

Goodbye to the Demiurge? Timaeus' Discourse as a Thought Experiment

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In the Demiurge's footsteps

In the *Timaeus*, the universe is described as having been constituted by a Demiurge who looks at an intelligible Model and aims to organize a chaotic *milieu* in the best possible way. The demiurgic work consists in fashioning an ensouled unique and complete universe, that is a living being which possesses both a body, made out of the four elements, and a soul which is a moving cause ontologically located between the intelligible and the sensible. Throughout Timaeus' discourse, we are not only put in the position of visualizing the Demiurge's work but we also enter his mind and access his thoughts and feelings. In the long history of Plato's cosmological discourse' interpretations, there has been no agreement about how to answer this question: *who* is the Demiurge? Ancient and contemporary answers to this question can be divided into three main tendencies¹: (i) the literal interpretation assumes that the Demiurge must be understood as a divine cause responsible for the actual fabrication of the universe² ; (ii) the didactic interpretation puts forwards the necessity to admit in Plato's cosmological scheme the demiurgic function of an independent and separated intellect³; iii) the reductionist interpretation attempts to identify the Demiurge with another entity described by Timaeus in his discourse (either somehow related with

¹ (Ilievski 2021) provides a very useful and detailed survey of the different accounts dealing with the identity of the Demiurge. Ancient and contemporary interpretations seem to fall under the same interpretative categories with, every now and then, some new suggestions.

² This could consist in one single act (as defended by (Broadie 2011), p. 253) or a recurrent event (see (Johansen 2008), pp. 90-91).

³ For example (Brisson 1974) and (Karfík 2007).

the intelligible Model⁴ or the World Soul⁵). Each one of these lines of interpretation depends on the understanding of the *Timaeus* as a whole and also, for some of them, on the necessity to attribute (or not) to Plato's thought a doctrinal unity⁶. My approach in this chapter will be based on the following methodological principle: in order to understand *who* the Demiurge is, it is necessary to appreciate the status of Timaeus' discourse. In other words, if we understand what kind of discourse about the universe is provided by Timaeus, then role of the Demiurge will appear more clearly. More specifically, I wish to show that Timaeus' *eikôs muthos* could be understood as a thought experiment and that, consequently, the Demiurge must be conceived as an epistemological point of view adopted by anyone who attempts to fashion the universe in the *laboratory of the mind*.

The fact that the status of the Demiurge is related to the nature of Timaeus' discourse seems rather plausible since our understanding of Timaeus' story will clearly influence the analysis of the different characters of the story. For instance, if there is enough evidence to support the idea that Timaeus' *eikôs muthos* must not be taken literally, then the Demiurge could appear to be part of the furniture of the discourse and not of the universe⁷. However, we should notice that the opposite is more likely: it is *because* a demiurgic cause is introduced at the beginning of the argumentation that Timaeus' discourse will imply a chronology and the distinction of a *before* and an *after* the act of production, and all the temporal vocabulary such a distinction implies. Timaeus' description of the coming to be of the universe strongly relies on a chain of deductive arguments⁸ which starts

⁴ The Demiurge could then be a mythological representation of the Form of the Good ((Zeller 1922) pp. 694-695 and 707-718), the Form of the Living Being ((Halfwassen 2000), pp. 51-54) or some other Forms like the Form of the Intellect ((Menn 2009), p.47). Those interpretations must recognize a kind of demiurgic capacity within the domain of the intelligible Forms: see (Ferrari 2013).

⁵ In that case the Demiurge would symbolize the World Soul ((Carone 2005), pp 42-51) or the rational part of the World Soul ((Cornford 1937), p. 39).

⁶ In some other dialogues, a demiurgic cause seems to be introduced, but in different contexts (see *Philebus* 23d, 26e and 30b, *Laws*, 902e, *Sophist* 265a-c, *Statesman* 269c-d, 270a, 273b). The relation between the notions of intellect and soul is also at the center of various discussions (*Philebus*, 30c9-10, *Sophist*, 248e-249d). Does Plato have a unified conception of a demiurgic cause in the Universe? Must the intellect always be placed within a soul? Is the Demiurge an intellect? It seems that the jury is still out on all these questions. My approach in this chapter is not directly concerned with these matters, however I will make a few comments on some of them in the next pages.

⁷ This seems to be a rather evident point, but we must nevertheless keep it in mind we address both the questions of the myth and the Demiurge. If Timaeus intends to tell us a myth about the coming to be of the universe, then we should not be surprise that he will use the perfect tense *gegonen* ("has come to be") and not the imperfect in 28b7 since this is precisely a necessity involved by the choice of a *once upon a time* discourse adopted about the universe.

