be the first quarter of the game, and t_2 the second one. In (**) take t_1 to the morning, and t_2 the evening. Then we have:

(*[^]) Heat-Knicks' *first quarter of the game* = Heat-Knicks' *second quarter of the game*;

(**[^]) Leonardo DiCaprio *in the morning* = Leonardo DiCaprio *in the evening*.

But (*[^]) and (**[^]) instantiate two very different relations. In fact, while (**[^]) is an instance of (2), (*[^]) is not. Saying that Heat-Knicks first quarter is identical to the second one is false. If events have temporal parts, then diachronic identity statements like (*[^]) are *genidentity* statements. A temporal part can be strictly identical only to itself. The two temporal parts taken into consideration are distinct: they are two different periods of time of the same event. Genidentity relation has the following form:

(3) a *at* t_1 is a temporal part, b is a temporal part *at* t_2 : a =_G b.

⁶«I simply do not understand what these things are supposed to be, and I do not think this is my fault. I think that no one understands what they are supposed to be, though of course plenty of philosophers think they do» (p. 133).

where $=_G$ means: «to be part of the same portion of matter»⁷. (3) and (2) are two very different relations. Given that (*) and (*[^]) are equivalent, (*) is not an instance of (2). So, the position according to which events only have temporal parts, is not appropriate for **GoDI**, for different ontological domains identity through time applies in different ways.

If we hold the first type of Complex View, we face two choices: stating that events do not have temporal parts, or assuming **GoDI** is false. The first branch if this disjunction is a really hard choice to make. How can we deny that events are divided in a temporal parts? I don't see any plausible defense of such a thesis: events are not static entities. From a tridimensional perspective, this is what differentiate them from groups and individuals, as the previous quotations by Wiggins and van Inwagen suggest. On the other hand, stating that **GoDI** is false is not an easy path to follow. According to three-dimensionalists, diachronic identity is a genuine case of identity. So, why should they deny the passage from **GoI** to **GoDI**? Why, if identity is a general matter, identity through time is not?

2.2 Naturalistic Perdurantism

Take soccer teams, pop-rock bands, nations, and so on. The persistence of such things has, at least in a sense, a conventionalist character. Consider the Band Case. Call Sugababes₁ the band formed by the original members in 1998: Siobhán Donaghy, Mutya Buena and Keisha Buchanan. Call Sugababes₂ the band with Siobhán Donaghy replaced by Heidi Range. Call Sugababes₃ the band with Siobhán Donaghy replaced by Heidi Range and with Mutya Buena replaced by Amelle Berrabah. Call Sugababes₄ the band with Siobhán Donaghy replaced by Heidi Range, with Mutya Buena replaced by Amelle Berrabah and with Keisha Buchanan replaced by Jade Ewen. Call Sugababes₅ the band formed again by the original members in 2011.

⁷Sider (2001a, 225).

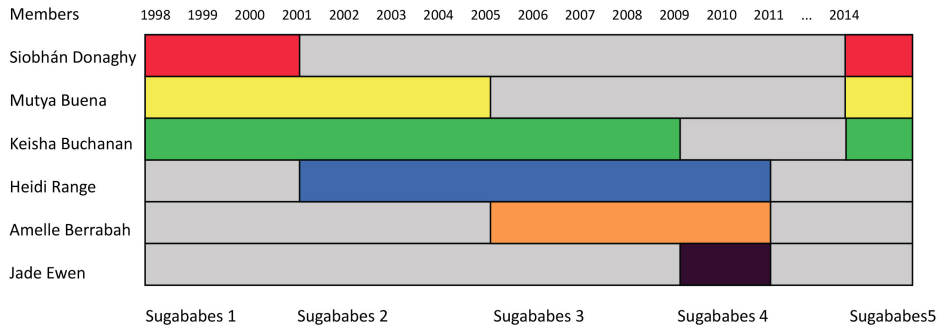


Figure 2.1: Sugababes over time

We can now ask ourselves the following question: in which way do the Sugababes persist? How can we identify Sugababes_1 with Sugababes_4 even if all the members of the original band have been replaced? One viable option is to say that persistence of groups is a matter of conventionality, while persistence of events and individuals is not. One could be tempted to say that, provided that groups are formed and persist by conventions, they are not *as natural* as the other entities. If, in order to increase sales, the record company decided to create a new band with the four original members of Sugababes called Honeybabes, this would lead us to consider Honeybabes different from Sugababes. The fact that Sugababes_3 is identical to Sugababes_4 is as arbitrary as the fact that Sugababes is distinct to Honeybabes. It is sufficient that the record company, the band members or a third party decides if Sugababes is identical to Honeybabes, or if Sugababes_3 is identical to Sugababes_4 .

2.2.1 Restricted Conventionalism

Regardless on the decision we settle on, it will be a matter of conventionality. This issue does not only concern bands, but a vast number of groups. Take, for instance, the sport teams. A team can change name and/or location (NBA team Oklahoma City Thunder where previously known as Seattle SuperSonics), can merge with another team (Italian Serie A team Sampdoria is the merge of

two pre-war teams: Sampierdarenese and Andrea Doria), gradually change all its players, undergo bankruptcy and so on and so forth, and still be considered the same team. Moreover, take one of the most important socio-economic entities: nations. To what extent a nation can change (borders, language, currency, legislature, constitution, ...) though remaining the same? All these questions involve conventions.

If the examples I have provided present this conventional aspect, it seems that the majority of beings does not. While the persistence of Sugababes is a conventional fact, existence and persistence of people, trees, microwaves, boiling water and building constructions is not. This line of reasoning can lead to the second approach to reject the thesis that a unified treatment of all the phenomena of persistence is needed. Stating that some groups or some individuals (like artifacts) persist in a conventional way, while other entities persist according to natural joints is the second version of what I have called the Complex View. If conventionality applies only to some entities, there will not be generality of persistence, because there will not be a univocal way to treat all the phenomena of persistence.

Once we discard endurantism for not being the best choice for a unified treatment of the phenomena of persistence, perdurantism and exdurantism are left on the table. This is to say that we can keep supporting the generality thesis in a four-dimensional world. But we cannot take the generality for granted, even in such a metaphysical picture. If a perdurantist is what I call a “naturalistic perdurantist”, she will be able to reject the Simple View, by adopting different ontological categories for different kinds of four-dimensional worms. In the next section I will show the implausibility of this move.

2.2.2 Egalitarianism

According to perdurantism a numerical same object which exists at different times does not exist. Objects are aggregates of temporal parts as well as spatial parts, each existing at a time. But what is the relation between the temporal parts of a single aggregate? In the four-dimensional world-view, given the mereological principle of the unrestricted composition, for any temporal parts there is a

mereological aggregate of those temporal parts⁸.

Perdurantists consider all the aggregates on the same metaphysical level, i.e. we can quantify on and talk about all of them without differentiating. Despite this *worm equality*, someone might be tempted to say that there is a difference between some worms and others. To paraphrase George Orwell's Snowball in *Animal Farm*, all worms are equal, but some worms are more equal than others. In particular, it might be argued that some worms are in some sense natural, e.g. worms that instantiate natural sortals, or worms all of whose parts are homogeneous and nicely connected, and others that are not. This is a version of what Hirsch (1993) calls *ontological inequality*. Let's call it *naturalistic perdurantism*.

I argue, against this position, that a perdurantist who accepts the unrestricted composition cannot set any significant metaphysical difference between worms. I do that by showing that this problem is analogous to the so-called *special composition question* (SCQ), i.e. the question about under what circumstances some things compose a single object. If the SCQ distinguishes between which aggregates exist and which do not, what I call *special nature question* (SNQ) distinguishes between which aggregates are natural and which are not. Given this analogy, I suggest that the vagueness argument against the restricted composition can be applied, *mutatis mutandis*, to the idea that some aggregates are acceptable while others are not.

When a perdurantist accepts unrestricted composition, she adopts universalism. She has all the possible aggregates in her ontology, given that universalism states that every possible aggregate exist. According to her ontology, some aggregates are the objects we are familiar with: persons, chairs, skyscrapers, swimming trunks, and so on. Call this first *kind* of aggregates \mathbf{N}_a . Moreover, she has an even larger number of aggregates that we can call *freaky*, \mathbf{F}_a . Freaky aggregates are the sums that are not part of standard ontology. The \mathbf{F}_a are Lewis (1991, 7-8)' *trout-turkeys*, Hirsch (1992, 32)'s *incars and outcars*, Chisholm (1973)'s aggregate of temporal parts of his left foot and Grand Central Station, and so on.

Certainly, one can state there is no difference between \mathbf{N}_a and \mathbf{F}_a . This

⁸I will take unrestricted composition and all the other mereological principle into account in the next chapter.

position is compatible with the simultaneous acceptance of universalism and perdurantism. But if one tries to justify the commonsensical intuition that, given that the \mathbf{N}_a are natural, they have a sort of ontological supremacy on the \mathbf{F}_a , it becomes problematic.

What is (if any) the metaphysical difference between \mathbf{N}_a and \mathbf{F}_a ? One could answer that aggregates like \mathbf{N}_a are homogeneous, i.e. well-organized and well-connected with each other. In this respect, one could say that the \mathbf{N}_a instantiate natural sortals in virtue of their homogeneity. “There is something *in the temporal parts themselves* that guides our categorization of the aggregates”, and “All the temporal parts of Elizabeth II are related in a compatible way, such that the temporal part of a trout-turkey are not”, she might say.

A further question is: what does “natural” mean? Put the definition of “natural” you favor. Broadly speaking, what I have in mind is “natural” as opposed to gerrymandered, arbitrary, conventional⁹, wildly assorted. For example, one could think of a natural worm as one whose temporal parts are spatially continuous, in which case the aggregate of the Chisholm’s left foot and Grand Central Station would not be natural. Otherwise, one could think that a natural worm is one whose temporal parts are causally continuous. In this case, a trout-turkey would not be a natural worm¹⁰.

The position originated from these answers to the two questions presented above (what is the difference between natural and freaky aggregates? What does natural mean?) is *naturalistic perdurantism*, i.e. the position according to which there is a metaphysical difference between worms based on some natural properties they instantiate. I argue that *naturalistic perdurantism* is a loose attempt to put

⁹I’m using “conventional” in Heller (1990)’s sense. He has an argument in favor of the existence of such aggregates, based on an instance of the vagueness argument. I will use an instance of the vagueness argument too, but my strategy is different, as well as my formulation of vagueness argument. While Heller wants to argue in favor of the existence of conventional objects, I want to criticize the ontological distinction between natural and conventional aggregates.

¹⁰The distinctive feature that makes some aggregates natural and others freaky has not to be intended as a cognitive process. It is not important if we *recognize* something as natural, or if something seems natural to us. We are looking for an objective criterion, i.e a criterion based on the properties of temporal parts, not on our ability to identify them as related in a particular manner. In fact, although we can disagree on which aggregates are natural and which are not, we can believe there is something independent from our evaluation that fastens the temporal parts as the rings of a chain.

together some pre-philosophical intuitions with the perdurantist account. Why should we have to posit that if something appears to us natural or intuitive, then it has to play a substantial role in our ontology? I am not convinced by this line of reasoning. In this way I think it look like are just *ontologysing* a distinction we like, by doggedly looking for a natural correspondence for our distinction in the world.

