Metaphysics
A guided tour for beginners

TOMASZ BIGAJ

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INTRODUCTION

The term "metaphysics" elicits mixed responses. For some metaphysics is the ultimate science of reality, surpassing all other branches of knowledge in depth and beauty. But for others metaphysics has a checkered past and a somewhat tarnished reputation. To begin with, even the term itself is a result of a historical accident. When one of the greatest philosophers of all time Aristotle died in the fourth century BC, he left reams of written notes on virtually all scientific topics imaginable – from logic, politics, and ethics, to astronomy and botany. His pupils and followers took up the colossal task of organizing those manuscripts into separate works, known today collectively as the *Corpus Aristotelicum*. However, they had a considerable difficulty with categorizing a group of particularly abstract and hard to comprehend writings dealing with such issues as the notion of being and substance, the first causes (or principles) of things, the notions of one and many, the problem of change, the existence of mathematical objects and of one God. Rather than subsume these writings under any extant category, the decision was made to place them in order following the treatises on physics, and therefore the provisional title "Metaphysics" was coined, which literally means "what comes after physics". But the name stuck, and to this day is associated with the most general and abstract philosophical considerations regarding what exists. Much later another term – "ontology" – became popular as an alternative to "metaphysics". "Ontology" is a blend of two Greek words: *on* which

means "being", and *logos*, interpreted in this context as "science". Some philosophers treat the terms "ontology" and "metaphysics" as synonyms, but it is also common to use the former in a narrower sense to refer to the part of metaphysics which analyses the most general categories of objects (known as ontic categories) constituting reality.

Throughout its long history metaphysics has undergone numerous transformations, both in subject and method. There were times when metaphysics had the reputation of a highly speculative branch of philosophy, disconnected from experience and common sense. Some philosophers in the 17th century attempted to build comprehensive and rather abstract metaphysical systems purported to reveal the ultimate nature of reality. For instance the Jewish-Dutch philosopher Baruch Spinoza argued in a very convoluted way that everything is made of one substance which is identical with God, whereas the German polymath Gottfried Wilhelm Leibniz insisted that the ultimate elements of the universe are independent and isolated souls called monads. But such unbridled speculations drew a lot of criticism and even contempt from a broad spectrum of philosophers. Among the most prominent critics of metaphysics were the Scottish thinker David Hume and the German philosopher Immanuel Kant. Hume believed that the only way to acquire knowledge about the external world is through the senses, and therefore it is impossible to have direct access to reality not mediated by our experience. Kant agreed with this claim and consequently with Hume's critical approach to speculative metaphysics. However, Kant vowed to restore the good name of metaphysics (in a new form referred to by him as "critical") by focusing his investigations on the fundamental concepts such as time and causality which are necessary to form any knowledge whatsoever. Such a new metaphysics should subsequently become the foundation of all scientific knowledge.

Hume's radical anti-metaphysical stance echoes in many later philosophical schools, in particular the influential 20th-century school of logical positivism. Philosophers associated with this movement argued that metaphysical claims are not only fundamentally unknowable, but even meaningless. For them any meaningful statement must meet the stringent requirement of *verifiability*; that is it must be possible to prove conclusively that it is true (in later versions of verificationism this condition was replaced by a slightly less strict requirement that for all meaningful statements it should be possible

either to prove that they are true, or to prove that they are false). Logical positivists believed that science passes the verificationist test of meaningfulness with ease while metaphysics definitively fails it. Thus the only meaningful general statements about the world can be found in the fundamental scientific theories, such as physics or astronomy. However, as it turns out even legitimate scientific claims can have difficulties with satisfying the verificationist criterion if they are sufficiently universal. Nowadays the verificationist principle is considered to be thoroughly discredited, and metaphysical statements are back in favor.

The tide began to turn in favor of metaphysics in the second half of the last century. Even scientifically oriented philosophers came to the realization that scientific theories by themselves cannot offer us a unified and clear picture of reality. Different theories in science are based on different, sometimes even incompatible fundamental assumptions regarding the nature of the world, and to make matters worse some theories do not uniquely determine their proper "metaphysical" interpretations. Thus one important problem that the metaphysician can take up is trying to answer in most general terms the question of what the world should be like for a given scientific theory to be true. Another possible area of fruitful metaphysical investigations is a reconstruction of the metaphysics of common sense. What objects should be assumed to exist, and what structure should the world possess, for our basic, pre-philosophical and pre-scientific intuitive beliefs to be vindicated? If this task is accomplished, the next step may be to compare the reconstructed metaphysics of the person in the street with the metaphysics arising from accepted scientific theories. What intuitive beliefs regarding the world should we abandon as a result of scientific progress, and what beliefs can we retain? All these questions require of course a developed conceptual framework of basic metaphysical notions, such as the notions of object, existence, identity, property, temporality, persistence, causality, and many more. Thus it should not come as a surprise that modern metaphysics occupies itself extensively with the task of defining these fundamental concepts in various ways and selecting the best characterizations available.

