Relations

*Project and provisional plan of the book:*

Relations are one of the most important currently debated topics in metaphysics and philosophy of science. Additionally, relations of different kinds are central to the practice of virtually every subfield of philosophy (see sample chapter below). However, there does not appear to be any book specifically dedicated to the philosophy of relations on the market. The proposed book will try to fill this gap. It is designed for and, if accepted, will be specifically written for the collection *New Problems of Philosophy*. It will cover the topic of relations in depth aiming at being of interest to both students and professional philosophers. It will be of the average length (approximately 200-250 pages) and will follow the typical structure of other volumes belonging to the collection, including a glossary of technical readings and, for every chapter, a summary, and a list of suggested readings. It will appeal to a wide readership from a broad range of philosophical subfields (especially, but not exclusively, metaphysics, philosophy of science and mathematics, philosophy of mind, philosophy of logic, and philosophy of language). I plan to complete a first draft of the book in about a year and a half time (many chapters have already been drafted and I take the liberty to send you two sample chapters).

The book will be divided into the following chapters :

1. Historical Introduction to the Topic of Relations (see draft chapter below)
2. Key Problems of the Philosophy of Relations : 1. Adicity
3. Key Problems of the Philosophy of Relations : 2. Order
4. Key Problems of the Philosophy of Relations : 3. Bradley’s Regress (see draft chapter below)
5. Central Conceptions of Relations: Sets, Categories, Predicates, Thematic Roles, Slots, Russell’s View.
6. Assessment of the Ability of Different Conceptions of Relations to deal with Key Problems Outlined in Chapters b)-d).
7. Higher-Order Relations
8. Relations All the Way Down?

 i) Glossary

Ipso facto*, there are no things without opposition* (Peirce 1965, 1, p.457)

*Je ne crois pas aux choses, je ne crois qu’à leurs relations. (I don’t believe in things, I just believe in relations.*) Georges Braque (quoted in A. Liberman, *The Artist in his Studio*, 1960, p.39)

Historical Introduction to the Topic of Relations:

Given that this book will treat *inter alia* of the different ways to understand what relations are, specifying precisely the nature of relations at its outset would be inappropriate. Some approximate and provisional characterisation of our topic must nonetheless be given at its start. This is relatively easy given that the notion of relation is familiar, being an integral part of everyday and scientific thought and discourse. The following examples of relations, drawn from the everyday realm and from various scientific contexts, might be of some help in bringing home the concept, as well as in illustrating the broadness and diversity of the category of relations.

-The city of Geneva *lies 6278 km away from* New York.

-Napoleon’s birth *occurred* *251 years before* the author started to write the present book.

-The author is currently *thinking of* going to a football match.

-Thirst *causes* birds to drink from the fountain nearby.

-Objects a, b, c *are elements of* the set {a,b,c}.

-Nucleons A, B, C *are part of* the nucleus N of atom AT.

These examples of relations’ instances can be usefully contrasted with the following cases of monadic properties instances.

-Electron E *is negatively charged*.[[1]](#footnote--1)

-Triangle T *is triangular*.

-A *is a cat*.

The first obvious remark to make about the previous examples is that, by contrast with instances of monadic properties, relations’ instances are typically[[2]](#footnote-0) constituted by more than one object. Otherwise put, relations typically require more than one object to be instantiated. A first provisional (metaphysical) definition of relations is therefore that relations are tropes inhering in at least two objects or universals comprising at least two objects per instance.[[3]](#footnote-1) A second way to make the notion precise is to put to use metalinguistic and logical notions. Relations are indeed typically represented using n-adic predicates[[4]](#footnote-2) with n larger than 1 (henceforth n-adic predicates for short), by contrast with monadic properties which are typically represented using monadic predicates. A second provisional (metalinguistic/logical) way to define relations is therefore to define them as the type of entities that n-adic predicates typically stand for. In natural languages n-adic predicates take the form of comparative adjectives, prepositions, and transitive verbs among other types of words, and, as we will see later, philosophers from Plato’s time onwards have made great usage of these types of words when speculating about relations. Indeed, a metalinguistic and logical way to characterize relations, similar to the one just given apart from the fact that it was limited to dyadic relations and predicates, has historically been one of the first ways to define relations, having been used at least since Plato’s time.

A striking fact about relations, thus provisionally characterised, is that they are pervasive throughout philosophy. To give a couple of examples, relations are central to the following philosophical sub-fields.

-Philosophy of mind, where the relations of intentionality, of perceiving, and of intending, are key, among others.

-Philosophy of mathematics, where the relation of set-membership, and of being an image of …under a function are essential, among others.

-Philosophy of logic with *inter alia* the relation of identity that incidentally will be the topic of many of the following lines.

-Philosophy of language with the relations of reference, predication, expression, and of having a propositional attitude, for example.

-Metaphysics with the relations of causality, grounding, the part-whole relation, and the relation of truthmaking among others.

-Philosophy of physics with the spatial, temporal, and spatio-temporal metric relations among others.

-Normative ethics with *inter alia* the relations of being more valuable than, and of being a reason for.

-Epistemology with the relations of being an evidence for, of justification, of understanding, believing, judging and knowing, for example.

-Philosophy of science where, as we shall see, structuralism has been a central movement that pervaded the XXth century as a whole, and has known an increasing amount of interest over the past decades.

 The importance of relations is not limited to philosophy, however. Their importance cannot be overemphasized in both science and the humanities. As we will see throughout the book, it is hardly an overstatement to assert that without the notion of relations, many scientific disciplines could not have existed in their modern guise. Relatedly, philosophy as a whole could hardly be practised without the concept of relation, as the examples of relations above are essential to their respective subfields. It is therefore a very surprising historical fact that the legitimacy of *sui generis* and mind-independent relations was extremely slow to be accepted in philosophy. The reason why this happened is a debated matter and an interesting topic in its own right, a problem of central importance to the history of philosophy (see Brower 2016, Penner 2016 for attempts to explain this reluctance). The following lines will briefly outline the long march that philosophy had to go through before accepting irreducible and mind-independent relations. Doing so will allow us to introduce some of the main concepts and problems we will encounter in the rest of this book.