2.2.3 Special Composition Question and vagueness

I try to weaken naturalistic perdurantism by an analogy. I argue that the problem of telling the difference between the natural and the freaky worms is the analogue of the problem of telling under what circumstances some things compose a single object. The second part of the analogy is Van Inwagen (1990, 31)'s *special composition question*¹¹:

SCQ What would one have to do – what *could* one do – to get the *x*s to compose something?

The answers to the SCQ are of four kinds: (i) the nihilists argue the *x*s never compose an object; (ii) the universalists argues that the *x*s always compose an object; (iii) someone proposes an in between solution - like Van Inwagen (1990) himself when he states that only “living things” exist; (iv) the *brutalists* argue that there is no true answer because «it is just a “brute fact” that the relevant objects compose something»¹².

My idea is that naturalistic perdurantism is a way of putting forward again the SCQ in a universalist world. As perdurantism accepts unrestricted composition, it entails (ii). So, according to a perdurantist, every material object composes something¹³. But once one endorses universalism and wants to justify a difference between *kinds* of aggregates, another question, analogue to the SCQ, arises, i.e. the *special nature question*:

¹¹I will specifically analyze the special composition question in the next chapter.

¹²Markosian (1998a, 214)

¹³For my purpose, it does not matter whether (ii) is the right answer to the SCQ. It is trivial that *if* one accepts the unrestricted composition, *then* she is forced to endorse (ii).

SNQ What would one have to do to get temporal parts to compose a natural worm?

If, in the SCQ the problem is to separate the sums that exist from the ones which do not, in the SNQ the problem is to distinguish between natural and freaky aggregates. The answers to the SNQ are of two kinds: (i*) regardless how temporal parts are related, it is impossible to set any difference between worms; (ii*) temporal parts have to be related in such a way that the aggregates instantiate a natural sortal; (iii*) it is a brute fact that some aggregates are natural and some others are not. Even if these answers slightly differ from the ones to the SCQ, we can glimpse a similarity. While (i*) is the analogue of (i) and (ii), given that we can read it as “no matter what, every aggregate is natural” or “no matter what, no aggregate is natural”, (ii*) can be considered as the analogue of (iii) and (iii*) as the analogue of (iv).

How to deal with this analogy? I argue that the vagueness argument against restricted composition [Lewis (1986); Sider (2001a)] can be applied, *mutatis mutandis*, to the SNQ. Here I agree with Hawley (2001, § 3.6)’s assessment of the idea that naturalness comes in degrees. In this respect, if the vagueness argument leads to accept universalism, then its “naturalistic version” will lead to reject naturalistic perdurantism.

When bits of matter are arranged in certain ways, an object—say, a person—comes into existence; and that thing goes out of existence when the bits cease to be arranged in the appropriate way. But what sorts of arrangements are suitable? If one arrangement is suitable, then a very slightly different arrangement would seem to be as well. Iterate this procedure, and we have the conclusion that objects always come into and go out of existence, no matter how bits of matter are arranged.¹⁴

Consider a series of possible worlds $W_1 \dots W_n$. In W_1 there is a person, Peter¹, whose body consists of n molecules. In W_2 there is something, Peter², that is

¹⁴Sider (2001a, 120).

exactly like Peter¹, except for one molecule of his body, which has been replaced by a molecule of a scrambled egg. The difference is negligible, so it is reasonable to suppose that Peter² is a person, too. At least, it is reasonable to suppose that Peter² exists: it is a legitimate mereological fusion, if Peter¹ is. More generally, for each $k \leq n$, world W_{k+1} contains something, Peter^{k+1}, that is a perfect copy of Peter^k, except for one molecule, which in Peter^{k+1} is a molecule of a scrambled egg. Thus, in W_n there is something, Peterⁿ, who consists entirely of molecules of a scrambled egg. Never mind whether Peterⁿ is a person. Since there appears to be no cut-off value of k such that Peter^k counts as a legitimate mereological fusion while Peter^{k+1} does not, this scenario yields a sorites that supports the argument from vagueness for mereological universalism.

Transposing Sider's version of it, we can consider a slightly different argument. If we move from aggregates of molecules to aggregates of temporal parts, we can construct the same dialectics.

When temporal parts are arranged in certain ways, an object—say, a person—*is a natural worm*; and that thing *is not natural* when the *temporal parts are not well-organized and well-connected each other*. But *when are temporal parts related in such a way?* If *two temporal parts are well-organized and well-connected each other*, then a very slightly different *temporal part* seems to be as well. Iterate this procedure, and we have the conclusion that *temporal parts are well-organized and well-connected each other*, no matter *which temporal parts are connected*.

Suppose that in world W_1 there is a person, Carl¹, who is an aggregate of m person stages, Carl¹₁... Carl¹ _{m} . According to a naturalistic perdurantist, Carl¹ is a natural worm. Now pick a j somewhere in the middle between 1 and m , let n be the number of molecules composing the body of Carl¹ _{j} and consider the series of possible worlds W_1 ... W_n defined as follows. In W_2 , there is a sequence of temporal stages Carl²₁... Carl² _{m} such that Carl² _{i} is a perfect duplicate of Carl¹ _{i} for each $i \leq m$ except for Carl² _{j} , which differs from Carl¹ _{j} in that one of his molecules has been replaced by a molecule of a scrambled egg. In spite of this difference, it is reasonable to suppose that Carl² _{j} counts as a person stage, if Carl¹ _{j} does.

After all, the difference is negligible. Hence, it is reasonable to suppose that $\text{Carl}^2_1 \dots \text{Carl}^2_m$ count as a natural worm, if $\text{Carl}^1_1 \dots \text{Carl}^1_m$ do. If the naturalistic perdurantist allows this move, then she opens the door to a diachronic analogue of the vagueness argument for mereological universalism. The move can be iterated so that each W_{k+1} contains something, Carl^{k+1} , whose temporal stages are exactly like those of Carl^k except for Carl^{k+1}_j , which differs from Carl^k_j in that a new molecule has been replaced by a molecule of a scrambled egg. In particular, in W_n we have that Carl^n_j consists entirely of a scrambled egg and is not, therefore, a person stage. Thus, Carl^n is an aggregate composed of $m-1$ person stages and one scrambled-egg stage. Yet the naturalistic perdurantist is not in the position to pinpoint any cut-off value of k such that Carl^k counts as a natural worm while Carl^{k+1} does not.

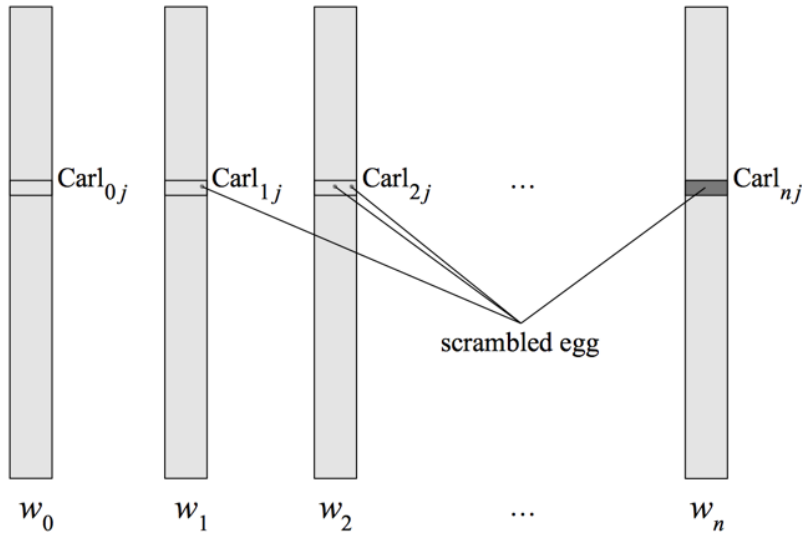


Figure 2.2: Scrambled egg

2.2.4 All worms are equal

The analogy leads to deny naturalistic perdurantism. In fact, the temporal part version of the vagueness argument leads to the idea that it is impossible to tell

the natural apart from the freaky worms. Moreover, it is also impossible to define what a natural worm is, given that we are not able to define “natural” without coming across, once and again, the sorite originated from the vagueness argument. Distinguishing between natural and freaky worms is structurally analogue to distinguishing between which aggregates exist and which do not. Once we have bought universalism and consequently accepted all the possible aggregates, how can we draw any ontological line between them (short of accepting brute facts)? In light of my argument, the simple answer is that we cannot.

2.3 A world of temporal parts

In the first part of the chapter I have presented two possible options to the Simple view, namely a critique of temporal parts, and naturalist perdurantism. In the next sections I will address a critique to classic perdurantism, on the basis of the circularity of the relation between temporal parts.

The acceptance of this concerns also exdurantist position. In fact, given that usually exdurantists accept aggregates of temporal parts in their ontology, they have the same problem of perdurantist (even if aggregates are not central in their metaphysics). For this reason, in the last part of the chapter, I will illustrate a radical form of exdurantism, free of four-dimensional aggregates.

2.3.1 Relation between temporal parts

Recall the Fission Case, presented in §1.2.4. It is puzzling because, at the end of the experiment, we have that $Derek_1$ is identical to Derek and that $Derek_2$ is identical to Derek even if $Derek_1$ and $Derek_2$ are distinct. This thought experiment has generated a vast debate in many areas of philosophy. It is puzzling in respect to our common intuitions on personal identity: we have all the features that usually allow us to claim personal identity between Derek, $Derek_1$ and $Derek_2$ but cannot actually do it, without arguing against the transitivity of identity and the principle of the identity of indiscernibles. But the amoebic division is problematic also from a mere metaphysical point of view. Depending on which metaphysics we use to explain (or to solve) the puzzle, we examine other classical metaphysical issues:

from persistence to spatio-temporal coincidence, to the generality of identity and so on.

One of the most interesting solution to the fission case is offered by Derek Parfit (1971, 1984), with the so-called “identity doesn’t matter view”. In short, Parfit supports his thesis with the following argument. (i) Identity has a certain formal character, such that it does not permit degrees, and it is a one-one relation. (ii) A criterion of personal identity does not have the same formal character. The above fission example shows how this relation can be one-many or many-many. (iii) We cannot consider that two relations with different formal characters go together, so we have to give up identity, the relation which poses the paradox. What matters for Derek’s survival whether Derek₁ or Derek₂ is identical to him, but rather if Derek has a certain psychological relation with them, even if it does match with identity. Personal identity is not dependent on identity. It would be the case that, to say, Derek₁ is the *best candidate* for the persistence of Derek even if Derek₁ is not the same person as Derek.