⁸ When it comes to the thinking activity of the Demiurge (as differentiated from to the one of the young gods), ten explicit deductions can be found : 1) the necessity of a cause for the sensible, 2) the choice of an intelligible model, 3) the construction of the universe composed of a body and a soul, 4) the completeness of the model, 5) the unicity of the universe, 6) the composition of the world body by four elements, 7) the constitution of time as a moving image of eternity, 8) the constitution of the divine specie as celestial entities, 9) the division of task between the demiurge and the young gods and (10) the geometrization of the elements from two basics triangles. In each of these arguments, the Demiurge *validly* deduces from some premises (sometimes specified, sometimes implicit) specific conclusions about the proprieties of the universe.

in 27d5, before the beginning of the *eikôs muthos*, by the introduction of three premises on which all the rest of the discourse will be based⁹: 1) the intelligible-being (27d6: *ti to on aei*) must be distinguished from sensible-becoming (27d6-28a1: *ti to gignomenon aei*), 2) the necessity of a cause (28a4: *aitios*) for all that becomes and 3) the requirement for a demiurge (28a6: *dêmiorugos*) to use an intelligible model if he wants the result of his work to be beautiful (28a8: *kalon*). Those three premises will be applied to the universe (29d-30c) in order to deduce that it has been produced by a divine (30a2: *theos*) demiurge. This deduction is not undertaken by the Demiurge but by Timaeus *in order* to justify the nature of the discourse (29d2: *ton eikota muthon*) he is going to produce. It is usually¹⁰ admitted that the transition from premises (1) and (2) towards premise (3), that is the identification of the cause of the becoming to the Demiurge, is rather delicate. The distinction between the intelligible and the sensible is explained in the second part of Timaeus' speech in an argument (*modus ponens*) which deduces from the epistemological distinction between *nous* and *doxa aléthês*, an ontological difference between the Forms (of the Four Elements) and the sensible objects (51d3-51e6). In the context of this argument, a Form is said to be *ungenerated and indestructible, which neither receives anything else into itself from elsewhere nor itself enters into anything else anywhere*¹¹ (52a1-2: *agennéton kai anôlethron*), whereas a sensible object, which is like (52a5: *homoion*) the Form, *is perpetually in motion, coming to be in a certain place and again vanishing out of it*¹². This description is made within the context of the account of the ontological nature of the images (*mimêmata*) of the Forms appearing in the Receptacle (51e-53c). It must be noted that for Timaeus, both the Forms and the Receptacle are described as *uncaused*, whereas the sensible objects are causally dependent on the two other kinds. More precisely, the intelligible is said to be the father (50d7) of the sensible, which seems to imply that within Timaeus' discourse, the intelligible itself could be a suitable candidate to be the *cause* of the sensible¹³. As a matter of fact, if the sensible is described as an image of the intelligible (50c-52d), its cause and model could well be the intelligible itself (as in the case of the model of an object reflected into a mirror¹⁴). Throughout Timaeus' discourse, we will learn that the World Soul

⁹ Other premises will be introduced throughout the discourse (the beauty of order, the superiority of intellect, the relation between circular motion and thinking, the anteriority of the soul over body, the necessity of inequality to explain mechanical motion, etc.)

¹⁰ For (Ebert 1991), p. 52, Timaeus is committing here a formal fallacy (*Argumentationsfehler*), whereas for (Sedley 2008), p. 102, the introduction of the Demiurge is completely legitimate

¹¹ 52a1-3 : « (...) ἀγέννητον καὶ ἀνώλεθρον, οὐτε εἰς ἔαυτὸ εἰσδεχόμενον ἄλλο ἄλλοθεν οὐτε αὐτὸ εἰς ἄλλο ποι ιόν. ». Translations by (Cornford 1937) with minor modifications.

¹² 52a6-7 : « (...) πεφορημένον ἀεί, γιγνόμενόν τε ἐν τινι τόπῳ καὶ πάλιν ἐκεῖθεν ἀπολλύμενον. »

¹³ In the *Philebus* 26e, the necessity of having a cause for all that becomes can also be found. In this context, although this is a highly polemical discussion, it seems that the soul can endorse this causal function (see 30b-d).