This short book gives a brief and elementary overview of a selection of central problems discussed in contemporary analytic metaphysics. Although most of these problems are deeply rooted in classical philosophical schools and doctrines, I will present them in a

modern philosophical guise, as it is commonly done on the pages of current philosophical journals and books. One conspicuous feature of this modern approach to metaphysics, which will show in this book, is its heavy reliance on other branches of knowledge, including logic, semantics, mathematics, and all areas of natural sciences with physics at the forefront. To begin with, the classical metaphysical question of the existence and identity of objects cannot be properly approached without a strong support from modern logic and semantics. The same applies to yet another traditional metaphysical debate on the nature of so-called universals. Discussions on the existence and nature of abstract entities are part and parcel of modern philosophy of mathematics, hence the connections between metaphysics and mathematics are strong in this field. Logic gives us a new insight into another famous metaphysical debate on the meaning of necessity and possibility. But it has to be admitted that the presently dominating logical analysis of these notions gives rise to a number of new, previously unknown metaphysical questions, such as the problem of the status of possible worlds. Further on we will see how modern physics influences and shapes the age-old philosophical topic of time and temporality. One particularly exciting question is whether physics implies that the experience of the passage of time which we all have is just some sort of an illusion with no deeper ontological meaning. Physics has a say in current discussions on the notion of causality as well. It turns out that the metaphysics of causation can also benefit from the logical analysis of modality, and in particular the logical semantics of counterfactual conditional statements. Finally, we will consider the fascinating question of the relation between the doctrine of determinism and the apparent existence of freely acting agents, that is us. We will witness yet again how this metaphysical question can be approached using a mixture of physics, psychology, and logic.

1 EXISTENCE AND IDENTITY

Existence is one of the most fundamental notions of metaphysics, and also one of the most resistant to explanation. As we already noted in the Introduction, a significant portion of metaphysical analysis concerns the problem of what categories of objects can be identified as constituting parts of reality. The word "reality" may be just interpreted as "all that exists". Thus metaphysicians should have a good understanding of what it means for something to exist. We will start our attempt to clarify the notion of existence by looking carefully at how this word functions in natural language. Let us begin by labeling affirmative sentences of the sort "The South Pole exists" or "Electrons exist" as positive existential statements. But sometimes we would like to deny that something exists. In that case we have to make use of negative existential statements.

Negative existential statements are typically used to indicate the fictional character of some concepts. Thus we can explain to a child that fairies don't exist, or that the famous detective Sherlock Holmes never existed. But negative existential statements also play an important role in science. For example, astronomers at the beginning of the 20th century put forward the hypothesis that there should be yet another planet in the Solar System which orbits the Sun closer than Mercury. This hypothetical planet was even given the name of Vulcan, after the Greek god of fire. However, such a planet was never detected in spite of an extensive search, hence the conclusion was drawn that Vulcan does not exist. In mathematics some negative

existential statements form important theorems. An example can be Euclid's famous theorem about the nonexistence of the greatest prime number. Finally, philosophers often advance negative existential statements with respect to "suspicious" entities postulated in certain theories, such as abstract objects or mental events.

But there is a semantical problem brought about by negative existential statements. Let us consider the statement "Vulcan does not exist". What is this statement about? If, as its grammatical structure suggests, we interpret it as being about its subject, that is Vulcan, we have an immediate difficulty here. For it looks as if Vulcan had to exist in order for the sentence "Vulcan does not exist" to be true. Clearly, a statement is about something only if this something exists, otherwise it would be about nothing. But this leads to a contradiction: Vulcan both exists and does not exist. This is an age-old philosophical problem known already to the Greek philosopher Plato, and sometimes even referred to as the Platonic riddle of nonbeing. Below we will consider two possible solutions to this paradox, which will lead to two rather different conceptions of what existence is.

Non-existent objects

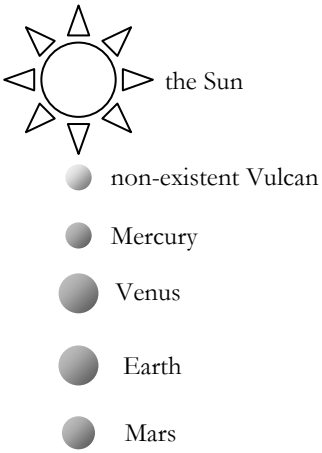
One way out of trouble is to divorce the notion of existence from the notion of an object. We may choose to admit that Vulcan is something – an object – but this object happens to be a non-existent one. This leads us to a metaphysical conception, according to which all objects can be divided into two groups: existent and non-existent ones. In the first category we can find familiar entities: trees, planets, cars; whereas the second category of non-existent entities is filled by all sorts of fictions: unicorns, fairies, planets closer to the Sun than Mercury, and so on. The main proponent of non-existent objects was the Austrian philosopher Alexius Meinong (and hence modern followers of his theory are often called neo-Meinongians). He believed that all concepts we can come up with must refer to something which he called objects of thought. Sometimes these objects of thought turn out to be real, that is existent, but in some other cases they remain mere figments of our imagination. But this does not rob them of the status of an entity.

The conception of existence that emerges from these considerations is often referred to as the property view. This is so,

because according to this view existence is a property of some objects. Just as the property of being red differentiates objects that possess it from objects that don't, existence merely separates all entities into two groups depending on whether they are real or not. But there is an ontological notion even more general than existence which is available to the metaphysician – that is the notion of *being*. There are unicorns, but they don't exist. The proponents of the property view admit that there are objects which don't exist. Existence implies being, but being does not imply existence, the same way as being a horse implies being a mammal but not vice versa.