Parfit’s solution, if correct, would solve the perplexities arisen from the puzzle in respect to personal identity. But, from a metaphysical point of view, we need a strong justification in order to reject diachronic identity with respect to personal identity. It is not a coincidence that “identity doesn’t matter” has been discussed by David Lewis in a famous tit for tat between him (1983) and Parfit (1976). Lewis argues that his position can be assimilated to Parfit’s¹⁵. According to Lewis himself, the only difference between their positions is that: «Derek Parfit rejects my attempt to square his views (which are mine as well) with common sense» (Lewis (1983, 73)). Here, I am not interested in a historical reconstruction of this debate, nor in a perdurantist reading of Parfit’s work. What I am interested in, is Lewis’ answer to this puzzle. Lewis is probably the most famous and influential perdurantist. He believes that objects are mereological aggregates of temporal parts. His solution to the fission problem is to accept coincident entities. Two four-dimensional coincident objects are simply objects that share their temporal

¹⁵Lewis is not the only one who believes that IDMV can be endorsed in a four-dimensional framework. Merricks (1999) argues that IDMV, along with all the psychological theories of personal identity, is committed to a four-dimensional metaphysics.

parts. There is not a real coincidence problem¹⁶. In the fission case, Derek₁ and Derek₂ share all their temporal parts until the division. They exist as coincident objects in that interval and as non-coincident after the fission. With this so-called *multiple occupancy thesis* Lewis wants to save the common-sense platitude of identity, by arguing that identity matters, in so far as Derek₁ and Derek₂ existed before the division.

(1) R-relation =_{df} relation of mental continuity and connectedness among person-stages;

(2) I-relation =_{df} relation that holds among several stages of a single continuant person.

R-relation is mentioned – even without any reference to temporal parts – by Parfit (1971, 1984), and it is a criterion of personal identity. (2), on the other hand, is a relation about aggregates. In fact, while (1) provides a kind of *loose* connection, (2) provides a *strong* connection between stages. Take a temporal part of Derek before the division, D₁, and a temporal part of Derek₁ the instant after the fission, D¹₁. D₁ and D¹₁ are surely R-related. But this is not sufficient to consider them as temporal parts of the same person. D₁ and D¹₁ are temporal parts of the same person if and only if they are I-related. It is not clear if the fact that two temporal parts are I-related implies that they are also R-related, but we can skip this concern. According to a perdurantist, D₁ and D¹₁ are R-related, because they exemplify psychological continuity and connectedness. And they are I-related because they are temporal parts of a single object. Consider now Lewis' definition of what a single continuant person is:

(3) Person =_{df} mereological aggregate of I-related person stages.

There is something odd here. We need the definition of “single continuant person” in order to understand what I-relation is. But if the definition of person is of the kind of (3), our definition of I-relation becomes:

(2*) I-relation =_{df} relation that holds between several stages of a single mereological aggregate of I-related person stages.

¹⁶Cf. Sider (2001a, 152-153).

We cannot accept (2*). It is not only non-informative, but also circular. Actually, it is very difficult to give a definition of *I-relation* that can provide a good criterion. Lewis is the only one who tries to define it, while others rest on his definition, or are not interested in a in-depth examination¹⁷.

A suitable explanation of the circularity of the *I-relation* concerns directly the nature of the perdurantist metaphysics. In fact, perdurantism accepts the so-called *unrestricted composition*, according to which for any set of temporal parts there is a mereological fusion of those temporal parts. Given this mereological principle, it is necessary to have a particular relation that is able to pick particular mereological aggregates up. It is trivially true that two temporal parts belong to the same object, since for any temporal parts there exists an object that is the fusion of them. This is the reason why perdurantists need the *I-relation*. So, try to reformulate it avoiding the circularity. We can attempt to consider *I-relation* as a relation of causal dependence and spatiotemporal and qualitative continuity¹⁸.

(4) *I-relation* =_{df} relation of causal dependence and spatiotemporal and qualitative continuity between temporal parts.

I-relation as characterized in (4) is informative and non-circular. Unfortunately, it does not provide sufficient or necessary conditions. It is not difficult to imagine cases in which even if two temporal parts are related in that way, they are not part of a particular aggregate. Consider D_1 , Derek's temporal part at t_1 , where t_1 is the instant before a fatal heart attack, and D_2 , Derek corpse's temporal part at t_2 , where t_2 is the instant right after Derek death. Between D_1 and D_2 there is a causal dependence relation. In the same way D_1 is causally dependent from D_0 , Derek's temporal part at t_0 , with $t_1 > t_0$. Moreover, D_1 and D_2 are spatiotemporally and qualitatively continuous. In this respect there is no better successor for D_1 than D_2 . Nevertheless, D_1 and D_2 do not belong to the same aggregate "Derek", because it would be inappropriate to include in a person-aggregate a corpse's temporal part. In the same way D_1 does not belong to the aggregate that has D_2 as the first temporal part, because it would be inappropri-

¹⁷See Sattig (2008), Sider (2001a, 194).

¹⁸Cf. Sattig (2008, 183).

ate to include in a corpse-aggregate a person's temporal part. This is certainly a problem that necessitates a revision to (4). But it is unclear what kind of revision is needed, given that even if we ensure that the temporal parts have to instantiate the same sortal, it remains problematic¹⁹.

2.4 Deworming the world²⁰

In the previous part I have shown the difficulty to characterize in a non-circular way the relation among temporal parts. This is a substantial shortcoming for a theory of persistence. And this is not a trouble for Lewis' theory only. To my knowledge, there is no other suitable way to describe it. Sider (2001a, 190) says that the relation between temporal parts, called "genidentity", "unity relation" or "I-relation" can be «analyzed in some way (in the case of persons perhaps in terms of memory or bodily continuity) or taken as a primitive». My argument illustrates that I-relation cannot be analyzed in terms of a criterion of identity, nor it can be taken as primitive, in so far as it is circular and non-informative.

What, then? My argument does not collide with the idea of a four-dimensional world-view. It only shows that perdurantism is not able to provide a good criterion for the relation between temporal parts. Although, according to exdurantism, the aggregates of stages does not play an important metaphysical role, so exdurantism can still work as a good metaphysics for the supporters of the generality. In this part, I will discuss an option for exdurantists: given that the relation between stages is not clearly characterized, what if exdurantism gets rid of them?

2.4.1 What are worms for?

As noted, many exdurantists claim to share a "common metaphysical picture" with the perdurantists (Hawley, 2001, 48). Some consider their view to be a mere version of perdurantism (Sider, 2001a, 218), one which, from the metaphysical point of view, is committed to instantaneous temporal parts, the stages, and that, from the semantic point of view, takes these stages – and not the worms – to be

¹⁹See Varzi (2003b)

²⁰This section is co-authored with Damiano Costa.

the referents of the singular terms of our ordinary language²¹. It is worth noting that according to a framework where there are both worms and stages, but where the ordinary objects we usually speak about and quantify over are the stages, the worms do not play any additional role. In Varzi's words,

The stage view is truly reductionist, in that all the work is done by the time-bound stages; their temporally extended aggregates, if such there be, add nothing. (2003, 407)

For exdurantists, worms seem to be nothing over and above a logical consequence of their acceptance of an independent mereological view, mereological universalism, a.k.a. unrestricted composition, according to which for all the entities there exists such a thing as the mereological sum, or fusion of those entities (Sider, 2001, 7). Given mereological universalism, the existence of worms is a trivial consequence of the existence of stages. However, mereological universalism has been questioned, not only by advocates of the commonsensical view stating² that some sets of entities compose wholes while some others do not, but also by recent defenses of the other radical option, mereological nihilism, according to which no composite object exists or, in other words, for no set of entities there is such a thing as their mereological sum (Rosen and Dorr, 2002; Sider, 2013; Van Inwagen, 1987, 1990).

It is also interesting to note that, *modulo* universalism, there really are no reasons for an exdurantist to accept worms in her ontology. One may think, for example, that (i) if time is gunky – hence if there are no instants of time – there may be worms and gunky temporal parts, but no stages – which are instantaneous (Hawley, 2001, 52). Similarly, one may think that (ii) with the worms one could more easily make sense of propositions that seem to be about ourselves in the past and the future. However, at a closer look, these are not reasons for an exdurantist to accept worms in her ontology. Since they require (i) to do without instantaneous stages or (ii) to identify ordinary objects with worms, they are rather reasons for an exdurantist to stop being an exdurantist and become a standard perdurantist instead.

²¹See Hawley (2001); Sider (1996, 2001a); Varzi (2003a)

2.4.2 All world's a stage (for real)

If on the one hand there seem to be no reason, *modulo* universalism, for an exdurantist to accept worms in her ontology, on the other hand there seem to be reasons to remove such worms. First, there are concerns about ontological parsimony. Notice that the case of worms is different – worse, actually – than other cases in which ontological parsimony has been invoked. Consider universals, for example. Universals are usually introduced to perform some noble metaphysical work, e.g. to offer an explanation of similarity relations. Of course there is always room for disagreement about the real necessity of universals to explain similarity, but at least friends of universals think that universals are there for a purpose, their existence has a meaning. Not so about the exdurantist's worms, which are there for no purpose at all. If there is a case in which Occam's Razor should be used, it surely is this one. Moreover, exdurantism is typically introduced as the temporal analogue of modal counterpart theory: just as counterpart theory says that no entity exists at more than one world, so exdurantism says that no entity exists at more than one time. Similarly, just as counterpart theory identifies ordinary substances with world-bound entities, so exdurantism identifies ordinary objects with instantaneous stages²². And just as counterpart theory does not introduce transmundane worms one would expect exdurantism not to introduce transtemporal ones. Hence, I define radical exdurantism in the following way:

RadicalExdurantism Entities are instantaneous stages that do not ultimately persist and do not temporally compose.

The interest of a dewormed version of exdurantism may also come from the careful consideration of the views with which it may be conjoined and the results that would come from this conjunction. For example, as I will explain in section 3.2.2, dewormed exdurantist might consider conjoining her view with mereological nihilism.

²²On the analogy between exdurantism and modal counterpart theory see Hawley (2001); Sider (1996); Varzi (2003a).

2.5 Exdurantism and diachronic identity

I have argued that radical exdurantism, i.e. exdurantism free of aggregates, is our best metaphysical option. The premises of my argument are two principles: the Generality of identity and the Generality of diachronic identity. The line of reasoning from the premises to the conclusion is the following. If we accept both **GoI** and **GoDI**, we need a metaphysics able to provide a unified treatment of all the phenomena of persistence. I have shown that, on the one hand, endurantism is not able to achieve this task and, on the other, perdurantism does not offer a satisfying characterization of the relation between temporal parts. On the contrary, radical exdurantism offers the unified treatment and does not suffer from the problems of the circularity of the I-relation.

However, someone might argue that

1. The generality of identity leads to the Generality of diachronic identity on the assumption that
2. Diachronic identity is a genuine case of identity.
3. The generality of diachronic identity we need a unified treatment of all the phenomena of persistence;
4. The theory that satisfies this requirements without setbacks is radical exdurantism, but
5. Radical exdurantism deny (2.).