¹⁴ Although some scholars don't find legitimate the comparison between the Receptacle and a mirror, it seems that Timaeus gives some clues in favour of it, as for example i) the description of the mirror phenomena (46a-c) just before the introduction of the errant cause and ii) the manner the liver is described as a mirror in which images coming from the reasoning part of the soul appear (very similar to the description of the Receptacle) (70d-72c).

has an essential role to play in order to explain change within the universe (37c-39e). When the three initial premises of the discourse are stated, it does seem possible to assume that, if specifying in what sense causality must be understood, intelligible *could* be the cause of the sensible. At least nothing seems to justify, out of the blue, the appeal to productive causality. Either this must be a fallacy¹⁵ committed by Timaeus (not the best way to start a discourse!¹⁶) or the introduction of the Demiurge must be made on purpose. What seems rather reasonable is that *once* the causality of the becoming is supposed to be productive, then necessarily the subsequent discourse will deal with a *process* of fabrication involving a model, a matter and a craftsman, as well as all the vocabulary such a description involves. It is then *because* Timaeus wishes to give a discourse involving these three elements that productive causality is abruptly introduced in 28a6. Why does then Timaeus wish to offer such discourse? No explicit answer can be found in the text, nevertheless Timaeus insists on the fact that i) the Demiurge, choosing the best possible model (an Intelligible Model) and being himself the best of causes (29a5-6: *ho aristos tōn aitioñ*), will fashion a beautiful universe ; ii) it is hard to find the maker and the father of the universe and it is impossible (28c5: *adunaton*) to talk of it to everybody (28c3-5); iii) the discourse offered is an *eikōs muthos* (29d).

Concerning (i), it seems to be a recurrent idea in the dialogues that crafts, when based on knowledge, will produce good results. More precisely, it is by looking at intelligible Forms that a craftsman can impose to his work a certain order (*taxis*) making of it an organized (*tetagmenon*) and orderly entity (*kekosmēnon*)¹⁷. This is exactly what the Demiurge of the Universe will do in Timaeus's discourse. However, that could not be the whole story, since as it appears in (ii) and (iii), when applied to the fabrication of the universe, the search for its Demiurge will be hard and can only be made within a very specific kind of discourse. One of the most vexed issues about Timaeus' account is indeed its discursive status. In 29b1-29d2, after having distinguished between two ontological (*ousia* and *genēsis*), cosmological (*paradeigma* and *eikōn*) and epistemological (*alētheia* and *pistis*) levels, Timaeus adds a discursive distinction related (29b5: *sungeneis*) to the former, namely between consistent and exact discourses (*omologoumenoi logoi kai apēkribōmenoi*) and the likely myth (*ton eikota muthon*). Does the introduction of the *eikōs muthos* imply that the limitation of the

¹⁵ The argument would become valid if an implicit premise is added, for instance, *in the domain of becoming every cause must be productive*.

¹⁶ (Ebert 1991), pp. 53-54, thinks that this fallacy is made in order to offer a parody of the Pythagorean's poor reasoning skills. However, it seems that Timaeus is rather cautious in his argumentation and validity appears to be preserved in all his deductions.

¹⁷ *Gorgias*, 503d7-504a5. See also *Republic X*, 596a-597d and *Cratylus* 389a-390e.

discourse is related to its object, the universe being an ever-changing image of its model¹⁸? Or is there any other way to understand the status of Timaeus' discourse¹⁹? It is clear that the discourse is qualified as an *eikôs muthos* not only since it addresses the question of the nature of the becoming but also because it deals with matters about *the gods and the generation of the universe* (29c4-5: *theôn kai têns tou pantos geneseôs*). It seems plausible that the gods in question here are the Demiurge and his helpers, the young gods, and that, in the expression *eikôs muthos*, the second term is as much important as the first²⁰. In this way, we should not reduce this expression to its epistemological limitative role. After all, it is commonly admitted that what Plato is offering to us in the *Timaeus* constitutes his version (and maybe tribute) to traditional cosmogonies²¹ which is also an open dialogue with pre-Socratic philosophers like Pythagoras, Empedocles, the Eleatics and the atomists²². Timaeus' discourse is indeed part of a cosmological tradition, however the manner this account is offered through a myth of the production of the universe is rather original since it allows us to *visualize*²³ the fabrication of the universe.

I would like to show in the following pages that it is possible to understand Timaeus' whole discourse as a kind of thought experiment placing the audience (and the reader) in the footsteps of a diving craftsman. In other words, Timaeus is presenting to us the *great experiment* of fashioning

¹⁸ The limitations of the discourse do not only concern the Demiurge (ii) but also the enquiry about the universe. We should accept the myth and look for nothing further (29d2-3: *prepei toutou mèden pera zétein*). Although there have been many attempts to systematize the uses of *logos* and *muthos* in the discourse, none of them, it seems, has reached a definitive result. See (Brisson 2012), (Grasso 2012), (Mesch 2002) and (Vlastos 1939).