The property view of existence seems to be very natural and intuitive. However, the underlying conception of non-existent beings encounters serious difficulties. First of all, the domain of non-existent objects must be rather large, perhaps even outnumbering the realm of ordinary, existing entities. Each concept, no matter how outlandish, must have its counterpart at least in the domain of fictions. Consider, for instance, the description "The x-foot-high golden mountain", where x is any real number. To each such description there should correspond one non-existent object. This already implies that there is at least as many distinct fictional objects as there are real numbers. Moreover, there is the problem of contradictory objects. Is there a non-existent square circle? If yes, then some object possesses two mutually inconsistent properties of being square and not being square (e.g. being circular).

Another problem is related to the fact that non-existent objects are incomplete with respect to their properties. For instance Vulcan can be said to possess definitely only two properties: being a planet and being located within the orbit of Mercury. But other possible properties of Vulcan are fundamentally indeterminate: its mass, its diameter, period of revolution, period of rotation, the tilt of its axis, etc. are not determined, as they don't enter into the definition of the concept of Vulcan. This stands in sharp contrast to the way existent objects behave. Even though we may not know many properties of the existent planet Mercury, we have good reasons to believe that no matter what possible characteristic of a planet we choose, Mercury either possesses it or not. Because of their incompleteness, in many cases it is impossible even in principle to decide whether some non-existent objects are one and the same entity or distinct objects. Consider, for instance, the non-existent planet Vulcan whose diameter equals 16,654 miles, and the planet Vulcan whose period of



Is this what our solar system would look like if we admitted non-existent objects?

revolution around its axis equals 73.4 hours. Are they identical or distinct? But how could we possibly decide, if it is in principle indeterminate what the period of revolution of a planet is, given only its diameter? The American philosopher Willard van Orman Quine famously quipped that there are no entities without identity. If the matters of identity or distinctness are not settled in a given domain, the items in this domain do not deserve to be called objects, or entities.

It is controversial, to say the least, to assume that non-existent objects can possess properties in the same way existent objects possess their properties. Consider again our fictional planet Vulcan. We are being told that this non-existent planet literally exemplifies the property of being located somewhere between Mercury and the Sun. But we have extensively scoured this area using our best astronomical instruments, and we've failed to notice anything that remotely resembles a planet in the vicinity of the Sun! How can an object have the property of being located somewhere without actually being there? You may point out that non-existent objects cannot be observed. True, but we have not defined Vulcan as a non-existent being, but as a planet. And isn't it part of what we mean by being a

2 UNIVERSALS AND PARTICULARS

The distinction between universals and particulars is almost as old as philosophy itself, as it can be traced back to the great Ancient thinkers – Socrates, Plato, and Aristotle. The concept of universals derives directly from the observation that individual things display striking similarities which enable us to categorize them into general kinds. Classification of objects and processes is the beginning of all science, as without it we wouldn't be able to discover and describe any regularities. Most probably even the language that we speak would not be possible without us recording similarities between things. A natural metaphysical explanation of the fact that things of a given kind (trees, chairs, electrons) have something in common is to assume the existence of an extra object which stands in a particular relation to those things. For example, a red rose and a red car can be said to resemble each other because of a third object, redness, that is somehow present in both objects.

In that way we have introduced a new type of objects – universal objects, or universals for short. Universals are supposed to be related to ordinary things in a special way. This relation is known as instantiation, or exemplification. A red rose and a red car both exemplify one universal: redness. Objects which can only exemplify, but are never exemplified themselves, are now referred to as particulars. But some universals can exemplify other universals as well. For instance redness, which is a universal, exemplifies the property of being a warm color. Thus we can have a whole hierarchy

of objects ordered with respect to the relation of instantiation. At the bottom of the hierarchy are particulars, then universals exemplified by particulars (so-called first-order universals), then universals exemplified by the universals from the previous level (second-order universals), and so on. We can also make another important distinction between monadic and polyadic universals. Monadic universals are primarily properties, although some insist to include in this category a separate type of universals known as kinds. Properties are called monadic (from the Greek word *monos* – alone, single) because they can be instantiated by individual, single objects. Polyadic universals (the Greek word *polys* means "much"), on the other hand, are relations. Relations are exemplified not by single individuals, but by their pairs (in the case of dyadic universals) or triples, quadruples, etc. To illustrate, the relation of being the father of is exemplified by the pair (David, Solomon).

Postulating the existence of universals can help us analyze the semantic structure of basic sentences of natural language. Let us consider the subject-predicate statement "Socrates is courageous". It is natural to interpret this sentence as being true when the individual named by its subject "Socrates" possesses (exemplifies) the property represented by the predicate "is courageous". More precisely, two semantical functions of linguistic expressions are usually distinguished: that of denotation and connotation. An expression denotes a thing if it can be truthfully said about this thing. The name "Socrates" denotes one individual, namely Socrates himself. On the other hand, the predicate "is courageous" denotes all individuals of whom it is true that they are indeed courageous. Thus predicates typically denote more than one individual object. But each predicate also picks out a single object which is a universal. The predicate "is courageous" naturally singles out the property of being courageous. However this predicate cannot be said to denote courage. Clearly it is not appropriate to say that courage is courageous. Hence we need to introduce the new semantical function of connotation. The predicate "is courageous" denotes courageous individuals, but connotes the property of being courageous. It is usually assumed that individual names, such as "Socrates", do not connote anything. We don't use such names to pick out any property of an individual, but rather to pick out the individual as a whole.