 Traditional philosophical historiography considers that the very existence of relations was fully recognised by philosophers only starting from the end of the XIXth and beginning of the XXth century. According to this view, it was not until progress in mathematical logic emancipated logicians and philosophers from the traditional Aristotelian thesis that sentences and propositions had a subject-predicate form, thereby allowing philosophers to symbolically represent relations in terms of functions and arguments and in terms of n-adic predicates and terms, that relations could make their entrance on the philosophical scene (see for example Kneale and Kneale 1962, p.31,Weinberg 1965, pp. 61–63, Cornford 1957, pp.28-36). This logical and philosophical revolution was chiefly the work of De Morgan, Peirce, Schroeder, Frege, Russell, and Whitehead (see Dipert 1984, Kneale and Kneale, pp.427-434). Prominent philosophers throughout the XXth century have voiced this historiographic view. Here is what Russell had to say towards last century’s beginning (1914, p.56):

Traditional logic, since it holds that all propositions have the subject predicate

form, is unable to admit the reality of relations: all relations, it maintains, must

be reduced to properties of the apparently related terms.

Here is a quotation from David Armstrong dating from its end (1989, p.29):

Philosophy has been a long time coming to grips with the category of relations. . . . It is not until the late nineteenth and the twentieth century with C. S. Peirce, William James, and Bertrand Russell that relations begin (no more than begin) to come into focus. Indeed in a sentence like ‘Simmias is larger than Socrates’, what exactly is ascribed to Simmias under a subject-predicate analysis? Is it the property of being large, of being larger, of being larger than Socrates? And what role does the other proper noun Socrates play in this ascription?

Furthermore, according to this narrative, prior to the XIXth century revolution in logic, the lack of a proper philosophical understanding of relations had tremendous implications in philosophy.[[5]](#footnote-3) For example, according to Russell, Leibniz’s philosophy was to a large extent a consequence of the lack of a proper grasp of relations (1937, pp.9-15, see also Rescher 1967, Wong 1980, and Hintikka 1972 for discussion and criticism of Russell’s interpretation of Leibniz).

As so often, this coarse hisoriographic narrative deserves to be mitigated. As a matter of fact the grammatical category of relative terms and the metaphysical category of relations has continuously puzzled philosophers from Plato to the present day. However, as we will see, it is true that prior to the XIXth century, philosophers, apart from certain possible exceptions about which more later, do not seem to have been able to understand relations as being both irreducible and mind-independent.

A word should be first said about what was meant by relations before the end of the XIXth century. In contemporary terms, as we have seen, relations can, to a first approximation, be both metaphysically defined as n-adic tropes or universals or be metalinguistically defined as the type of entity an n-adic predicate typically stands for. In something like the first, metaphysical sense, relations limited to dyadic relations, were discussed before the XIXth century. However, apart from the exceptions already mentioned, they were either considered not to possibly exist or to be mind-dependent. On the logical and linguistic side, the notion of a relational sentence was by no means alien to pre-XIXth century philosophers. However, relational sentences were understood as statements making essential reference to some objects other than their subjects[[6]](#footnote-4), rather than in the modern sense of statements involving n-adic predicates. Indeed, by contrast with absolute (i.e. non relative) expressions, relative expressions, like the comparative adjective ’taller’ in the sentence ‘A is taller than B’, being true or false of their subject do not only depend on the subject’s own properties (i.e. on A’s), but also of those of another object (i.e. B). This construal of relational sentences allowed philosophers, following Aristotle, to define relations metalinguistically and logically as that which corresponds, or as philosophers like to say today, as that which makes true[[7]](#footnote-5) true relative statements or judgments. According to this metalinguistic/logical definition, by contrast with what we’ve called the metaphysical definition of relations, relations were widely accepted to exist and be mind-independent throughout Antiquity, the Middle Ages, and the early modern period. As a matter of fact, the main ancient philosophers to have denied the mind-independence of relations in this metalinguistic/logical sense are probably the Stoics, who according to Sextus Empiricus (*Against the Professors*, book 2, 453-4), and other ancient sources like Plotinus (*The Enneads*, VI, 1, 6-9) and Simplicius (*On Aristotle’s Category*, c.7, 1-6), held that all relations were mind-dependent (see Henninger 1989 p.9). It must nonetheless be granted to the traditional historiographic narrative that one of the major difficulty that pre-XIXth century philosopher faced when studying relations seems to have been to treat relative predication in the context of the traditional subject-predicate analysis. A second major source of resistance towards accepting relations as real and irreducible, especially potent during the middle ages, was the difficulty philosophers had in accounting for their location (see Penner 2016 for discussion). Following Aristotle, relations were indeed widely considered to be accidents, by contrast with substances, and so to inhere in (i.e. ‘be in’) single objects, and so to have spatial locations. Medieval philosophers found it hard to understand how one accident could be located in two objects (see Peter Auriol, *Scriptum super Primum Sententiarum*, fols. 318va-b, Avicenna *Liber de Philosophia Prima*, Ch.10, tr.3, discussed in Henninger 1989, p.5). In reaction to these difficulties, apart from the already mentioned exceptions, pre XIXth philosophers in their majority attempted to reduce relations, metalinguistically construed, to different types of monadic properties. In doing so, as we will see, the biggest difficulty they faced was in accounting for non-symmetrical[[8]](#footnote-6) relations.