¹⁹ To the classical interpretation which associates different kinds of discourse with different objects (so that a discourse about the sensible which is an *image* of the intelligible can only be *likely* : see (Brisson 2012)), (Burnyeat 2005) has opposed a non-ontological interpretation based on the idea that the Timaeus discourse is a piece of practical reasoning and can consequently be said to be *appropriate, fitting, fair, natural or reasonable*, since it provides the best practical choice about the fabrication of the universe. It will appear clear that what is suggested in this chapter focuses on another aspect, which is the *point of view* of Timaeus' discourse. It both recognizes that the distinctions between the sensible and the intelligible is at the heart of the discourse offered but also that it implies a kind of practical experiment about the fabrication of the universe.

²⁰ To the contrary of what (Vlastos 1939) defends when he affirms that the use of *eikôs* attenuates the distinction between *muthos* and *logos*. To be sure, *Timaeus* discourse is primary a myth, which is sometimes called a *logos*. That there is a permeability between those two terms within the *Timaeus* could be indicated by the fact that Socrates' summary of his description of the ideal city is called a myth in comparison to Critias evocation of the true history of the Atlantis (27d, 26e-27b). See on that (Johansen 2008) pp. 40-43.

²¹ See on that (Burnyeat 2005) p. 144-145.

²² See (Taylor 1928) pp.17-19 who claims that the *Timaeus*' cosmology does not correspond to Plato's own position. For the Pre-Socratic influences, see (Cornford 1937) pp. 40-43, 57 ,168, 199-202 and for the presence of Platonic doctrine in the dialogue see (Sedley 2019).

²³ That is indeed one of the fundamental functions of a myth. As (Grasso 2012) writes on p. 362 : « Myth does pertain to image in that it may be said to unwind, as before our very eyes, the world's genesis, which (being outside our grasp because it belongs to a 'time' that antedates that of our possible experience, or more controversially time in itself, and because any knowledge of it would imply our accomplished knowledge of the precise nature of a divine action and thought) becomes representable for us in myth, by unwinding itself at once chronologically, along narrative principles, and 'visually', in the mental images which discourse elicits in the reader. »

the whole of the universe²⁴, an experiment which needs to be done not only by (deductive and non-deductive) reasoning, but also with the use of our imagination. In consequence, the Demiurge will appear to be an epistemological tool allowing this experience to take place in our own minds, which will imply two important claims allowing to understand the originality of the present interpretation in relation to others: 1) it does not seem necessary to attribute to the Demiurge an ontological role²⁵ and 2) Timaeus' experiment cannot be “translated” into a purely argumentative account. In other words, and to the contrary to most didactic approaches, Timaeus's discourse could not be expressed in an abstract treatise of cosmology for experts based on empirical observation and deductive *a priori* arguments, for the use of imagination is an essential part of the process.

Timaeus' Discourse as a Thought Experiment

At the beginning of the *Critias*, Timaeus makes the following statement about the cosmos: “Now I offer my prayer to that god who came to be long ago in reality, but who has just now been created in my words²⁶”. Although this sentence is taken by some²⁷ to be an important evidence for a literal reading of Timaeus' discourse, it seems nonetheless possible to understand the opposition between *logos* and *ergon* as highlighting the fact that Timaeus' account is in fact the discursive counterpart of the process of fabrication of the world²⁸. This process has been translated into words in Timaeus' speech and is, in this way, a discursive imitation of the act of fabrication of the universe²⁹. The point of having described this act of creation is to offer to us a detailed account of the universe in all its complexity. In which sense this account could be suggested to be a thought experiment? Are we not risking to apply anachronistically a concept that is foreign to Plato's mind?

²⁴ In the conclusion of his article (Burnyeat 2005) writes, on p. 163 : « Remember that Timaeus is trying to engage us in the almost ungraspable thought experiment of imagining what it would be like to craft *everything*. »

²⁵ In both the literal and didactical approaches, the Demiurge is understood as operating some causality in the universe. What is defended in this chapter is that it is not actually his primary function and, in consequence, if in Timaeus' cosmological scheme, there is no need for such causality, then it might be better not to attribute it to the Demiurge.

²⁶ *Critias*, 106a3-4: « τῷ δὲ πρὶν μὲν πάλαι ποτ' ἔργῳ, νῦν δὲ λόγοις ἄρτι θεῷ γεγονότι προσεύχομαι (...). » Transl. by Diskin Clay in (Cooper 2009).

²⁷ See (Sedley 2008), p. 102 and (Vazquez 2021).

²⁸ The contrast seems to be between two “births” of the word, one in the demiurgic work and the second in Timaeus' speech. See on that (O'Meara 2017), p. 38, n. 41. The allusion to antiquity (*pala*) could be understood in relation with the pseudo-history of the Atlantis, which also seems to have taken place in a *fictional* past. On the fictionality of the Atlantis story see (Broadie 2011) pp. 44-7 and (Johansen 2008) pp. 44-7.