A similar analysis can be applied to sentences involving relations (polyadic universals). The statement "Socrates is the teacher of Plato"

is true if the relation "being the teacher of" is instantiated by the pair (Socrates, Plato). According to this analysis (which at this point slightly departs from the standard grammatical approach) the entire sentence can be broken down into three components: two individual names "Socrates" and "Plato", and one two-argument predicate "is the teacher of". The individual names denote appropriate people and connote nothing, whereas the predicate denotes all pairs of individuals such that the first one is the teacher of the second one. Besides that, this predicate connotes the binary relation "being the teacher of", which is a polyadic universal.

The assumption of the existence of universals can also account for the phenomenon of abstract reference in natural language. Abstract reference occurs when we use a noun which cannot be literally interpreted as referring to any particular. Examples of abstract reference are numerous. It is present in the following sentences: "Redness is a color", "Courage is a moral virtue", "These two statues have the same shape", "All objects share at least one property". The terms "redness", "color", "courage", "moral virtue", "shape" and "property" can be interpreted as names of appropriate universals. To appreciate how commonplace the phenomenon of abstract reference is, the reader is invited to randomly select a few sentences from this book and see for herself how many names referring to universals they contain

Realism and nominalism

The metaphysical position according to which universals exist is known as conceptual realism, or realism for short. Realism can come in various forms depending on how broad in scope the category of universals is assumed to be. Unrestricted realism, also known as semantic realism, asserts that to every meaningful predicate of natural language there corresponds a universal. Thus there is the property of being red, because we have the predicate "is red", and there is the property of being round connoted by the predicate "is round". But on top of that there is also a separate universal "redness and roundness" which corresponds to the predicate "is red and round". Therefore it should be clear that unrestricted realism must postulate a vast number of distinct and yet mutually connected universals. Some critics point out that this proliferation of universals is unnecessary, and in special cases it can even lead to serious logical problems.

3 POSSIBILITY AND NECESSITY

In this chapter we will study the so-called modal notions, of which the two notions of possibility and necessity are particularly prominent. As is often the case, the term "possibility" may convey various rather disparate ideas. One of its typical interpretations can be identified as epistemic. When I say in an uncertain voice that it is possibly raining in London now, what I roughly mean is that I don't have sufficient reasons to form a strong belief about what the weather is like in London (perhaps with a slight hint that I consider rain to be more likely than not). Anyway, this use of the term "possible" points primarily to the state of my knowledge rather than to reality itself, hence the label "epistemic". Another use of the word "possible" involves a temporal perspective. This temporal perspective is present in the context of talking about future alternative scenarios. Pointing at Rodin's famous sculpture The Thinker one can say that it can be possibly painted yellow. As of now it is open whether it will be painted yellow or any other color, or left as it is. But there is a third optional reading of possibility, which can be seen for instance in the supposition that the Thinker might have been an altogether different statue, for instance another famous sculpture by Rodin The Kiss. Possibility understood as in this example is sometimes dubbed "counterfactual", although this term is a misnomer, for not all possibilities are contrary to facts in this approach. But we want to emphasize that under the counterfactual interpretation a past situation may be possible even though it actually

Could this sculpture...

...have been shaped into that?

hasn't taken place, so in a way has been already excluded from the real world. We don't need to resort to the openness of the future to speak about possibilities in this sense. In what follows we will focus almost entirely on the third interpretation of possibility.

Modal notions and modal contexts

In modern philosophical language the notions of possibility and necessity are presented and analyzed in terms of so-called possible worlds. The question of what possible worlds are will be extensively scrutinized in subsequent sections, as it is a metaphysical problem par excellence. For now we can simply imagine possible worlds as collections of situations, or states of affairs. Situations, on the other hand, are just objective counterparts of meaningful statements. To illustrate that, the statement "This lizard is green" represents the situation that this particular lizard is indeed green (in short the lizard's greenness). The actual world can be seen as a collection of all situations which correspond to true sentences. Possible worlds also comprise of situations, but not necessarily situations that obtain in our world. But a statement describing some situation which exists in a given possible world is always true in this particular world. Thus the notion of truth becomes relativized to a world. We may also add that possible worlds are collections of situations which are in a sense

complete. That is to say, for each meaningful, unambiguous sentence it should be determined whether it is true or false in any possible world. To use the words of the influential 20th century philosopher David Lewis, possible worlds are ways things might have been. If you think that the current President of the US might be a woman, you have to accept that there is a possible world in which the current President of the US is a woman.