In fact, according to radical exdurantism nothing persists over time, because entities are instantaneous stages, each of which is different at any instant. The conclusion of this line of reasoning is that diachronic identity never occurs, so the argument is invalid.

But this perplexity does not affect radical exdurantism. Radical exdurantists deny that there is something that persists, i.e. that there are actual instances of diachronic identity. This is extremely different from arguing that diachronic identity is not a genuine case of identity. On the contrary, according to radical exdurantism, diachronic identity and synchronic identity are one and the same

relation. In an exdurantist world there is not the usual distinction between these two kinds of identity, in so far as there is not actual persistence.

Chapter 3

The Simplicity of Everything

It can be argued that what I have defined as “the Simple View” is not simple at all, for it is not in line with our pre-philosophical intuitions. If, as I argue, to endorse the Simple View one should accept what Heller (1990) might illustrate as a non-standard ontology¹, then the Simple View is revisionary as it implies a sort of renewal of our attitude towards what there is. However, endorsing an endurantist metaphysics would have the advantage of better complying with the commonsensical view about persistence of objects, rather than with the Simple View framework based on the generality. For this reason, perdurantism and exdurantism are required to meet the burden of proof, by providing more arguments to defend themselves.

I acknowledge that this reason can lead us to seriously question this commitment demanded by radical views, but it is not a real argument in favor of the standard ontology, nor it is a motive to reject a thesis on the basis of its counter-intuitive aspect. Besides, in many philosophical disputes there are standard positions, as opposed to revisional theories. Take, for instance, the quarrels between dualism and materialism, nominalism and realism, and so on. There are no positions dissolved by the above-mentioned line of reasoning. The revisionists should accept the fact that their theories entail an additional effort to become

¹Heller illustrates the standard ontology as the metaphysics according to which every-day objects like lamps, i-Pads, mountains and people are three-dimensional objects which persist with a three-dimensional shape. The Simple View encourages to drop three-dimensionalism in favor an exdurantist position, so it suggested a different ontology.

more intelligible and charming. Once the revisionists take this step, the conservatives, i.e. the ones that accept the standard views, should not criticize the counter-intuitiveness of the formers' thesis. The attempt to equal out the intuitiveness should be paid back with the evaluation of the thesis only according to the coherence and the robustness of its arguments.

The Simple View – and the principles that it entails, namely the Generality of Diachronic Identity and the Generality of Persistence – is simple in as much as it offers a coherent and smooth way of treating persistence. Yes, it requires the revision of almost all our intuitions about time, change and survival. But who can assure us that our intuitions are correct?

In this chapter, I will expand the Simple View from time to space, by endorsing mereological nihilism. Recalling the last section of the previous chapter, I argue that forasmuch as a radical exdurantist advocates a deworming world, her attitude towards spatial composition should be analogue. In fact, if she denies temporal composition and provides reasons against the existence of temporal aggregates, she should behave similarly in relation to spatial aggregates.

3.1 From time to space

In the second chapter, I have defended one theory of persistence, namely exdurantism. The reason exdurantism is more advisable than endurantism lies in what I describe as “generality”. I provided reasons in support of the idea that endurantism is not able to offer a unified treatment for all the phenomena of persistence through time and change. A perdurantist, on the other hand, can support what I call “the generality of persistence”, i.e. the principle according to which every case of persistence through time should be treated univocally. Nonetheless, perdurantism presents a downside: the relation between temporal parts is circular and non-informative. For this reason, I suggest to reject perdurantism and to adopt a radical version of exdurantism, free of four-dimensional aggregates.

The rejection of the aggregates perdurantism and exdurantism refer to is not an easy choice to make. Indeed, exdurantism itself is quite a revisional thesis. The radical exdurantism I propose is a revisional version of a revisional thesis and,

of course, I do not expect it to be accepted easily. Nevertheless, if the relation among temporal parts is truly problematic and if the classic exdurantism accepts aggregates (even without any metaphysical weight), then we are in need of a sort of revision.

Moreover, the dewormed version of exdurantism suggests a further step. Classically, exdurantists, as well as perdurantists, accept the mereological principle of unrestricted composition, according to which for any entities there exists their mereological sum (or fusion). If so, aggregates of temporal parts, as exdurantists claim, come for free. But this, as I will explain, is not enough, at least for a dewormed exdurantist. For this reason, she should endorse mereological nihilism, the view according to which no composite objects exist. In the remainder of the chapter, I will present the basic features of mereology, in order to provide a summary of mereological nihilism and its implications.

3.1.1 Ground mereology

Mereology is the theory of the relation of parts to whole and the relation of part to part within a whole. In the natural language, there is not a univocal way to describe the concept of “to be part of”. For example, when I say that “the handle is part of the door”, “the left half is your part of the cake”, “that area is part of the living room”, “the second quarter is part of the game”, “the gin is part of Martini”, I am using the word *part* in four different ways. Respectively, to indicate a portion attached to the remainder, a part arbitrarily demarcated, an immaterial part, a temporal part and to be part of a mixture composite². Despite of these manifold uses, we can characterize the very notion of parthood as indicating any portion of a given entity. This neutral notion of part is the cornerstone of mereology.

Classical mereology states that “to be part of” is a two-places relation with no ontological restrictions, so it applies to all entities, no matter what ontological category they belong to. Moreover, parthood relation is not relative to time, space, worlds, sortals etc. Furthermore, as Lewis (1991) states, mereology is considered “ontologically innocent”. In fact, according to mereology, given certain objects, no further ontological commitment is required for the existence of their sum.

²Cf. Varzi (2014).

Hence, we can say that mereology is general, in the same way that, in the previous chapters, I argued identity is. And, similarly, this characterization of mereology as general (or, in other words, neutral) has also been questioned³.

The language of the theory is a first-order language supplemented with a distinguished, binary predicate constant, “P”, to be interpreted as the parthood relation. The so-called “Ground Mereology” is the starting point theory, built from three proper axioms of P:

$$(P.1) \quad Pxx$$

$$(P.2) \quad (Pxy \wedge Pyz) \rightarrow Pxz$$

$$(P.3) \quad (Pxy \wedge Pyx) \rightarrow x = y$$

This is to say that, according to ground mereology, the relation is reflexive (P.1), that if y is part x and z is part of y , then z is part of x (P.2), and that if y is part x and x is part of y , then x is identical to y (P.3).

From the notion of part and (P.1), (P.2) and (P.3), other mereological predicates can be introduced :

$$(PP) \quad Ppxy \Leftrightarrow Pxy \wedge \neg x = y^4, ^5.$$

$$(PE) \quad PExy \Leftrightarrow Pyz \wedge \neg x = y$$

$$(OL) \quad Oxy \Leftrightarrow \exists z (Pzx \wedge Pzy)$$

$$(UL) \quad Uxy \Leftrightarrow \exists z (Pxz \wedge Pyz)$$

These predicates form the basis of the classic notion of mereology. According to (PP), y is a proper part of x iff y is part of x and y is not identical to x . On the other hand, y is a proper extension of x iff z is part of y and y is not identical to x (PE). It is the case that y overlaps x iff there exists z , such that z is part of x , and z is part of y . (OL) holds when x and y have a part in common, when x and y are the same object or when x is a proper part of y – or viceversa. Also, it

³See, for example, Mellor (2006); Gilmore (2009).

⁴Here I use “ \Leftrightarrow ” as “equivalent by definition”.

⁵Simons (1987) and others use the formalism “ $x \ll y$ ” to indicate the proper part relation.

is the case that y underlaps x iff there exists z , such that x is part of z , and y is part of z . (UL) between x and y occurs when x and y do not overlap or do not share any part⁶.

3.1.2 Decomposition and composition principles

Along with (P.1), (P.2), (P.3), (PP), (PE), (OL) and (UL), classical mereology can be extended in two ways: by means of decomposition principles, and by means of composition principles. The former consider the extension of the theory from a whole to its parts. The latter consider the extension of the theory from the parts to the whole.

Let start with the decomposition principles. A strong intuition that goes along with ground mereology is that a whole cannot be decomposed into a single proper part. This is the so-called “supplementation” principle:

$$(SU) \quad P P x y \rightarrow \exists z (P x y \wedge \neg O z x)$$

According to (SU), every proper part must be supplemented by another disjoint part, i.e. there would always be a mereological difference⁷. A stronger and a weaker version of (SU) can be introduced in classical mereology:

$$(SS) \quad \neg P x y \rightarrow \exists z (P z y \wedge \neg O z x)$$

$$(WS) \quad P y x \wedge x \neq y \rightarrow \exists z (P z y \wedge O z x)$$

According to (SS), i.e. strong supplementation principle, if y is not part of x then y has a part that does not overlap x . On the other hand, the weak supplementation principle, (WS), states that if x is part of y , then y has a part that does not overlap x .

Furthermore, other two interesting notions can be introduced:

$$(AT) \quad A x = \neg \exists y P P y x$$

$$(AG) \quad G x = \neg \exists y (A y \wedge P x y)$$

⁶Cf. Koslicki (2008, 12-3)

⁷Varzi (2014).

An atom is an entity with no proper parts, regardless of whether it is point-like or has spatial extension. An atomless gunk, if there exists such thing, on the other hand, is an entity that has no atoms that compose it.

The second group of extensions includes the so-called composition principles. It consists in the definition of mereological sum (or fusion), mereological product and mereological difference, unrestricted composition and the uniqueness of composition:

$$(MS) \quad x + y \Leftrightarrow \sigma z (Pzx \vee Pzy)$$

$$(MP) \quad x \star y \Leftrightarrow \sigma z (Pzx \wedge Pzy)$$

$$(MD) \quad x + y \Leftrightarrow \sigma z (Pzx \wedge Dzy)$$

$$(UC) \quad \exists w \phi w \rightarrow \exists z S_i z \phi w$$

$$(UQ) \quad \exists x \phi x \rightarrow \exists z (z = \sigma x \phi x)$$

Let focus on the last two principles, which will be helpful in the remainder of the chapter. According to unrestricted composition, (UC), any X s have a mereological sum, while the uniqueness of composition. (UQ), on the other hand, tells that there are no X s that have more than one mereological sum.

3.2 Mereological Nihilism

In the previous section, I have introduced the principles of the classic mereology. Even if one accepts the metaphysical innocence of those principles, it is true that mereology opens the door to further analysis concerning the metaphysics of spatial composition. In fact, the common sense view is that composition only occurs among some things. In this case, (UC) is not a principle accepted by common sense.

As in many other fields of philosophy, deepening the metaphysical issues of our everyday attitude is a good guide to the comprehension of the alleged paradoxes that commonsense rises. This is not to say that we should always revise our pre-philosophical intuitions, rather that we should keep checking them with our philosophical tools.