The first strategies to reduce relations to monadic properties were initiated by Plato (Phaedo 100e-105b, Greater Hippias 300-303, Parmenides 132b-134e).[[9]](#footnote-7) In Plato’s metaphysics, particulars receive their names and properties in virtue of partaking in Forms, which are immaterial, non-spatial, non-temporal universals.[[10]](#footnote-8) For example, according to Plato, Helene is beautiful in virtue of her partaking in the Form of Beauty, and likewise for all beautiful particulars. However, Plato did not accept the existence of what, in modern parlance, we would call polyadic Forms. He therefore attempted to reduce or eliminate relations in favour of what modern philosophers would call monadic properties.[[11]](#footnote-9) Plato’s task was straightforward in the case of symmetric relations but much more difficult for non-symmetrical ones. Let us start with symmetrical relations. Assume that A and B are equal to one another. According to one interpretation (Scaltas 2016, section 2.5, see also Matthen 1976, p.98, 1984, pp.305-6) of the Greater Hippias, Plato, through the mouth of Socrates,[[12]](#footnote-10) would consider that, strictly speaking, A and B are in this case jointly and collectively partaking in the Form of equality.[[13]](#footnote-11) A dyadic symmetric relation is thereby reduced or eliminated in favour of the collective partaking of two objects (A and B) in a monadic Form (Equality). This requires the introduction of an irreducible plural and collective type of partaking in addition to the more familiar singular way of partaking whereby a singular object like Socrates individually partakes in Forms, like the Form of Wisdom. The case of asymmetric (and more generally non-symmetric) relations was more challenging to Plato. For example, to borrow Plato’s original example (Phaedo 101a-b), if Simmias is taller than Socrates then the Form Tallness should qualify differently Simmias (making him taller than Socrates) and Socrates (making him smaller than Simmias). However, according to Plato, partaking in a Form qualifies the objects that partake in it in a uniform, single manner[[14]](#footnote-12) contrary to what is required in the case at hand. Second, one cannot simply ground the fact that Simmias is taller than Socrates in the partaking of Simmias in Tallness and of Socrates in Smallness. Indeed, Simmias is taller than Socrates but might be smaller than some other object, say Plato. Likewise Socrates is smaller than Simmias but might be larger than some other object, say Xanthippe. However, according to the view in question, this would imply that Simmias and Socrates partake in both Tallness and Shortness, two contradictory Forms. Generally speaking, objects can be larger than some objects and smaller than others. In reaction to this problem Plato writes :

But, he said, do you agree that the words of the statement ‘Simmias is taller than Socrates’ do not express the truth of the matter? It is not, surely, the nature of Simmias to be taller than Socrates because he is Simmias but because of the tallness he happens to have? Nor is he taller than Socrates because Socrates is Socrates, but because Socrates has smallness compared with the tallness of the other?—True. Nor is he shorter than Phaedo because Phaedo is Phaedo, but because Phaedo has tallness compared with the shortness of Simmias?—That is so. So then Simmias is called both short and tall, being between the two, presenting his shortness to be overcome by the tallness of one, and his tallness to overcome the shortness of the other. (*Phaedo* 102b7-d2, trans. G. M. A. Grube).

Overall scholars disagree over the exact translation of this passage, and more generally over the treatment of non-symmetric relations in *Phaedo* (102c10-103a), let alone over whether Plato’s theory of non-symmetric relations succeeds or even exists (see Castaneda (1972, 1978) criticised in Gallop (1976), and Mathen (1984), but defended in McPherran (1983) to which Mathen (1984) replied). Let us briefly review its most prominent recent interpretations.

According to Castaneda (1972, 1978), relations are treated by Plato in the *Phaedo* through the introduction of a specific primitive notion of joint partaking of particulars in chains of opposite monadic Forms likes Tallness and Shortness. In the case mentioned in the quoted passage, there would be a ‘joint or in-company’ partaking of Socrates in Shortness and of Simmias in Tallness. This fact is symbolically represented by Castaneda as ‘Tallness (Simmias)-Shortness(Socrates)’ (Castaneda 1972, p.471). Such facts are said by Castaneda to be ‘many-pronged’ and are constituted by chains of monadic Forms that can only be jointly instantiated in this type of facts. These chains of Forms are in turn identified with relations, thereby reducing relations to chains of monadic Forms. Although Plato does not cover the extension of dyadic relations to n-adic ones, its extension would be straightforward, as Castaneda notes, through the admission of chains of n monadic Forms (for n>2). Castaneda’s Platonic theory requires the admission of a primitive predicate, representing ‘joint or in company participation[[15]](#footnote-13)’ for every integer n≥2, namely the predicate ‘There is jointly partaking of …in…, of…in….,…, and of…in…’. Alternatively, one could simply introduce a multigrade primitive partaking predicate that could do duty for every n≥2. One might worry, however, that Castaneda’s reading requires the introduction of higher-order relations among Forms, resulting in the mere displacement of our problem to higher-order realms (Gallop 1976, p.157, Scaltas 2016, p.34-35). Castaneda himself speaks of a ‘connection’ or ‘link’ in between Forms like tall and short, rather than of higher-order relations. However, replacing ‘relations’ with quasi-synonyms does not seem to get rid of the problem. Nonetheless, introducing higher-order relations could be dispensed with, if one gave up the identification of relations with chains of Forms and only identified relational fact with collective partakings in pluralities of Forms.

According to a second interpretation of Plato’s view on relations, due to Scaltas (2016), asymmetrical relations are rather treated by Plato in terms of plural and collective partaking of particulars in opposite Forms like Hot and Cold corresponding to different intensities of a common qualitative state, that of temperature in the case at hand. For example A being hotter than B would be treated as A and B collectively partaking in the Forms of the Hot and the Cold in such a way that A partakes of the Hot and B partakes of the cold (Scaltas 2016, p.32). Apart from the fact of stressing the importance of the existence of a common qualitative scale to which opposite Forms should belong, and of dispensing with links between opposite Forms, this interpretation is very similar to Castaneda’s (*pace* Scaltas himself). However, by contrast with Castaneda’s interpretation, this reading cannot account for non-symmetrical relations not involving any qualitative scale like the relation of A loving B (which in Castaneda’s notation would be rendered as Lover(A)-Loved(B)).