Philosophers and logicians usually do not place any specific restrictions on the notion of possible worlds, except that they have to be logically consistent. But they admit that some possible worlds can be so far-fetched as to be epistemically "inaccessible" from our actual world. For that reason we will only focus on the worlds which are, in a suitable sense, accessible to us. Having the notion of an accessible possible world at our disposal, we can now proceed to define some important modal concepts. To begin with, we will say that a statement is possibly true (in short, is possible) if there is a possible, accessible world in which it is true. The complementary notion of necessity is defined as follows: a statement is necessary if it is true in all possible worlds accessible from our world. We may observe that any statement which is true in our world is also possible, since the actual world is just one of the possible and clearly accessible worlds. For the very same reason it is also the case that if a statement is necessarily true, it is true in our world. But there may be possible sentences which are false in our world, for instance the statement that the current President of the US is a woman. We may also introduce the category of contingently true sentences. A sentence is contingently true if it is true in our world but there is a possible world in which it is false. It can be verified that the concepts of possibility, necessity and contingency are not independent from each other. Rather, they are mutually definable. For instance, it may be stipulated that a statement is necessary if its negation is not possible. A statement is contingently true if it is true and is not necessary. Examples of necessary statements are usually taken from logic or mathematics. It is hardly questionable that the statement "It is raining or it is not raining now" must be true in all possible worlds.

The notions of necessity, possibility and contingency can be applied not only to sentences but to objects as well. An object is possible if it exists in at least one possible world, is necessary if it exists in all possible worlds accessible to us, and is contingent if it exists in the actual world but doesn't exist in some other possible

worlds. Realists typically assume that abstract objects (universals, mathematical entities) are necessary, although the concept of a contingent abstract object is treated by some as a viable alternative. Some philosophers also insist that God is a necessary being (we have discussed the ontological argument for the necessary existence of God in Chapter 1). Within the framework of possible worlds we may in addition consider the notion of possible but not actual objects (merely possible entities). This concept superficially resembles the notion of non-existent entities that we criticized in Chapter 1. For instance, it may be claimed that the planet Vulcan is such a possible object, since arguably there is a possible universe in which a planet orbits the Sun closer than Mercury. But we should observe that merely possible objects avoid the main problems associated with the conception of non-existent objects. In each possible world objects are complete with respect to their qualities, and they literally possess all their qualities (Vulcan is literally located between Mercury and the Sun, since in an appropriate possible world there is a planet closer to the Sun than Mercury). In all considerations related to possible worlds the underlying conception of existence is the one expressed by the quantifier view, not the property view. The only novelty now is that we may introduce two notions of existence: actual existence, where the scope of the existential quantifier is limited to the actual world, and possible, "unrestricted" existence, with the quantifier ranging over all possible worlds.

Because of this bifurcation of existence, when we apply modal notions of necessity and possibility to statements involving quantification, things get a bit complicated. It turns out that there is usually more than one interpretation of such modal statements, and each interpretation may lead to slightly different conditions under which a given statement is deemed true. In logic it is customary to distinguish between two types of modal attributions: *de re* ("to a thing") and *de dicto* ("to a statement"). This distinction can be best explained using some examples. Consider, for instance, the false statement "There is a woman who is the president of USA in 2011". What can we have in mind when we say that this statement is possible? One interpretation may be as follows: this statement is considered possible if there is a woman in our actual world (for instance Hillary Clinton) who, although not the actual president of the US, is the president in another possible world. This explication is based on the *de re* interpretation of modality. The *de dicto*

4 TIME AND TEMPORAL OBJECTS

Time and temporality have always been at the center of metaphysical investigations. Today's metaphysics of time is strongly influenced by the advances of modern science (mostly physics), but it still remains an independent and active area of philosophical research. In this chapter we will see how philosophers try to capture the essence of the temporal character of the physical world. Some of them insist that temporality can be analyzed exclusively in terms of an ordering of events, whereas others maintain that there is yet another aspect of time which has to be taken into account – the so-called passage of time. The proponents of the objective passage of time usually believe that what is happening now is somehow ontologically privileged in comparison with what will happen or what has happened. On the other hand, this special ontological character of the present is questioned by those who want to reduce time to a mere succession of events. We will see how modern physical theories, such as special relativity, bear on this issue. The special and general theories of relativity have an impact on yet another fundamental debate regarding the nature of time (and space as well). The question considered here is whether time and space are entities independent of physical objects, or do they owe their existence to more fundamental beings. Finally, we will briefly touch upon the subject of how things persist in time. However, we will start our discussion on time with an introduction and analysis of another crucial ontological category – that of events.

Events

Events are assumed to form a category of spatiotemporal objects which is separate from the category of things. Although both events and things exist in space and time, their modes of spatiotemporality are significantly distinct. Things are considered to be *continuants*, which means that even though they exist throughout longer periods of time, at each particular moment a given thing is fully and completely present. Events, on the other hand, are *occurents*. They are not complete until the last moment of their existence. To illustrate this distinction, let us compare Napoleon (ontologically speaking, a thing) with the Battle of Waterloo (an event). Both Napoleon and the battle coexisted during a certain period of time, but at each moment of the battle Napoleon existed as a complete entity, whereas the same moment contained only a small fragment of the entire battle. It has to be added, though, that there is a non-standard interpretation available according to which things exist in time in a similar way to events. We will talk more about this suggestion later in the chapter.