Consider the following scenario:

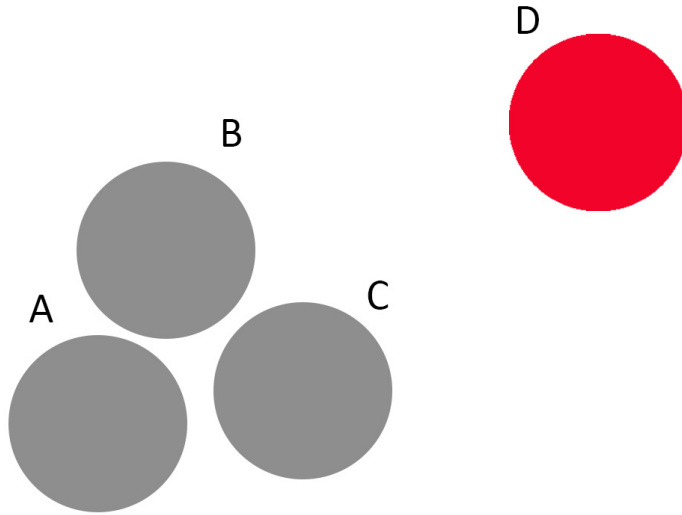


Figure 3.1: Mereological world

Let make it uncomplicated and consider A, B, C and D as simple entities with no further parts besides themselves. Moreover, consider that A, B, C are not only of the same shape, color and appearance, but they also behave the same way. Suppose that when A moves to the right, B and C simultaneously comove to the right, just like the cells of a single organism, while D does not. If so, how many entities are in the figure 3.1?

The most common answer would probably be five: A, B, C, D and the triadic unit $A+B+C$. This is because we find a regularity in the “behavior” of A, B and C, such that it suggests us that a further object exists, namely the sum of them. It is the same line of thought that guides us in our every-day practices. In fact, we countenance the existence of galaxies, school of fishes, bodies of human beings, collections of stickers and a vast number of composite objects. But we leave out of our catalogue of what there is a likewise vast number of “things”. In our world there is no room for things like the sum of my backpack and the vacuum cleaner. Even if I tie them or I put the vacuum cleaner inside the backpack, nobody would believe in the existence of a back-cuum (va-pack, or whatever you may call it).

Let define this standard way of thinking as “the ordinary ontology”:

(ORD-ON) All and only ordinary objects exist.

It is rather unclear how one should explain what ordinary objects are. As a matter of fact, we are not puzzled when asked “Is x an ordinary object?”, while we would rest clueless when required to provide a good general criterion for what an ordinary object is⁸.

As Rosen and Dorr (2002) note, «common sense does not deliver an explicit rule or principle governing composition. But it does have firm opinions about particular cases» (p. 160). Nobody outside the Philosophy Department would shown any doubts about the existence of aggregates like bodies, neighborhood, chairs, and so on. But this lack of clarity about the composition of material objects leaves room for the philosophical inquiry.

3.2.1 Setting the Special Composition Question

Peter Van Inwagen (1990, 31) asks the famous question:

What would one have to do – what *could* one do – to get the x s to compose something?⁹

which has been addressed in many ways by many authors. Following Markosian (1998a, 212), it can be restated as follows:

SCQ What necessary and jointly sufficient conditions must any x s satisfy in order for it to be the case that there is an object composed of those x s?

From what van Inwagen calls *Special Composition Question* (henceforth, SCQ) the debate over composite objects, ordinary objects and the composition itself

⁸The discussion about ordinary objects is extensive. Nevertheless, it relies on a general and intuitive characterization of what a thing needs to be an ordinary object. The defense of ordinary ontologies usually lies on the strength of our commonsensical intuitions (which, of course, leaves the opponents dissatisfied). See Thomasson (2007); Sattig (2012); Lowe (2005); Unger (1979); Hawthorne (2006, § 7); Korman (2014).

⁹«We shall use the expression “the x s composes y ” as an abbreviation for “the x s are all part of y and no two of the x s overlap and every part of y overlaps at least one of the x s”.» Van Inwagen (1990, 28-9).

has become very active. Whether objects compose other objects is not only an interesting question from a theoretical point of view, but it becomes substantial when certain metaphysics do not allow composition or some others countenance the existence of composite objects. The choice of adopting a certain answer to the SCQ is determined by the endorsement of a certain metaphysics, and viceversa. Before analyzing this strong link, let examine the answers to the SCQ.

We can draw a line between uniform and non-uniform answers¹⁰. The uniform answers try to reconcile the commonsensical intuitions. They consider different grades of composition, from weak to strong relations:

- (CONTACT)** The *x*s compose an object *y* if and only if the *x*s are in contact.
- (FASTENING)** The *x*s compose an object *y* if and only if the *x*s are fastened together.
- (COHESION)** The *x*s compose an object *y* if and only if the *x*s are sticked together.
- (FUSION)** The *x*s compose an object *y* if and only if the *x*s are fused.

Van Inwagen states that these four options cannot be considered good answers to the SCQ. Indeed, it not difficult to find counter-examples for all the cases¹¹:

- (CO)** Two objects can be in contact and still do not compose a further object. When I hug my dog, even if we are in strict contact, we do not form an object composed by my dog and I.
- (FA)** Even if we make the contact more stable, it does not work. When I am on a plane following the stuart's advise, I fasten my seatbelt. But the fact that the seat I am sat on and I are fastened together does not entail that we compose a further object.
- (CO)** Even if, to say, we glue the backs of two human beings, it would not be the case that a third object, the one composed by the two human beings, enters the scene.

¹⁰Cf. Thomasson (2007, 127-34).

¹¹Only a counter-example is needed to get the answer wrong, because answers are supposed to work for all objects.

(FU) Consider a case in which two persons, Anna and Bert fuse, and call the result of the fusion Carl. Despite their fusion, nothing is such that Anna and Bert compose it. Anna and Bert no longer exist¹².

The non-uniform answers are the so-called “series-style answers”, which take the following form:

(S-SA) $(\exists y$ such that the x s compose y) if and only if the x s are F_1 and stand in R_1 , or the x s are F_2 and stand in R_2 , or ..., or the x s are F_n and stand in R_n .

The series-style answers leave open the option of treating different kinds of things with different relations. In fact, the schema (S-SA) can be considered as “ $(\exists y$ such that the x s compose y) if and only if the x s are lego blocks and stand in relation of being stucked together, or the x s are cotton swatches and stand in the relation of being stitched, or the x s are planks and stand in the relation of being assembled in a ship-shape, and so on. This kind of answers does not offer a unified response to the SCQ, but make the answer possible, in line of principle. Van Inwagen criticizes (S-SA) mainly by arguing that this kind of answer is circular and make the parthood relation non transitive¹³.

Besides the wide debate about this circularity and non-transitivity issues, a remark by van Inwagen itself is worth noting. The fact that some kinds of objects may compose further objects while others may not is problematic. Take the Ship of Theseus case. A certain number of planks may form a ship, if they are fastened together and arranged in a specific way. Human beings, on the other hand, may not. If they are gathered together under certain circumstances, they may form a soccer team, while planks may not. This compositional difference leads to a metaphysical one. Van Inwagen’s conclusion is that this kind of ontological discrimination is not justified. Even if someone could reply that a certain ontological difference can be defended, series-style answers suffer from a problem of vagueness. Once we have drawn a line between, to say, human beings and planks, it is not

¹²Van Inwagen considers the commonsense perspective. By taking into account different metaphysical theories, like perdurantism, Anna and Bert still exist, even if they fuse.

¹³For the complete arguments, see Van Inwagen (1990, 64-6)

difficult to instantiate a version of the argument from vagueness I have introduced in the previous chapter¹⁴

3.2.2 Universalism and Nihilism

Once van Inwagen has ruled out commonsensical and series-style answers, he faces two general responses to SCQ, namely universalism and nihilism:

(UNIVERSALISM) The x s compose an object y if and only if the x s exist.

(NIHILISM) The x s compose an object y if and only if there is exactly one of the x s.

Universalism follows the mereological principle of unrestricted composition I have introduced in the previous section:

(UQ) $\exists x\phi x \rightarrow \exists z(z = \sigma x\phi x)$,

while nihilism rejects it. This is to say that, according to universalists, for every pair of objects there is a further one, while for nihilists there is not such a thing as a composite object. Unrestricted composition is a theorem of classical mereology, but it is very far from the commonsensical intuitions about the ordinary ontology. In fact, the universalist countenances the existence of a multitude of objects that would not fit outside of the Philosophy Department – indeed, most of her ontology has no place in (ORD-ON). On the other hand, the nihilist's ontology is a subset of the commonsensical one. According to the nihilist, there are no chairs, trees or people, but she includes in her ontology the basic entities that compose such things.

¹⁴See § 2.2.3. As noted, classical argument from vagueness can be found in Lewis (1986); Sider (2001a).

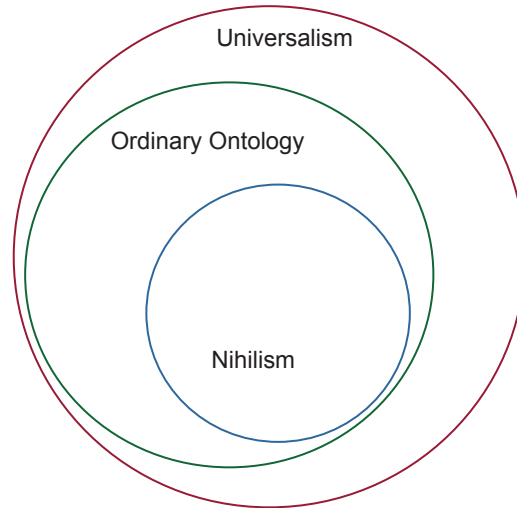


Figure 3.2: Different ontologies

«Any region of space that one might have thought contained a cat or a star in fact contains only elementary particles» (Van Inwagen, 1990, 72).

Van Inwagen rejects both universalism and nihilism. According to him, universalism can be demolished in a six-steps argument:

1. I am now and I existed ten years ago;
2. I am a biological organism and I have always been so;
3. Every organism is composed of some atoms at every moments of its existence;
4. Consider any organism that existed ten years ago; all of the atoms that composed it ten years ago still exist;
5. Consider any organism that exists now and existed ten years ago; none of the atoms that now compose that organism is among those that composed it ten years ago;

6. If Universalism is true, then it is not possible that $\exists y \exists z \exists w \exists v$ such that the xs compose y at the moment w , and the xs compose z at the moment v , and $y \neq z$.

While nihilism is closer to van Inwagen's answer, it is criticized because it «would appear to be false, for you and I exist and we are composite object»¹⁵. For this reason, the answer proposed by van Inwagen himself takes this commonsensical intuition into account:

(LIFE) The xs compose a y only if the activities of the xs constitute a life.

This move would partly preserve our intuitions about a certain kind of objects, namely the living things, and it is not committed to extreme thesis like universalism and nihilism, nor it is affected by the problems that series-style answers have.

However, even though **(LIFE)** is a proposal in line with van Inwagen's critiques to the other answers to the SCQ, it is not immune to criticism. The opponents of **(LIFE)** can be divided in three groups: (i) the ones who are not convinced by van Inwagen's critiques to series-style answers, universalism and nihilism; (ii) the ones who think **(LIFE)** is not a tenable option *tout court*; the ones who believe both (i) and (ii).