According to a third interpretation, due to Matthen (1976, 1984), Plato construes Socrates as partaking in the Form of smallness relatively to Simmias, and Simmias as partaking in the Form of largeness relatively to Socrates. By contrast with Castaneda’s interpretation, there would then be two facts in the case at hand. Furthermore, according to Matthen’s reading, partaking is treated as involving only one Form per instances of partaking, albeit as involving partakings that hold relatively to other particulars in the case of relative predications. According to Matthen (1976), this should be taken to involve, for every object A relatively to which partaking occurs, the introduction of a distinct partaking (partaking-with respect to-A), thereby involving an infinite number of partakings. However, this interpretation of Plato’s view can be simplified, following Mathen (1984), by introducing a single novel kind of partaking, alongside partaking *simpliciter*, expressed by the primitive predicate ‘…partakes in… with respect to…’.

All three of the above interpretations are open to objections and we refer the reader to the above-mentioned articles for mutual criticisms of Plato’s view on philological, hermeneutic, and philosophical ground. Interestingly, two of the most intensely debated questions surrounding Plato’s views on relations bear on whether, according to him, a relation’s instance is to be identified with that of its converse and on the nature of the equality relation which, as we will see later in this book, are some of the most intensely debated questions in contemporary philosophy of relations.

Relations were not alien to ancient philosophy posterior to Plato’s work either. In his *Categories*, Aristotle identified relations with one of the ten categories of being (especially, ch.7), and discussed this topic further in his *Metaphysics* (V, 15, 1021a30, XIV,c.1, 1088a29-35)[[16]](#footnote-14) and in his *Physics* (III, 202b11–15, and V, c.2, 225b11-13). Aristotle first defined relations in terms of how they are spoken of, i.e. metalinguistically, in terms of relative predicates, to be contrasted with non-relative or absolute predicates:

We call relatives all such things as are said to be just what they are of or than other things, or in some other way in relation to something else. For

example, what is larger is called what it is than something else (it is called larger

than something); and what is double is called what it is of something else (it is

called double of something); similarly with all other such cases. (*Categories* 7, 6a36–6b, trans. J. L. Ackrill)[[17]](#footnote-15)

However, Aristotle rejects this first definition attempt, for certain substances, like hands and heads, are said to be of certain other substances (namely animals). He goes on to define relations non-metalinguistically as ‘those things for which this is their very being: to be toward another in a certain way’ (*Categories* 7, 8a29 35). To the modern reader, this cannot fail to be reminiscent of Russell’s conception of relation as having a sense or direction (1937, sec.94, 1984, 126-7) which will be discussed later in this book. In his *Metaphysics* (V, 15), Aristotle further distinguishes among three types of relations: numerical (a type of relation that, for Aristotle, includes identity, qualitative and quantitative equality, as well as other numerical relations like the relation of double to half), causal, and psychological relations.

 Given the fundamental importance that the philosophy of Aristotle-referred to as the Philosopher in medieval times-had in the development of western medieval philosophy from the XIIth century onwards, a time at which Aristotle’s work, besides the *Categories*, became available to western philosophers, relations were bound to be a major topic of later medieval philosophers (see Brower 2010, 2016, Henninger 1989, Weinberg 1965).[[18]](#footnote-16) Following Aristotle, the dominant stance during the middle ages was to consider that, when an object A is related to B, for example by having the same height as B, there generally[[19]](#footnote-17) really were two accidents[[20]](#footnote-18) one inhering in A, the relation of being the same height as B, and another inhering in B, the correlation of being the same height as A. Philosophers then tried to reduce these relations and correlations into further monadic accidents inhering in (i.e. located in) their subject. A first variant of this strategy during the middle ages, endorsed in different forms by such as Abelard (1079-1142, *Logica ‘ingredientibus’*, 216-7, see Brewer 1998), Thomas Aquinas (1224/5-74, see *Summa Theologica* I, q.28, a.1, *Quodlibetal* I, a.2, IX, a4), Gilles of Rome (1243-1316, see *In I Sent*., d.26, q.1), and Henry of Ghent (d.1293, see *Quodlibetal* V, q.2, VII, question 2, IX, q.3), was to attempt to reduce relations to ordinary monadic accidents, like having a certain height, *being inside* the relata (their *esse-in*), conjoined with a certain *being-towards* the other relata (their *esse-ad*).[[21]](#footnote-19) A second variant of the same strategy, endorsed in different forms by such as Albert the Great (c. 1200-1280, see *Metaphysica* 266a-b, see Brower 2001, sec. 5 for translation and further references) and Duns Scotus (circa 1265-1308, see *Ordinatio* II d.1 q.5 n.277, Quodlibetal, q.6, n.33), was to attempt to identify relations[[22]](#footnote-20) to monadic accidents but to insist that these accidents were *sui generis* relative accidents grounded in but distinct from ordinary non-relative ones.[[23]](#footnote-21) Roughly, if A was similar in colour to B, the accident of A’s colour similarity to B would be considered, following this second line of thought, to be grounded in but distinct from A’s colour. Interestingly, an apparent exception to the animadversion towards real and irreducible relations, shared by both of these currents, stands out, that of XIIIth century’s Nicholas de Paris (*Rationes super Libro Sex Principiorum*, MS Vatican Biblioteca Apostolica Vat. lat. 3011, f. 14ra, see Hansen 2012, Ebbesen 1995). Another possible exception to the philosophical denial of real irreducible relations is arguably provided by Peter Aureoli (circa 1280-1322). While denying that actual relations, construed as connecting two objects together, exist mind-independently, Aureoli acknowledged that some exist in a potential and mind-independent way (In I Sent. P.687.2 C). Finally Richard of Medieville (1245/9-1302/7) might also be counted among such exceptions, for he considered relations as ‘non-inhering’ accidents that ‘depend simultaneously on two (objects)’ (*Quodlibetal* I, q.9, see Henninger 1989, ch.4, p.64, for latin text and translation).