Events are commonly used in natural language as well as the language of science and philosophy. We talk without reservation about battles, treaties, births, deaths, earthquakes, hurricanes, and so on. Fundamental physics is chock-full of reference to events: collisions, annihilations, creations, absorptions, emissions. In philosophy events are considered to be proper arguments of the causal relation. We also talk about mental events, actions and beliefs. Thus the ontological thesis about the reality of events seems to be well supported by linguistic practice. But for those still unconvinced we may offer an additional linguistic argument, originally formulated by Donald Davidson. Consider the following sentence: (P) Jones is slowly buttering his toast with a knife in the kitchen. It is obvious that sentence (P) logically implies that Jones is buttering his toast, that Jones is doing something with a knife in the kitchen, and so on. However, it turns out that it is rather difficult to formalize these unquestionable inferences in a language which assumes the existence of things only. This is so because standard logic does not offer a straightforward way of representing adverbial modifications (such as "slowly" or "in the kitchen") as separate parts of predicates. On the other hand, if we introduce events into our domain, we can rephrase all the sentences involved in such a way that the logical entailment will be clearly visible. The starting sentence (P) can be interpreted as:

(Q) There is an event x such that x is a buttering of toast, x is done by Jones, x is done slowly, x is done with a knife, x is done in the kitchen. Now all adverbial modifications are transformed into predicates attributed to one event: the buttering. And by eliminating various elements of the entire conjunction we can derive all the required consequences using the well-known logical law which enables us to infer each conjunct from a conjunction of two or more sentences.

Once we have accepted events into our ontology, we should formulate some criteria of their identity and distinctness. When can we say that we have two events rather than one? One possible answer may be that two events are identical if they coincide spatiotemporally. But there are convincing examples of events which violate this rule. Imagine a metal sphere which is rotating around its axis and at the same time is heating up. The events of rotating and of heating up are intuitively distinct, and yet they occupy the same area of space-time. One way of dealing with this challenge is to adopt the criterion proposed by Davidson, according to which events are numerically identical if and only if they have exactly the same causes and the same effects. Clearly the sphere's rotation and its heating up have different causes and effects (for instance the former causes the sphere to flatten a bit at the poles, whereas the latter causes it to expand uniformly). But there is one big problem with the Davidsonian criterion. In order to decide whether an event x is identical with an event y we have to identify and compare all causes and effects for x and y. But in order to verify whether a given cause for x is the same as a cause of y we must use the same criterion again, and it prescribes that we have to determine first whether x and y are identical or not (as x and y are effects of the events considered). Thus we are going in a circle: in order to decide whether x is identical with y we should know in advance whether they are identical or not. It is generally accepted that Davidson's criterion cannot avoid the circularity problem, even though in some special cases a proper identification of two events can be made on its basis.

In the light of this difficulty, another interpretation of events has been proposed by Jaegwon Kim. Events for Kim are property exemplifications, or more specifically triples of the form $\langle a, P, t \rangle$, where a is an object, P is a property, and t is a time at which a possesses P. From this characteristic it follows that two events are identical when they occur on the same object, at the same time, and

5 CAUSATION

Our physical universe consists of bodies which are mutually connected by a web of various relations. First and foremost, there are spatiotemporal relations that determine the relative locations of things in space and time. We have also discussed how objects can be related to each other with respect to their common properties (as expressed in various degrees of similarity and qualitative identity). But the list of fundamental metaphysical relations would be woefully incomplete without the causal relation. Causality is appropriately called the cement of the universe. Causal interactions between physical bodies help to combine them into larger structures: molecules, cells, organisms, planetary systems, galaxies, etc. Virtually everything that happens around us is brought about by causation. Earthquakes cause damage, sunlight causes photosynthesis, and stock market collapses cause panic. But what does it mean that something causes something else? As usual, we will start off with some basic distinctions. To begin with, we should differentiate between general causal statements, such as "Smoking causes cancer", and singular causal statements of the type "The sinking of the Titanic was caused by a collision with an iceberg". General causal statements involve types of events, whereas singular statements concern individual occurrences. There are no simple logical rules connecting the two types of causal statements. For instance, it would be inappropriate to infer from the statement that smoking causes cancer that each individual who smokes more than a given number of cigarettes a day

will develop cancer. On the other hand, there is no easy method of generalizing singular causal statements in order to reveal the underlying causal link between types of events. This is the case, because for a given event there is usually more than one way of categorizing it into a broader type. For instance, an individual act of smoking a cigarette can be subsumed under the category of inhaling the chemicals produced in the process of burning tobacco leaves, but also under the category of being engaged in a nerve-soothing practice, or moving particular muscles of the mouth and the chest. Only the first categorization leads to causal generalizations involving serious health issues.