Here, I am not offering reasons to deny **(LIFE)**. For my purpose, it is sufficient to note that van Inwagen's critique to nihilism cannot be considered decisive. As a matter of fact, I do not think it is even a critique for the nihilist. Her ontology is such that people, along with other biological organisms, do not exist. But, as van Inwagen himself admits, it does not mean that the regions of space filled up by what the commonsense ontology calls persons are empty. Indeed, there is *something*, namely elementary particles.

This is not to say that the disagreement between nihilist and – in this case – the commonsense ontology is purely verbal. The two ontologies are quite different, it is not only a matter of how we describe the world. But a critique according to which nihilism is false because there exists something, me, that is a composite

¹⁵Van Inwagen (1990, 73).

object, is a way of setting the dispute at a verbal level, not a way to contrast the view. Consider a region of space \mathbb{R} . Now, we can reformulate van Inwagen's objection in this way: "In \mathbb{R} , there is a person, me, that is a composite object. So nihilism is false". The nihilist could easily reply that "In \mathbb{R} , there is a number of particles arranged person-wise". And she could also add that "If there were no persons, only particles arranged person-wise, our sensory experience would be the same"¹⁶. The nihilistic description of reality is less absurd than it seems *prima facie*. Although, it is a deep revisionary theory with an ontology very different from the commonsensical one. The discussion about the right answer to the SCQ is still open and my intent here is not to offer a solution to it¹⁷. Van Inwagen addressed the right question, even if his answers can be criticized.

In the next section, I will provide a conditional argument in favor of nihilism, based on the acceptance of the radical form of exdurantism I have presented in the second chapter.

3.2.3 A conditional argument for nihilism

I want to suggest a conditional argument for supporting nihilism. It is as follow: if radical exdurantism is true, then the "natural" approach to spatial composition is nihilism. So, if nihilism is a viable way, exdurantist should embrace it.

As I have outlined in the previous section, the debate around the answers to the SCQ has not reached a conclusive point. The general argument against the moderate answers (contact, fastening, cohesion, fusion) and the related criticism to series-style answers, leaves the door open to mereological universalism and nihilism. If so, the exdurantist who wants to take a stand towards spatial composition has to elect one of them¹⁸.

¹⁶Cf. Dorr (2002); Sider (2007, 2013)

¹⁷Among the others, I have not discussed here a famous reply to the SCQ, given by Markosian (1998a):

(BRUTE) It is a brute fact that the x s compose an object y .

According to him, there is no way to properly answer SCQ, because there are no rules of composition: it is a brute fact. "whenever composition occurs . . . it is just a 'brute fact' that the relevant objects compose something, and whenever composition fails to occur, this too is just a 'brute fact'" (214) <continue>

¹⁸It can be argued that moderate answers could be endorsed, yet, in a different manner. It

By endorsing nihilism, the exdurantist would be in a position to offer a unified treatment to all phenomena of spatiotemporal extension. In this world, populated exclusively by atomic entities, everything would be world-bound, time-bound, and space-bound. All appearances of extension through space, time and possible worlds would then be explained away in the very same manner, e.g. by appealing to a counterpart relation linking numerically different atomic entities (Varzi, 2003a), by paraphrasing away our talk about extension in terms of pluralities of atoms and their arrangements (Sider, 2013), or, again, by appealing to fictionalist accounts of the semantics of our everyday terms referring to allegedly extended entities (Rosen and Dorr, 2002).

It would be quite simple for the exdurantist to get rid of worms. She basically has to define exdurantism as the view according to which no entity persists. So defined, exdurantism implies the exclusion of worms. To see this, simply assume that there were worms. If there were, they would have a non-instantaneous path, hence, they would persist.

3.2.4 How to be exdurantist and nihilist: pixelism

I have suggested that nihilism is the *natural* attitude towards spatial composition that a strong exdurantist should adopt. This is because she does not accept temporal composition, i.e. she believes that entities are not aggregates of temporal parts. No temporal composition occurs. There are only what perdurantists call temporal parts, that, actually, are no parts of anything. So, the ontology of an exdurantist is composed by spatio-temporal slices. I have argued that, given this lack of temporal composition, there are no valid reasons to appeal to the spatial composition by endorsing universalism.

However, classical exdurantists endorse mereological universalism. If Varzi (2003a) takes advantage of the fact that mereological aggregates come for free, namely they do not require a further ontological commitment in addition to the one exdurantist make for the slices, Sider (2001a) takes a resolute stand in favor of universalism, by appealing to two arguments. The first comes from Lewis

is true that there is not a knocked-out argument. However, the radicalness of the exdurantism I have brought into focus is not compatible with such answers.

(1986, 212-3), namely the argument from vagueness. It can be summarized in five passages¹⁹:

1. If universalism is false, then there can be a sorites series for composition.
2. Every sorites series must contain either borderline cases of composition or a cut-off with respect to composition.
3. There cannot be borderline cases of composition.
4. There cannot be cut-offs with respect to composition.
5. So universalism is true

This argument has been heavily discussed. Assume, for sake of discussion, that it works. It is not a proper argument in favor of universalism, because it does not take into account the nihilistic view. In other words, the argument from vagueness rules out what van Inwagen would call “moderate” attitude towards composition, but it leaves the door open to both universalism and nihilism. In fact, nihilism blocks the argument at premise (1.), by arguing that composition never occurs – so there cannot be a sorite for composition.

For this reason, Sider provides a further argument against nihilism, taken from his Sider (1993). He states that nihilism is incompatible with the metaphysical possibility of atomless gunk. An atomless gunk, as I introduce in section 3.1, is «an individual whose parts all have further proper parts» (Lewis, 1991, 20). As defined this way, atomless gunk is certainly incompatible with nihilism, because nihilism itself cannot countenance the existence of a thing that can be infinitely divided into smaller and smaller parts.

I take into account two possible answers to this criticism. The first is provided by Dorr (2002, 68-9). He follows a Kripkean view of semantically defective predicates, and argues that «since ‘gunk is possible’ can be true only if there is actually such a relation as parthood, it doesn’t seem to be the sort of thing that could be established just by “conceivability” evidence». The second one is provided by Sider himself, who has recently revised his opinion. In fact, in Sider (2013), he argues

¹⁹Cf. Korman (2010, 891)

that the mere possibility of gunk does not defeat nihilism. This is because he offers a reductive analysis of metaphysical modality, namely “modal Humeanism”, according to which metaphysical statements that lie on arguments from possibility (as his own argument against mereological nihilism) play no distinctive role²⁰.

Here, I am not taking a stand towards Sider’s proposal of epistemology of modality, nor I am arguing in favor of Dorr’s solution to the possibility of gunk. I have considered these replies in order to show that the suspicious attitude that some exdurantist has towards nihilism can be softened. It is true that, according to classical mereology, aggregates come for free and the commitment to their existence is not problematic. What I am suggesting, is that if an exdurantist denies temporal composition and endorses universalism, then she should provide reasons to justify her rejection of nihilism, which seems a theory more in line with her philosophical background.

3.2.5 The difference between universalism and nihilism?

In the last sections, I have provided an analysis of the debate originated from the different answers to the SCQ. My sympathy for nihilism lies on the fact that, given radical exdurantism, it is the easiest way to take. Once we have established that no temporal composition occurs, it is painless to opt for a theory that seems symmetrical to exdurantism in respect to spatial composition. The conjunction of radical exdurantism and mereological nihilism it is a coherent and elegant way to describe reality.

I am aware that this idea could be criticized in several ways. That is the reason why I specifically propose the analogy between radical exdurantism and nihilism as a conditional argument. There is a further objection, though, that could contrast my analogy. Someone might argue that, ultimately, nihilism and universalism are not substantially different²¹. One could argue²², on the assumption that the whole is nothing over and above the parts, that the difference between the two theories is purely arbitrary. In fact, the slogan “the whole is nothing over and above the

²⁰Cf. Sider (2011, ch. 12); Sider (2013, 276-7).

²¹The same dialectic can be iterated also for temporal composition.

²²See Slater (2009).

parts” is endorsed by the most part of universalists, given their acceptance to classic mereology (which seems, as Sider (ming) points out, that «one can think of the axioms of classical mereology as being in some sense underwritten by the slogan, much as (some of) the axioms of Zermelo-Frankel set theory are often regarded as being underwritten by the intuitive iterative conception of set»). And if so, the critics argue, the ontology of universalism and universalism coincide.

This objection may lead to consider the analogy less pleasant, and may in fact lead supporters of nihilism and universalism to reconsider their position. Even if, for sake of discussion, we accept the extreme conclusion of the objection, i.e. that classical mereology leads the nihilism and universalism to be just arbitrarily different, there is a counter-objection nihilists (and universalists) can oppose to it. In fact, it can be replied that there is at least one substantial difference between nihilism and universalism. Nihilism, in fact, leads to the acceptance of atomism, i.e. the idea that reality is ultimately composed by atoms²³. On the other hand, universalism does not. On these premises, the differences between universalism and nihilism cannot said to be merely arbitrary.

²³Even the possibility of atomless gunk does not prevent this kind of answer.

Chapter 4

Pixelism¹

In the previous chapters I have defended a radical form of exdurantism. And I have suggested that radical exdurantists should embrace the spatial analogue of the thesis they support, i.e. mereological nihilism. The world of a supporter of radical exdurantism and mereological nihilism is such that no composition occurs. Let call “pixelism” the conjunction of radical exdurantism and nihilism.

Pixelism’s world view consists in a world of single entities, which are combined (both spatially and temporally) only fictionally in our everyday life. What I am suggesting here is an analogy. Consider the screen of your computer. It works by having millions of pixels. A pixel is the smallest addressable element of what is represented on a screen. The images you see on it are the result of the process involving each single pixel. As pixels do not actually “merge” to depict what you see on the screen, exdurantist entities do not actually go under temporal composition, and nihilistic entities do not go under spatial composition. Each pixel represents the smallest portion of what you see on the screen. The result is a combination of the characteristic of all the single pixels, that we unify perceptively as a unique image.

This is, roughly speaking, what happens in a two-dimensional model constituted by pixels. My idea is to develop this analogy into two models for pixelism. There are two viable options: the first one takes pixels to be hypercubes, i.e. four-

¹I am deeply in debt to Daniele Boccalini for his inestimable help in setting the theoretical framework of this chapter.

dimensional cubes, the acceptance of which is conditional on the acceptance of extended simples. The second one considers pixels as points in a four-dimensional space.

Such geometrical depictions have many advantages. First, they provides a way to consider under a different light the metaphysical implications of pixelism; second, they permit to analyze in a very simple way the modal implications of the theory I am defending; third, they easily allow to grasp what I intend with “the simplicity of everything”. Everything is simple because, ultimately, entities persist, compose and exist in different world in the same way, namely as pixels in a five-dimensional space, which consists in the three spatial coordinates, the temporal one and the modal one.