 Medieval philosophers faced the same obstacles as their Greek predecessors in trying to understand and characterize the nature of relations, construed as monadic properties. In particular, the main difficulty that they faced was to understand how the location of relations, construed as accidents, could possibly be divided between two substances. This is arguably the main reason why they, in their vast majority, rejected real irreducible relations ((see Penner 2017, pp.58-59). In response to the difficulties they faced, they reacted in part by resorting to a number of metaphors and analogies that summarised the link between relational accidents and their relatas. Following Aristotle, when A is related to B, an accident was said to inhere in A and ‘to point to’, or ’to be towards’ B. Sometimes relations were said to ‘lie between’ the relatas, to ‘look outwards’ or ‘ to be directed’ at their relata. Relations were also considered to be similar to ‘roads’ running between two cities, or to be ‘bridges’, or ‘intervals’, i.e. palisade stretching between two watchtowers (see Peter Aureoli, In I Sent. p.662.1DE and 664.1 AB-C, see Henninger 1989, pp.153-154). Philosophers also considered relations to be ‘rooted’ into their relatas (see Albert the Great, *Liber de praedicamentis*, 241a-241b[[24]](#footnote-22); Aquinas in V Phys. Lect 3). Interestingly, we will encounter these very same metaphors when discussing, later in the book, the contemporary philosophical literature dedicated to relations.

 During the XIVth century, with the advent of nominalism and conceptualism, philosophers were more and more inclined to deny the mind-independence of relations.[[25]](#footnote-23) William of Ockham (1285-1347/9, *Reportation* II, q.2, *Ordinatio* I, d.30, q.1, *Summa Logicae* I, c. 49) considered relations to exist in two senses. In the first sense, relation R was claimed to be identical with the relatas existing in the particular way connoted by the relational predicate ‘R’. In the second sense relations were claimed to be identical with relational concepts. Furthermore, this summary of Ockham’s position needs to me mitigated as he held it as being only valid when limited to what is knowable by natural reason. Ockham acknowledged that, in the case of some of what are considered to be revealed truths according to the Christian faith, for example in the case of the theological treatment of the relations of the different persons of the Trinity, real irreducible relations needed to be acknowledged (see Henninger 1989, Ch.7.4). On his side, Peter Aureoli identified relations with relational concepts (*Lib. I Sent*, p.662, I.c), although, as already noted, he granted that relations could exist mind-independently in a potential way.

The defiance towards real irreducible relations continued after the middle ages and was explicitly endorsed by the nominalist or conceptualist conceptions of such as Spinoza (*Short treatise* I, 10, *Metaphysical Thoughts* 1,5), of Gassendi (*Dissertations en forme de paradoxes contre les aristotéliciens*, book 2, ex. 3, a. 12), Hobbes (*Elements of Philosophy*, II, c. 11, sect. 6), Locke (*Essay*, bk. 2, ch.25, par. 1,5,7), and Hume (*A Treatise of Human Nature*, bk. 1, pt. 1, sec. 5). The case of Leibniz deserves special notice for his position directly bore the mark of scholastic thought.[[26]](#footnote-24) In a letter to Des Bosses, Leibniz famously wrote:

I do not believe that you will admit an accident that are in two objects at the same time. My judgment about relations is that paternity in David is one thing, sonship in Solomon another, but that the relation common to both is a merely mental thing whose basis is the modifications of the individuals (*Philosophical Papers and Letters,* p.609).

Similarly, in his correspondence with Clark, Leibniz wrote, concerning the ratio of two lines L and M :

It cannot be said that both of them, L and M together, are the subject of such an accident; for if so, we should have an accident in two subjects, with one leg in one and the other in the other, which is contrary to the notion of accidents. (Leibniz 5th letter, in his *Correspondence with Clark*, ch.47).

It is striking that the above argument is identical to the location objection that medieval philosophers made against accepting real irreducible relations.[[27]](#footnote-25)

As we will see in the rest of this book, the defiance towards irreducible and real relations is by no means dead in contemporary philosophy. Contemporary philosophers such as (Simons 2017, Lowe 2017, Campbell 1990, Parsons 2009, Heil 2012, ch.7, Vallicella 2002) have recently attempted to defend the view that there are no irreducible and real relations. Although it still survives, it must nonetheless be said that this position is currently a minority view and that a real sea change occurred at the end of the XIXth century. During these decades, the irreducible and real nature of relations moved from being the minority’s to being the majority’s view. A further sea change that occurred is that, prior to the XIXth century, philosophers limited themselves to the study of dyadic relations ignoring those of higher adicity and that posterior to these decades, they went on to discuss also relations of higher adicity.

An important source of this sea change was, as is frequent in philosophy’s modern history, the growing importance relations and structures took in science and mathematics during this period.[[28]](#footnote-26) Indeed, to a large extant, XXth century science can be considered as being the century of relations and structures (loosely construed as a collection of relations). Relations are indeed rife in the natural, human and mathematical realms and the discovery of their importance largely coincides with some of the main scientific progresses made in these fields during the XXth century.

As a matter of fact, the topic of relations might be one of the very few topics common to these otherwise foreign domains of research. This topic might help to bridge the growing gap separating the ‘two cultures’, famously depicted by C. P. Snow (1959), constituted from the end of the XVIIIth century onwards by the natural sciences and the humanities.[[29]](#footnote-27) This liaison is perhaps best illustrated by the contribution of André Weil-brother of philosopher Simon Weil, member of the structuralist Bourbaki group, and one of last century’s foremost number theorists-to *Les structures de la parenté (On Elementary Structures of Kinship* 1947), the landmark thesis of Levi-Strauss-one of the founders, along with Mauss, and Radcliff-brown of structuralist anthropology, and of the structuralist movement in the human sciences.[[30]](#footnote-28)

A first source of the growing importance that relations took in science is mathematics.[[31]](#footnote-29) Félix Klein in his Erlangen Program (1872) classified and characterised some of the main geometries of his time using their invariants and transformation groups. This structuralist conception was quickly to spread through the whole of mathematics and reached its heyday in the French Bourbaki group,[[32]](#footnote-30) according to whom the whole of mathematics boiled down to the study of the three main types of what Bourbaki called ‘mother structures’, namely the algebraic, topological, and order structures (see Piaget 1968 pp.21-25).