In what follows we will focus almost exclusively on singular causal statements. Hence we will interpret causation, as it is commonly done, to be a relation between individual objects. But what objects can be properly taken as causes and effects? One suggestion may be that causes are things which make something happen. In everyday speech we say for instance that a stone shattered the window, or that an asteroid wiped out the dinosaurs. But when we look closer we can see that this is a very imprecise way of speaking. A stone that is lying on the ground does not cause any shattering, and an asteroid which stays on its orbit at a safe distance from Earth does not threaten life on our planet. Strictly speaking, it is not things that cause something to happen, but what these things are doing. The dinosaurs went extinct because of the hit of an asteroid, which was an event. Thus it is natural to assume that both causes and effects are events involving certain things, not things themselves. But some philosophers suggest that this account of causality is too restrictive, as it doesn't make room for cases of what can be called negative causation. Sometimes it seems natural to single out the absence of an event rather than an event itself as a cause of a particular occurrence. We say that the lack of attention of the driver was a cause of the crash, and the absence of working sprinklers causally contributed to the fire. In order to admit negative causation (sometimes also called causation by omission) some propose to interpret causes and effects as facts, not events. Facts are objective counterparts of true statements, so if a statement about the absence of an event is true, there is a fact corresponding to this statement. But it is not entirely clear whether we really need negative causation. It may be pointed out that underlying any case of negative causation there is an even more fundamental instance of positive causation –

for example the lack of attention of the driver could have been actually due to his talking on his mobile. Moreover, some examples of causation by omission are clearly unintuitive. For instance we wouldn't normally accept the statement "The fact that I was not struck by lightning caused me to survive" unless we had a reason to believe that the lightning was imminent.

Let's continue our analysis of the causal relation connecting events, and let's focus on some of its basic formal features. It should be relatively clear that causation is not reflexive (my typing of this sentence certainly doesn't cause itself). But is it irreflexive? In other words, can there be special events which are their own causes? That depends on some additional assumptions. If we allow causal loops, which can occur for instance in time travel (we have discussed this in Chapter 4), and if we accept that the causal relation is transitive, then it follows that one event can be its own cause. This can happen when event x causes event y in the past, but y causes x in turn. This situation is of course only hypothetical, as we don't have any evidence for the existence of backward causal links, but some philosophers insist that there is nothing fundamentally incoherent about this possibility. The possibility of causal loops also shows that the causal relation is not necessarily asymmetric, although clearly in the overwhelming majority of cases if x causes y, y doesn't cause x (thus causality is certainly not symmetric). As for transitivity, it is usually assumed that causation is transitive: if one event x causes event y, and y in turn causes another event z, we naturally expect x to be a causal factor in creating z as well. But recently several cases have been considered which seem to undermine this conclusion. Consider, for instance, the following scenario: a bomb had been planted at a politician's office before it was spotted by the security service and disarmed. We should agree that the planting of the bomb caused its disarming, and the disarming in turn causally secured the politician's survival. But it sounds a bit odd to admit that the planting of the bomb was causally responsible for the survival of the politician. Still, this situation is far from clear, as some philosophers (including Lewis) insist that there is nothing wrong with the last statement – it only shows that sometimes actual consequences of our actions are different from the intended ones. Thus the issue of the transitivity of the causal relation remains contentious.

6 DETERMINISM AND FREE WILL

Causation can be seen as a force which makes things happen. Whether this force acts with necessity is a contentious issue, but some philosophers believe that events in our world do not unfold by accident or chance. According to this view, the entire history of the universe is somehow predetermined, so that there is no room for spontaneity or accidentality. This broad metaphysical hypothesis is known under the name of determinism, and those who oppose it call themselves indeterminists. In this chapter we will first attempt to clarify the thesis of determinism, which is a notoriously ambiguous and multifaceted view. Then we will discuss whether the assumption of determinism should change the way we see ourselves as acting agents. Can we meaningfully talk about the freedom of making decisions in a world in which everything is determined? And if some actions are indeed free in such a world, how to distinguish them from those that aren't?

In popular introductions to the subject determinism is often presented as the claim that everything has its cause. According to this stance events happen for a reason – they do not appear out of thin air. However, this interpretation of determinism (which is also referred to as the principle of causation) heavily depends on the adopted notion of a cause. As we have seen in the previous chapter, there is no shortage of competing conceptions of causality, and each conception leads to a different understanding of what the principle of causation says. For instance, if we followed the counterfactual

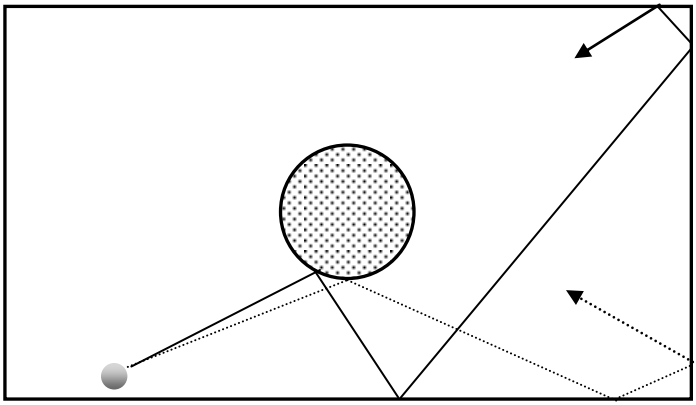
analysis developed in Chapter 5, this principle would state that every event is counterfactually dependent on some other distinct events. This looks like a very weak statement, and it is hard to imagine a world similar to ours in which it would be violated. Even phenomena which according to modern science may deserve to be called indeterministic seem to satisfy this weak principle. For example, contemporary atomic physics assumes that the process of the radioactive decay of an unstable nucleus is indeterministic in that it is impossible to tell exactly when it will occur (we can only calculate the probability that the nucleus will decay within a certain period of time). But clearly there are plenty of events on which this particular decay counterfactually depends, and which therefore count as its causes. One such cause may be simply the event of the creation of the nucleus (if the nucleus had not been created, it would not have decayed). To avoid this unintuitive consequence the proponents of the principle of causation implicitly assume the interpretation of causes as sufficient conditions. Our best scientific theories imply that the conditions preceding the decay are not sufficient for it to occur, because another atom in perfectly the same conditions may not decay now but in a thousand years. Thus probabilistic processes of radioactive decay would be without causes under this approach.