4.1 A world of pixels

In this section, I will explain pixelism within an analogy. Through this, I will describe the characteristics of a four-dimensional space of pixels, intended as hypercubes (§4.1.1) or points (§4.1.2). These geometrical models allow to explain in a very simple manner the relations between the entities pixelism countenance the existence of.

4.1.1 The dancing ballerina

Consider the screen of your computer. It works by having millions of pixels. Each pixel represents the smallest portion of what you can see on the screen. If you want to locate a given pixel on the screen, you should be able to provide a univocal name for each pixel. The easiest way to achieve this task is to visualize pixels as having univocal coordinates. Take the pixel in the upper left side of the screen, and call it $(0,0)$. From $(0,0)$ if you move right to the next pixel, you would have a pixel named $(1,0)$. If from $(0,0)$ you move down to the next pixel, you would have a pixel named $(0,1)$. If so, the pixel named (n,m) would be the one located n pixels from $(0,0)$ moving left, and m pixel from $(0,0)$ moving down. Within this coordinate system, we not only give a univocal name to each pixels, but we are also able to accomplish two additional objectives: (i) identify which pixels are

close to a given pixel (if we take the pixel $(3, 5)$ we know it is adjacent to the pixels $(2, 5)$, $(4, 5)$, $(3, 4)$, $(3, 6)$, and that it shares its four vertices with pixels $(2, 4)$, $(4, 4)$, $(2, 6)$, $(4, 6)$); (ii) determine the area of a given region of pixels.

What if we have more than one screen? Consider there are a vast amount of flat-screens stacked one above the other. In this case, our previous coordinate system is not sufficient to univocally identify a given pixel. In fact, there would be one pixel named $(0, 0)$ for each screen, namely the pixel in the upper left side of each screen. By all means, we can give an account of the different screen in which a pixel is located, by adding this information in the pixel's name. Take the pixel (n, m) located in the lower screen of the stack. Its univocal name would be $(n, m, 0)$. So, the pixel $(3, 8)$ located in the fourth screen from the bottom of the stack would be $(3, 8, 3)$ and so on. Given this new coordinate system, we are able, in addition to (i) and (ii), to determinate also (iii) the volume of a given number of pixels.

Now, with this three-coordinates system of pixels we are able to create a 3D image. To do so, we just have to identify specific pixels (and we can do it for each pixel of every screen) and, to say, make some of them white, and some others black. This way, we are able to draw a black ballerina silhouetted against a white background. What if we wanted to transform the 3D image into a moving picture? How can we make the ballerina dance? We would need, for every instant, a different configuration of the color of the pixels. And we could create different configurations by adding an additional coordinate to the pixels, as if every instant corresponds to a farther screen than the ones previously considered. In this respect, take the pixel (n, m, p) . At the instant 0, it would be named $(n, m, p, 0)$, while at the instant q , it would be the pixel univocally identified by the coordinates (n, m, p, q) . This means that, just as all and only the pixels of the second screen would be named in the following way $(n, m, \mathbf{1}, p)$, all and only the pixels at the instant 24 would be named in the following way $(n, m, p, \mathbf{24})$. Through this four-coordinates system, we are still able to talk about "distances", in respect to every coordinate. Take the following pixels:

1. $(1, 3, 1, 0)$;

2. (1, 2, 1, 0);
3. (0, 0, 1, 0);
4. (2, 3, 1, 1);
5. (1, 0, 1, 0);
6. (32, 1, 2, 4).

We can extrapolate a large number of data from their coordinates. For example, (1) and (2) are adjacent along the second coordinate, as (3) and (5) are along the first. Pixels (1), (2), (3) and (5) share the three spatial and the temporal coordinate: they take place at the same time with the same depth. (6), on the other hand, is very distant from the others.

This example show how we can equally manage information about pixels. The concept of distance and proximity can be applied to all the coordinates in the same way. Every information is codified by a number, and every pixel is described on the basis of the this information, i.e. its coordinates.

4.1.2 From screens to hyperspace

This is no more than a metaphor. But what if we wanted to apply this analogy to pixelism? Take the screens to be dimensions, and the pixels of the screen as the entities that crowd our world. With entities I am not taking into account chairs, skyscrapers or forests, because they are not present in the pixelist ontology: ordinary composite objects, strictly speaking, do not exist. Pixelism, like the other deflationist views about composition, considers them as arrangements of atomic entities. Accordingly, there are no chairs, but pixels arranged chair-wise. And so it is for all composite objects. Similarly, entities do not extend temporally. Persisting entities are arrangements of pixels. Following the exdurantist position, the arrangement of pixels I am now is not identical to the one that started writing this dissertation. The pixels configuration is different in so much as the two arrangements are temporally distinct.

The four dimensions originate a four-dimensional Euclidean space. As I have introduced in the screen analogy, in a two-dimensional Euclidean space every pixel

is located by two coordinates and there are two perpendicular directions. Three-dimensional Euclidean space is like the space we have experience of, where every point is located by three coordinates. There are three mutually perpendicular directions (the usual spatial directions: height, width and depth). Equally, in a four-dimensional Euclidean space every point is located by four coordinates, which correspond to four perpendicular directions².

In the screen metaphor, all the quantities are discrete. The space of the screen is divided into pixels, and we can say that the two-dimensional pixel (1, 1) is one unit to the left of the pixel (2, 1). And every step is precise: given that pixels are the smallest addressable units, we cannot move a quarter of pixel down. It is like in a chessboard. When we look at the model, we are like the king. The king cannot move 1,5 squares: it can move 1 square in every direction. And so can we. Nevertheless, when we talk about distances, it is reasonable to think of a not-discrete space, i.e. a space in which quantities are continuous.

Out of the metaphor, if we think of the pixels on the screen in a discrete space, we surely can picture a two-dimensional model in which the pixels are square-like. Adding dimensions, the square would become a cube (in three dimensions) and an hypercube (in four dimensions). This is the first model for pixelism I will present in § 4.1.3. If we think of pixels in a continuous space, then we need a different characterization than the hypercubes. In fact, in such a space, we may be interested in the entities in between the hypercubes. Consider again the two-dimensional pixels. In a continuous model, the pixels (1, 1) and (2, 1) are not simply one to the left of the other. In fact, every square is composed by segments, which in turn are composed by points. In a four-dimensions model, the circumstances are even more complicated. In fact, as I will explain, every

²The models I am proposing are pre-relativistic. As I have introduced in the previous section, in the Euclidean four-dimensional space every pixel has a univocal name, which consists in the description of its coordinates. The four dimensions correspond to the three spatial dimensions and time. In this model there is not a distinction between them: time is just another coordinate.

Even if some interpretation of quantum mechanics suggest that reality may be composed by punctual entities in a relativistic four-dimensional spacetime – cf. Lam and Esfeld, 2012, I am not taking the model I propose as a description of physical reality, nor I am committed in a spacetime model of reality *tout court*. My idea is that the relations between the entities that the metaphysics of persistence analyzes, can be reduce to a simple model. Furthermore, this model grants to understand the metaphysical nature of such entities.

hypercubes is composed by cubes, which in turn are composed by squares, which in turn are composed by segments, which in turn are composed by points. So, the hypercubes model would not be an adequate model for a continuous space. In this case, we can use the second model I want to propose, which considers pixels as points (§ 4.1.4).

4.1.3 Hypercubes

To build a model of pixels as hypercubes in a four-dimensional space, let us start with a zero-dimensional space. A point is a hypercube of dimension zero. In a one-dimensional space, if we move this point one unit length, it will form a line segment, which is a unit hypercube of dimension one. In a two-dimensional space, if one moves this line segment its length in a perpendicular direction from itself it will form a square. Adding a third dimension, if one moves the square one unit length in the direction perpendicular to the plane it lies on, it will generate a cube.

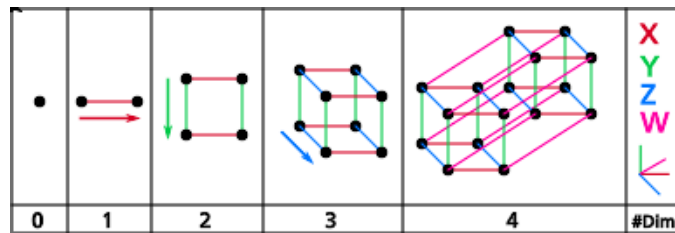


Figure 4.1: Bi-dimensional pixel (square) and Three-dimensional pixel (cube)

Finally, if one moves the cube one unit length into the fourth dimension, it will generate a four-dimensional unit hypercube.

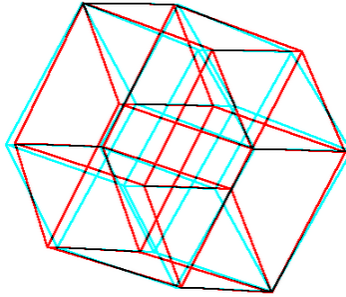


Figure 4.2: Four-dimensional pixel (hypercube)

In this model the hypercubes amount to the pixel in the screen metaphor. Every hypercube may be identified by a univocal name, given by its coordinates along the four dimensions. We cannot draw a world composed by hypercubes, because we cannot render the fourth-dimension. Although, we can conceive it, in the same way we imagine a three-dimensional space filled up by cubes.

In this model, the relations between hypercubes along the four dimensions are of the same kind. Theoretically, we could describe the world in all its part by writing down the coordinate of the pixels. We would describe persistence and composition of pixels in the same way we can describe a chess game by the movements of the pieces. The only difference is that, unlike chess pieces, pixels do not really move, unless fictionally.

4.1.4 Points

Accepting the hypercube model commits to the acceptance of extended simples. An extended simple is a material entity extended in space that nonetheless lacks proper parts. Even if we take an hypercube as the smallest unit in a four-dimensional space, it is composed by smallest elements, namely cubes, squares, segments and points.

The concept of extended simple coincides with the Democritean concept of the atoms that ultimately compose the world, and the possibility of such a thing has been discussed not only in metaphysics, but also in fundamental physics³.

³As noted by McDaniel (2007), the existence of simple can be entertain also in string theory

Among the others, Markosian (1998b, 2004); Simons (2004); Parsons (2000); McDaniel (2007) argue in different ways the possibility of extended simples. The opponents of such a view consider reality composed by atomless gunks or non-extended simples. An atomless gunk is an atomic unit whose parts all have proper parts, which all have proper parts, and so on, while a non-extended simple can be conceived as a point-sized unit. A model for pixels as atomless gunks can be produced in the same way as the hypercubes one. In such a model quantities should be discrete too. We can imagine the atomless gunk model with hypercubes that contains hypercubes *ad infinitum*.

On the other hand, a pixel model for point-size entities is different from hypercubes and atomless gunk hypercubes in so much as the quantity of the corresponding space is continuous. This means that the space is completely filled up by punctual entities (and so, for any real numbers, there exist a coordinate).