In the human sciences, the importance bestowed on the notion of relations was at least as great during the XXth century. However, by contrast with mathematics, the specificity of the XXth century in this regard must be mitigated as the topics of relations is certainly as old as the human sciences themselves (see Ducrot and al. p.16). Indeed, the idea of structure has been at the heart of linguistic thinking and sociology, and anthropology since the very start of these disciplines. Nonetheless, it is only in the XXth century that the notion of structure became the key element of a scientific movement that, under the name of structuralism, spanned the whole of human and social sciences. The founding moment of this movement is often reported as being constituted by the meeting of Jakobson and Levi-Strauss[[33]](#footnote-31) while in exile in New York in 1942 (see Dosse 1992 p.28, p. 38 for an account of their encounter). After the war, the study of relations and the structuralist point of view was applied to virtually every human science, and its influence was central, especially in France, to the human sciences of the second-half of the XXth century.[[34]](#footnote-32) In particular structuralist work of noted importance was done in the fields of indo-european mythology (with the work of Georges Dumézil[[35]](#footnote-33)), sociology (perhaps most prominently with the work of Pierre Bourdieu[[36]](#footnote-34), and to a lesser extent with the structural-functionalist approach of Talcott Parsons[[37]](#footnote-35)), linguistics (perhaps most prominently with Troubetskoy,[[38]](#footnote-36) Saussure,[[39]](#footnote-37) Jakobson,[[40]](#footnote-38) Hjelmslev,[[41]](#footnote-39) and Benveniste[[42]](#footnote-40)), history[[43]](#footnote-41), with literary studies generally (for example with the work of Genette, Barthes, and Todorov[[44]](#footnote-42)), semiology[[45]](#footnote-43) (Greimas, Metz[[46]](#footnote-44)), narratology (Propp 1928 (1958), Greimas (1966), pp. 172-221, see also Todorov in Ducrot et al., (1968), pp.123 and ff.), just to mention a few.

A third source of the interest for relations came from psychology where the Gestalt movement promoted Gestalt (variously translated as ‘patterns’, ‘forms’, or ‘structures’) as the key notion of the field. Starting at the beginning of the XXth century in Germany with the work of Köhler, Koffka, and Wertheimer among others, and anticipated by Ehrenfels seminal paper ‘Über Gestaltquälitaten’(1890), the Gestalt school developped, in strong opposition to the associationist school, which dominated XIXth century psychology and which tried to reduce all psychological processes to associations between sensations and mental images (see Köhler 1947, ch.5, esp. p. 144, ch.6, Guillaume 1979 ch.1, Piaget 1968,ch.4). On the contrary, according to Gestaltists, psychological wholes, like melodies, to take Ehrenfels (1890) example, were irreducible to their sensorial elements, i.e. the individual sounds that composed them. In addition to their sensorial parts, such wholes were also constituted by a further irreducible Gestalt-quality that structured these sensorial constituents. The Gestalt school not only applied structural ideas to the study of perception although it is perhaps there that it was the most influential. Its distinctive approach was also applied to virtually every subfield of psychology (Guillaume 1979, chs.3-4) including the study of actions (Guillaume 1979, ch.5), intelligence (Guillaume 1979, ch.7), and memory (Köhler 1947, ch.9, Guillaume 1979, ch.6).

Together with innovations in logic, the central importance of relations in virtually every scientific discipline was essential to the philosophical acceptance of irreducible and mind-independent relations as legitimate constituents of the world. We will encounter examples drawn from these various scientific fields again in the rest of this book.