Determinism, predictions, and laws

There is a long tradition in philosophy to associate determinism with predictability. Predicting future events is one of the main goals of science, which unfortunately can rarely be achieved in practice. We are severely limited in our ability to forecast the weather for a couple of weeks in advance, or to predict such catastrophic events as earthquakes and tsunamis. Pierre Simone de Laplace, a French mathematician, physicist and philosopher working at the turn of the 18th and 19th centuries, thought of one way of overcoming these limitations. Laplace is the author of a famous passage in which he characterizes determinism with the help of the following thought experiment. Imagine a powerful intelligence whose computational and perceptual abilities as well as general knowledge are infinitely greater than ours. This intelligent being (known to posterity as Laplace's demon) would have no problems with predicting every single future event (and every past one, for that matter) if he knew precisely the state the world is in at this very moment.

For Laplace this is the essence of determinism: it should be in principle possible to infer the occurrence of every event at some time t on the basis of the complete and accurate knowledge of the state of the world at another time t'. The main tool with the help of which this can be done is of course the laws of nature. Laplace derived his idea of determinism from the successes of Newtonian mechanics in describing and predicting motions of material bodies under the influence of gravitational forces. The laws of Newtonian mechanics have the mathematical form of second-order linear differential equations, and these equations possess unique solutions if only we fix the initial conditions. This means that if we fix the positions and velocities of all bodies in a given system at a certain instant, and if we take into account all gravitational (or any other) forces acting upon these bodies, we can in principle calculate the trajectory of each individual body. Unfortunately the mathematical calculations required for systems of more than just a couple of bodies are so enormously complicated that even the most powerful computers could not accomplish this task. That's why Laplace had to enlist the help of a supernatural demon.

However, there are several problems with the predictive version of determinism as envisaged by Laplace. First of all, it is unclear what exactly the computational capabilities of the demon are supposed to be. If we assume that the demon works like a "normal" computer but with unlimited storage capacities (a so-called universal Turing machine), then there are reasons to believe that certain necessary computations will never be able to be completed in the required time frame. On the other hand, if we intend to equip the demon with truly supernatural capabilities, then nothing can stop us from assuming that he can simply "divinate" every single future event, thus making the thesis of determinism trivially true. Another controversial issue is the assumption that the demon knows every single detail about the current state of the universe. This is a highly idealistic assumption, as all the quantitative information we can get about the world is always given within a margin of experimental error. To avoid such a controversial presupposition, Karl Popper has proposed a more down-to-earth formulation of predictive determinism which calls for the concept of an ideal scientist rather than that of a supernatural demon. For Popper the thesis of determinism is true if such an ideal scientist could in principle predict future events within a certain, fixed in advance margin of experimental error, if he knew the current



An example of a chaotic but deterministic system. A small variation of the angle at which the billiard ball is shot snowballs into a huge difference in trajectory.

state of the system, again with a reasonable degree of precision. However, it is interesting to observe that there are some systems which do not satisfy Popper's criterion, even though in a more fundamental sense they are still deterministic. These are physical systems which are extremely sensitive to small changes in their initial conditions, so that even a tiny variation of those conditions results within a short period of time in a dramatic difference in the evolution of the system. This phenomenon is aptly called "deterministic chaos", and it effectively prevents making any reasonable predictions for such systems, due to the fact that we can never know the initial conditions precisely enough to calculate their future behavior.

But in a more metaphysical sense chaotic systems of the sort described above may still be deterministic. The metaphysical idea of determinism does not invoke any epistemological notions such as prediction or knowledge. Instead, it focuses entirely on objective relations between the states of a given system at different instants. Determinism under this approach is often expressed in the form of the supposition that the momentary state of a system at one point of time fixes the states at all subsequent times. But what does it mean that one state fixes another? One possible interpretation may be that given the initial state s at time t, for any moment t' later than t there is

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ABOUT THE AUTHOR

Tomasz Bigaj is a lecturer at the Institute of Philosophy, University of Warsaw, Poland. He has been a Fulbright fellow at the University of Michigan, Ann Arbor, and a Marie Curie fellow at the University of Bristol, UK. His main areas of specialization are philosophy of science (especially of physics), metaphysics, and philosophical logic. He is the author of three books and over thirty professional articles published in peer-reviewed journals (including *Journal of Philosophical Logic*, *Synthese*, *Erkenntnis*, *Philosophy of Science*, *Metaphysica*). His latest book is *Non-locality and Possible Worlds: A Counterfactual Perspective on Quantum Entanglement* (Ontos Verlag, 2006).