Figure 4.3: Points in 2D and 3D

As pixels on the screen are univocally identified by their coordinates, so are points in an Euclidean space. And as in the hypercubes model, we are not able to display the fourth dimensions. We can represent it as a collection of hyperplans, i.e. a stack of three-dimensional subspaces⁴.

(Green, 1999).

⁴«In general, any N-dimensional space is coordinated by choosing N families of (N - 1)-dimensional spaces so that each point acquires a unique set of coordinates in this way. In a space of N dimensions an (N - 1) dimensional subspace is called a hyperplane. So coordinates involve finding N different ways of splitting up the space into collections of hyperplanes.» Maudlin (2011, 32).

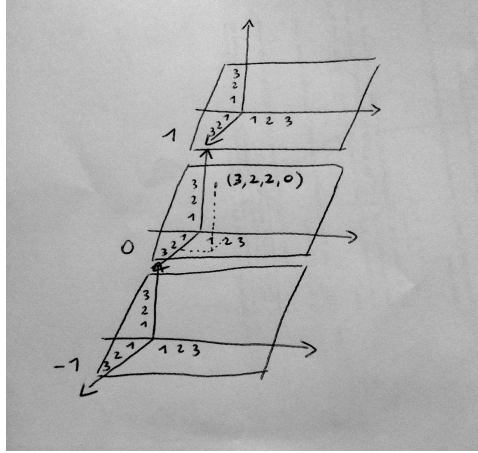


Figure 4.4: Points in 4D

4.2 The fifth dimension

So described, the two models have the advantage of depicting the spatial and the temporal relations in a univocal way. As I have described, there is no difference between a spatial distance, and a temporal one. This idea lies at the core of a four-dimensional approach to metaphysics, not only to pixelism. In fact, perdurantism and exdurantism maintain this uniformity also in respect to composition, by endorsing universalism. In fact, as every sum of temporal parts composes a temporal aggregate, every spatial part composes a spatial aggregate.

Pixelism preserves this uniformity in the opposite direction. In a pixel world there is no composition at all, neither in respect to time, nor in respect to space. I have argued that this attitude has the advantage of embodying the spirit of exdurantism, while accepting temporal aggregates and endorsing universalism do not. The two above-mentioned models describe how a pixelist account can offer a unified treatment to all phenomena of spatiotemporal extension. All appearances of extension through space and time would then be explained away in the very same manner, e.g. by appealing to a counterpart relation linking numerically different atomic entities (Varzi, 2003a).

My idea is that spatial and temporal relation between temporal parts can be

interpreted as counterpart relations. Within these models, we are now able to depict also the modal relation between pixels in the same we did for space and time.

Pixelism states that the relation between Leonardo DiCaprio in the morning and Leonardo DiCaprio in the evening⁵ is a counterpart relation, as classical exdurantism does. Given the analogy between temporal and spatial relations, we are also able to identify also spatial composition as a counterpart relation⁶.

Generally speaking, the relation between the actual Leonardo Di Caprio and the Leonardo DiCaprio in a possible world in which he is fast-food waiter is a counterpart relation too. The three relations at stake can be considered as the same, one in respect to time, the other in respect to possible worlds. *Ergo*, we can add a further coordinate to our model without adding any conceptual issues. On the contrary, if the spatial, temporal and modal relation are all counterpart-style relations, we need a fifth-dimensional model. The hypercubes and the point models easily allow this move.

Pixelism can be associated to a five-dimensional metaphysics. Five-dimensionalist holds that objects extend in the modal dimension, as well as they do in the temporal and in the spatial ones⁷. As I have noted in the second chapter, both perdurantism and exdurantism can be considered four-dimensional metaphysics, in so far as the world they describe is four-dimensional⁸. A similar distinction can be drawn also in a five-dimensional metaphysics. In line with the classical definition of endurantism, perdurantism and exdurantism, we can define two versions of five-dimensionalism:

Interdurantism Entities are five-dimensional aggregates of temporal and modal

⁵Rather, the relation between pixels arranged Leonardo DiCaprio-wise at a certain time in the morning and pixels arranged Leonardo DiCaprio-wise at a certain time in the evening.

⁶Also Aaron Cotnoir (2013) claims it is possible to reinterpret the parthood and composition relations as modal. His argument lays on «a commitment to a liberal view of the nature of simples» (p. 237).

⁷The seed of five-dimensionalism has been planted by Lewis (1983)'s postscripts to "Counterpart Theory and Modal Logic". More recently, it has been discussed by Varzi (2001a), Benovsky (2006, part II, ch. 6), Wallace (2014); Graham (2015); Miller and Duncan (ming).

⁸Trans-world identity, i.e. identity across possible worlds, is close to identity through time as much as both are based on the counterpart relation.

parts⁹.

Transdurantism Entities are world-bound individuals, i.e. present only in a single world.

According to interdurantism, entities have modal parts, in addition to their spatial parts. If an interdurantist endorses perdurantism (which is its temporal analogue), according to her, entities will be five-dimensional aggregates of temporal and modal parts. Such aggregates would extend in the five dimensions by their parts. Transdurantism – or counterpart theory¹⁰ – on the contrary, considers entities to be connected between possible world by a counterpart relation, without committing to the existence of trans-world aggregates.

Pixelism is not compatible with interdurantism. In fact, according to pixelism, there are no parts, because composition never occurs. There are not trans-world aggregates just as there are not trans-temporal or spatial aggregates. Nevertheless, pixels extend over five dimensions. If interdurantism is the modal analogue of perdurantism, transdurantism is the modal analogue of exdurantism¹¹. Strictly speaking, transdurantism is the modal analogue of radical exdurantism, in so far as a transdurantist does not accept the existence of trans-world aggregates. For this reason, pixelism should endorse transdurantism, i.e. a five-dimensionalism without aggregates, along with a radical form of exdurantism and mereological nihilism.

4.2.1 Transdurantist hypercubes or points

A transdurantist entity is something that moves along the five coordinates of a five-dimensional space only fictionally. As I have recalled in the previous section, pixels do not compose spatially (given mereological nihilism), temporally (given radical exdurantism) or trans-worldly (given transdurantism). We can explain

⁹We can define modal parts as four-dimensional aggregates. In each world there is a four-dimensional worm, which is a modal part of a five-dimensional aggregate. «Just as a temporally extended object is a sum of temporal parts, a modally extended object is a sum of modal parts.» Graham (2015, 18).

¹⁰Counterpart theory is presented by Lewis (1986). I call it transdurantism in order to provide a uniform account of the five-dimensional metaphysics.

¹¹Cf. Sider (2001a, § 5.8)

how this fiction works in the same way we describe exdurantism, i.e. by appealing to the motion picture technique. As the dynamic image we see on the screen is an optical illusion created by a series of still images, persistence, spatial composition and trans-wordly identity of pixels are only fictional.

Following the four-dimensional models in section 4.1.3 and 4.1.4, it is possible to describe two five-dimensional models. Take the four-dimensional hypercubes (m, n, p, q) . It is described by its four coordinate along the spatial and the temporal dimensions. Once we add a further dimension, namely the modal one, an additional coordinate is needed. Thus, the hypercubes (m, n, p, q) in the actual world would be univocally identified as $(m, n, p, q, 0)$. In a different possible world, then there would be a counterpart of $(m, n, p, q, 0)$, univocally identified by the five-coordinate system $(m, n, p, q, 1)$. And the same dialectic can be iterated for the point-model¹².

According to my analysis, pixelism is an elegant and coherent theory, which evaluate all the metaphysical phenomena of persistence, composition and modality in a homogeneous and consistent manner. My defense of pixelism started with the consideration that identity is a general matter. In a pixel world, identity is general in so far as there is no identity over time and over possible worlds. Nothing persists over more than an instant or a world. The pixels are univocally identified by a five-coordinates system, and their relation is a counterpart relation both in different worlds and at different times or different regions of space.

¹²The distinction between the hypercubes and the point models arises on the basis of the difference between discrete and continuous spaces. Given that the five coordinates have the same characteristics, also the modal dimension may be discrete or continuous. In the first case, there would be five-dimensional hypercubes, in the second, points in a five-dimensional space. It is difficult to imagine the modal dimension as continuous, since possible world are described as discrete (<reference>), i.e. there is not "something in between" two possible world that it is not a possible world itself. This could be a reason to support the hypercubes model, in so far as it deals with discrete space.

Conclusive remarks

In this work I have presented a thesis, namely pixelism, starting from the idea that identity is a general concept. I have suggested that the common idea that identity is general, absolute and fundamental relation that pertains to different metaphysical questions and ontological domains leads to a metaphysical position. In fact, the generality of identity so described suggests a further thesis, namely the generality of diachronic identity. If identity over time is a genuine case of identity, then it is reasonable to assume that the generality of identity also spreads to diachronic identity. As a consequence, also diachronic identity can be considered as general. The generality of diachronic identity grants that identity through time is a general relation that equally applies to individuals, groups and events. For this reason, I have argued that endurantists are not able to provide such a unified treatment. My conclusion is that the generality of identity can be hold only within a four-dimensional framework.

After my argument against the tenability of the perdurantist's characterization of the relation between temporal parts, I have argued that a radical form of exdurantism is needed in order to answer the questions of persistence through time and change. I have defined radical exdurantism as the metaphysical position according to which entities are instantaneous stages that do not temporally compose in four-dimensional aggregates. This attitude towards temporal composition is the temporal analogue of mereological nihilism, namely the view according to no spatial composition occurs.

Finally, I have defined the conjunction of these two thesis "pixelism". Pixelism's world view consists in a world of single entities, which are combined (both spatially and temporally) only fictionally in our everyday life. There are no persisting

chairs, cats or skyscrapers, but various combinations of pixels arranged chair-wise, cat-wise, skyscraper-wise. The temporal dimension is analogue to the spatial ones, on all respects. It can be efficiently illustrate with a geometrical model, in which entities are four-dimensional pixels in a four-dimensional Euclidean space. Moreover, if we add a further dimension, the modal one, we are able to describe a five-dimensional world in which all the spatial extensions have the same characteristic. The modal analogue of mereological nihilism and radical exdurantism is transdurantism, i.e. the kind of five-dimensionalism according to which entities are world-bound individuals, i.e. present only in a single world.

Hence, a pixelist should embrace transdurantism, in order to have a world in which entities have relations along the five dimensions indiscriminately, i.e. a world in which they do not compose spatially, temporally or modally. Three deep revisionist thesis find places in pixelism: (radical) exdurantism, mereological nihilism and transdurantism (or counterpart theory). All have been criticized on the basis of their incapacity to fit with our commonsensical intuitions. Nevertheless, within a pixelist framework, they strengthen each other. They together form a harmonious world-view, able to provide a consistent explanation of many metaphysical issues. And, to me, this is a great advantage.

By all means, pixelism is a revisionist thesis. But it is able to provide a robust alternative to commonsense, coherent in respect to persistence, composition and modality. Why believe in a world of entities with a five-dimensional shape? Because, paraphrasing Lewis (1986, 3), «the hypothesis is serviceable, and that is a reason to think that it is true».

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