1. The monadic nature of the property of having a certain electric charge is controversial, as we willl see later. However, for simplicity’s sake we assume here that this property is indeed monadic. [↑](#footnote-ref--1)
2. The ‘typically’ here is meant to allow for the possibility of relations which are not and perhaps cannot be represented at all, as well as for cases where relations are arguably, in some way to be made precise, indirectly represented by monadic predicates (for example, the monadic predicate ‘loving oneself’ which represents the relation that people that love themselves bear to themselves). [↑](#footnote-ref-0)
3. For the two different theories of properties as tropes (i.e. abstract particulars) or as universals, see the lexicon at the end of the book. [↑](#footnote-ref-1)
4. The adicity of a predicate is familiar. It is equal to the number of ‘slots’ of predicates or, equivalently, to the number of noun phrases’ tokens needed to complement the predicate at hand in order to obtain an atomic formula. Throughout this book, we will follow Strawson (1974, pp.37-8) and Armstrong (1978, p.3), in considering predicates to be constituted by whole sentences frames rather than by single words. [↑](#footnote-ref-2)
5. For the view that Plato already had a confused conception of relations, see the references in Castaneda’s appendix (1972). [↑](#footnote-ref-3)
6. See (Henninger, 1989), pp.2-3. For modern examples of this view of relational statements, see for example (Mill, Logic, I, 2, n°7). [↑](#footnote-ref-4)
7. In a slightly anachronistic way, we will often, in the lines below, use concepts and expressions such as ‘grounding’ and ‘truthmaking’ belonging to contemporary metaphysics when discussing the works of past philosophers. Although such terminology was alien to ancient philosophers, the concepts and views of the philosophers at hand will always be sufficiently similar, take or give a bit, to contemporary views to warrant such an ascription. We will mention the differences between ancient views and that of contemporary philosophers when necessary. This slight anachronism seems a necessary evil required to relate and compare past philosophical views to contemporary debates. [↑](#footnote-ref-5)
8. For definitions of this term, see the lexicon at the book’s end. [↑](#footnote-ref-6)
9. All dialogues’ translations are drawn from Cooper, John M. and Hutchinson, D. S. (ed.) (1997) *Plato: Complete Works* (Indianapolis :Hackett). [↑](#footnote-ref-7)
10. Particulars are empirical, spatial, and temporal objects. Forms have properties by self-predicating, the exact nature of which is intensely debated by commentators. Some scholars believe that self-predicating is of the same type as the partaking of particulars in Forms (Vlastos 1981), others that it differs in that a Form, by contrast with the particulars that partake in it, is a perfect instance of the property it stands for (Malcolm 1981), others that the relation between a Form and its essence is a *sui generis* form of predication (Code 1986), others still that it is a form of identity (Allen 1965). [↑](#footnote-ref-8)
11. According to Gallop (1976), Plato, in the passage of the *Phaedo* at hand, is concerned with distinguishing essential from accidental predication rather than in offering a theory of relations *per se,* and assimilates non-relational concepts to relational ones. We follow here the other interpreters of Plato’s *Phaedo* mentioned above according to whom Plato does develop a metaphysical thesis of what grounds or explains the truth of true relational predications and of relational facts. [↑](#footnote-ref-9)
12. The question of what portion of the views exposed in Platonic dialogues is Plato’s and which portion Socrates’ is one of the most pervasive questions in Platonic scholarship and we have no intention to enter into this controversy. For the sake of readability, we ascribe here all of Socrates’ view to Plato. It is customary to consider that the early dialogues, to which the *Greater Hippias* belongs, expose mainly Socratic views, whereas the middle dialogues, to which the *Phaedo* belongs, and the late dialogues, to which the *Parmenides* belong, express Plato’s own views, [↑](#footnote-ref-10)
13. Plato elaborated his theory of non-distributive predication in his *Greater Hippias* (300d7-303a1). A plural predication is distributive iff as being F implies that each of the as is F. Otherwise it is non-distributive. A plural predication is collective iff as being F imply that none of the as is F. Plato’s example of a non-distributive property is the property of being two (*Greater Hippias*, 301d5-302 b3). According to Scaltas (2016, p.21), strictly speaking, there are two irreducibly plural forms of predications in the *Greater Hippias*. A first one whereby the property in which the plurality partakes is never possessed by the members of the pluralities, and a second one whereby, although the members of the pluralities can possess the same property as the plurality, the possession of the property by the individuals does never ground the fact that the plurality possesses the same property. We are here only concerned with the first type of irreducibly plural predication. [↑](#footnote-ref-11)
14. This feature, called the monoeidicity nature of Forms, is defended in the *Phaedo*, but mitigated in the *Republic* (see Scaltas 2016, p.26). [↑](#footnote-ref-12)
15. ‘Participation’ being Castaneda’s chosen word to express partaking (1972, p.469). [↑](#footnote-ref-13)
16. Recall that the *Metaphysics*, unlike the *Categories,* which was available to western readers as early as the VIIth century, was only available to western philosophers from the XIIth century onwards. Recall also that the other Aristotelian categories (*Categories* 4, Ib25-6) are those of substance, quality, quantity, somewhere, position, sometime, having, acting, being acted upon. [↑](#footnote-ref-14)
17. Translation drawn from J. Barnes (ed.) (1984) *The Complete Works of Aristotle.* [↑](#footnote-ref-15)
18. For the influence of the *Categories* on medieval thought see (Pasnau 2012, sec.3). [↑](#footnote-ref-16)
19. Apart from some exceptions like the relation of the knower to the known, which Aristotle did not believe to be matched by any real correlation (see Aristotle *Metaphysics* V, 15, 1021a30) or of the relations whereby creatures are related to God (according to philosophers like Augustinus, Aquinas and Scotus). [↑](#footnote-ref-17)
20. Accidents, that are today called (contingent) tropes, are defined, following Aristotle (*Categories* 1, 1a20–1b6), as what inhere (i.e. are in) a subject by contrast with substances that are not in any subject. [↑](#footnote-ref-18)
21. See Henninger (1989, chs.2, 3) for further references, Latin text and translations. [↑](#footnote-ref-19)
22. Apart from some possible exceptions like the transcendental relations that creatures bear to God, considered by Scotus to be really identical to their foundations (see Henninger 1989, ch.5.2). [↑](#footnote-ref-20)
23. See Henninger (1989, ch.5) for further references, Latin text, and translations. [↑](#footnote-ref-21)
24. See Brewer (2001, p.232) for translation. [↑](#footnote-ref-22)
25. In this, the Stoics largely anticipated them. For the related position of the Islamic Mutakallimun, see (Weinberg, *The Concept of Relations*, pp.89-91). [↑](#footnote-ref-23)
26. For more on Leibniz’ view on relations, see Jauernig (2010) and Mugnai (2001). [↑](#footnote-ref-24)
27. In making the above statement, Leibniz was indeed arguably widely influenced by medieval philosophy, in particular by the Persian Avicenna (980-1037) who wrote that ‘in no way may you think that one accident is in two objects’ (*Liber de philosophia prima sive scientia divina* I–IV, 3.10) and by Aquinas (*Sent I*, d. 27, q. 1, art. 1, ad 2.). [↑](#footnote-ref-25)
28. For an overview of structuralism during the XXth century in both the human sciences (including psychology and linguistics), and the natural sciences (including mathematics, logic, biology, and physics), as well as in continental philosophy see (Piaget 1968); for the relationship between structuralism in mathematics and in linguistics, see Jakobson ‘Verbal Communication’ (1972), and Jakobson and Waugh’s *The Sound Shape of Language* (1979, p.22); for authoritative history of structuralism in phonology and for the influence of modern art on its development, see Jakobson ‘Retrospect’ (1962) in his *Selected Writings 1* and ‘The Phonemic Concept of Distinctive Features’ *in Proceedings of the Fourth International Congress of Phonemics Sciences*, Helsinski 1961 (La Haye 1962).-In the final lines of this chapter, references to page numbers are provisionally made only to original editions but will also refer to English translations, if available, in the final version. [↑](#footnote-ref-26)
29. Although Snow primarily aimed at literary circles in his conference, he also intended to include social scientists in the category of the ‘literary intellectuals’ (Snow 1959, p.9). For a more conciliatory description of the relationship between the humanities and the sciences that describes it as an aspect of the debate between the ancient and the modern from the XVIIth century onwards, see Gould *The Hedgehog, the Fox, and the Magister’s Pox* (2003). [↑](#footnote-ref-27)
30. ‘On the Algebraic Study of Certain Types of Wedding Laws (Murngin System)’, in Levi-Strauss’ *On Elementary Structures of Kinship* (1947, pp.257-263). Weil’s contribution is dedicated to the application of group theory to the wedding system of Murngin people living in the North of Australia. [↑](#footnote-ref-28)
31. ‘It is not things that matter but their relations’ in E.T. Bell, *The Development of Mathematics*, (New York 1945, p.466). [↑](#footnote-ref-29)
32. The Bourbaki group counted among its members some of last century’s greatest mathematicians, such as Pierre Cartan and Serre. For the development of the modern notion of mathematical structure, see (Bourbaki, N. 1984 pp.29-35, Hellman and Shapiro 2019, pp.7-32). [↑](#footnote-ref-30)
33. ‘Structuralism strives to represent social facts using models, always taking into consideration not terms, but relations between terms’ Levi-Strauss, in *Le Nouvel observateur*, 25 January 1967, p.32, author’s translation); see also ‘(…) like phonemes, kinship terms are meaningful elements; like them, they acquire their meanings only by being part of systems (…)’ (*Anthropologie structurale I*, 1958, p. 47, author’s translation); see also ‘Traditional sociology’s mistake, like that of traditional linguistics, is to have concentrated on terms rather than on the relations between terms.’ in (*Anthropologie structurale I*, 1958, p.63, author’s translation). Other relevant sections from Levi-Strauss include: *Anthrologie structurale I* (1958, ‘Structural Analysis in Linguistic and Anthropology’, ‘Language and Society’, ‘Linguistic and Anthropology’, ‘The Notion of Structure in Anthropology’ as well as p.330, 332, 379, 380, 414, 415-417), *Anthropologie Structurale II* (1973, p.28, 29, 103). See also his introduction to Jakobson’s *Six Lectures on Sound and Meaning* (1976, Minuit) and his *Introduction to the Work of Marcel Mauss* (1950, 1987). [↑](#footnote-ref-31)
34. For a survey of the institutional history of structuralism in the human and social sciences, and more generally in French culture during the XXth century, see Dosse, François *Histoire du Structuralisme I: Le champ du signe 1945-1966* (1992); *II. Le chant du cygne 1967 à nos jours* (1992). For review papers of the structuralist approach in linguistics, psychoanalysis, continental philosophy, anthropology, and literary studies, see Ducrot and al. (1968). [↑](#footnote-ref-32)
35. For the starting point of his famous defence of trifunctionality in Indo-European mythology and sociology, according to which Indo-European deities and social groups were divided among the three casts of the producers, the priests, and the warriors, see his ‘La préhistoire des flamines majeures’, in *Revue d’histoire des religions*, CV III, pp.188-220 (1938). This thesis had a great influence on French post-war comparative mythology and history, especially on the eminent medieval historian Georges Duby. [↑](#footnote-ref-33)
36. For a critical discussion of the use of the term ‘structuralism’ as a label for his own work, expression to which he favours ‘genetic structuralism’ see his *Choses Dites* (p.20, 24-25, 44, 187, 334-35, 342). [↑](#footnote-ref-34)
37. Note that at the end of his life, following remarks made by his great student Robert K. Merton, Parsons called into question the very label ‘strucural-functionalism’ with which his name has become associated, preferring that of ‘functional analysis’ instead (see Parsons (1975, pp.67-83, esp. pp.67-68, 79-80)). [↑](#footnote-ref-35)
38. ‘Current phonology is above all characterised by its structuralism and its universal systematism.’ (author’s translation) in Troubetskoy’s ‘Current Phonology’ (1933). For a sketch of Troubetskoy’s biography see ‘Nicolaj Sergeevic Trubetskoy (16 April 1890-25 June 1938)’, in Jakobson, *Essais de Linguistique Générale II,* 1973, ch.15. [↑](#footnote-ref-36)
39. ‘Phonemes are above all oppositive, relative, and negative entities.’ in Saussure (1967, 1995, p.164) and ‘(…) *in language there are only differences.* (…) there are only differences *without positive terms*.’ Ibid. (p.166. see also p.56, 78, 107, 124, 125, 149, ch.4) (author’s translation). [↑](#footnote-ref-37)
40. ‘On the Common Language of Linguists and Anthropologists’ in his *Essais de Linguistique Générale I,* Minuit, 2013. The following quote is also relevant: ‘It is impossible to understand a change occurring in a linguistic system without taking into account the system that is affected by it’, (Ibid, p.76), see also Ibid., p.104, and in his *Essais de Linguistique Générale II, 1973,* p.11, ‘the study of verbal structures is the undeniable aim of current linguistics in all respects (…)’, see also ch.1, p.100, 314, 315. In his *Six Lectures on Sound and Meaning* (1976), p.85: ‘Saussure already and rightly underlined that, what matters for phonemes, is not at all their phonic individuality, seen in itself and existing by itself. What matters is their reciprocal opposition inside a phonological system.’ (author’s translation) see also p.75, 78. In *The Sound Shape of Language*, by Jakobson and Waugh, (1979), see p.29, 63, ch.3. [↑](#footnote-ref-38)
41. For summary of Hjelmslev glossematic and its relation to structuralism, see Ducrot et al., (1968, p.70 and ff). [↑](#footnote-ref-39)
42. According to Benveniste, ‘the positive notion of linguistic fact is replaced by that of positive relation’ (author’s translation) in ‘Coup d’œil sur le développement de la linguistique’, 1963, repr. in his *Problèmes de Linguistique Générale*, I, 1986, p.20. [↑](#footnote-ref-40)
43. For discussion of the influence of structuralism on the French historical school Ecole des Annales, see Le Roy Ladurie’s ‘L’histoire immobile’ (Immobile History), inaugural presentation at the Collège de France, 30 November 1973, repr. in his *Le Territoire de l’historien*, vol.2, Gallimard, 1978. [↑](#footnote-ref-41)
44. For summary of the structuralist study of literary forms, see Todorov, pp.97-165, in Ducrot et al. (1968). [↑](#footnote-ref-42)
45. Semiology was defined by Saussure as ‘the science that studies signs as a part of social life’, in Saussure (1967, 1995), p.33. [↑](#footnote-ref-43)
46. See for example, Greimas, A. (1966), Metz (1968, 1973), see Eco (1988, ch.3) for a summary of structural semiology. [↑](#footnote-ref-44)