²⁹ For an interesting attempt to show how Timaeus himself is the demiurge of his own discourse, see (Hadot 1983) and (Osborne 1996).

Those two questions can only be answered if we say first a few words about thought experiments. Unfortunately, a consensual definition of this very commonly used tool has not been unanimously reached by philosophers. It is usually admitted that thought experiments are counterfactually scenarios involving the use of imagination in order to obtain a new knowledge about reality³⁰. However, as soon as we try to understand how thought experiments work, a lot of questions arise: up to which point imagination can be used in thought experiment³¹? Is there a difference between scientific and philosophical thought experiments³²? What role does intuition play in thought experiments³³? How is it possible to reach a new knowledge about a specific object giving the fact that thought experiments are done without the introduction of any new empirical data? This latter question is at the heart of the contemporary debate on thought experiments. Two extreme positions have been defended and most of the other positions can be situated between these two extremes. On the one hand, the *argument view* claims that thought experiments are nothing but arguments in disguise³⁴. This deflationist approach, which defends that *every* thought experiment can be *translated* into an argument, is, it seems, compatible with the didactical interpretation of Timaeus' discourse, in particular in relation to the Demiurge who would be a mythological representation of an ontological principle. On the other hand, the *intuition-based account* (or alternatively the *Platonic account*) claims that thought experiments bring new *a priori* knowledge about nature³⁵. Such experiments are undertaken inside the *laboratory of the mind*³⁶. Between those two positions, many less extreme ones can also be found. One particularly interesting is called *the mental model account* for

³⁰ A definition offered by (Ierodiakonou and Roux 2011) is: « thought experiments are counterfactual, they involve a concrete scenario and they have a well-delimited cognitive intention ».

³¹ That is the question of the degree of counterfactuality admitted: must the hypothetical scenario be potentially possible (and not being undertaken for practical, financial or ethical reasons)? How can an utterly impossible counterfactual scenario be related to the factual reality and thus allowing to thought experiments to achieve some progress?

³² Furthermore, thought experiments in philosophy are undertaken in its various domain (ethics, politics, epistemology, metaphysics, etc). Is it possible to find some common criteria between them? See on that (Mach 1976) p. 136.

³³ For (Dennett 1984), on p. 12, certain types of thought experiments are intuition pumps, namely those which focus on the important features: « Indeed one of philosophy's highest callings is finding ways of helping people see the forest and not just the trees. But intuition pumps are often abused, though seldom deliberately. »

³⁴ View defended by (Norton 2002), for whom thought experiments are picturesque arguments or *reduction ad absurdum* based on empirical premises and following the rules of deductive and non-deductive inferences. The use of imagination in thought experiments is a useful psychological and didactic tool, but does not add something new to the arguments developed.

³⁵ View defended by (Brown 1991) which is developed within a very specific conception of an epistemology of the *a priori* associated with a defense of the existence of mathematical objects and laws of nature. This view is Platonic in the sense that: « Some 'pictures' are not really pictures, but rather are windows to Plato's heaven. (...) As telescopes help the unaided eye, so some diagrams are instruments (rather than representations) which help the unaided mind's eye. » (Brown 1999), p. 39.

³⁶ Brown favorite example of a Platonic thought experiment is Galileo's refutation of Aristotle's theory of free fall in which no new empirical data is being used, not being a logical truth either.

which thought experiments consist in the manipulation of mental models in our mind³⁷. According to this view, our ability to build mental model (that is quasi-spatial mental representations furnished with previous pieces of knowledge³⁸) and then manipulate the furniture of these models allow us to reach new knowledge that could not have reached without the manipulation of these mental images. One interesting aspect of this approach is that it allows an association between thought experiments and fictions³⁹. Dystopic fictions like the *Handmaid's Tale* or *Brave New Word* describe counterfactual situations which take place inside the reader's imagination⁴⁰. Nevertheless, this might seem to be a too generous way of defining thought experiments, for if any piece of fiction could be seen as a thought experiment, we might wonder if a dilution of the specific mechanism of thought experiments might not occur, and consequently thought experiments would belong to a sort of a *fourre-tout* category⁴¹. It is indeed necessary to circumscribe thought experiments within a more precise definition, and to that end, three criteria⁴² can be suggested:

1) A thought experiment must always involve a counterfactual scenario. The degree of counterfactuality can vary but the experience should always be *connectable* to our factual reality in order to be effective. Counterfactuality will allow to lead the experiment within the laboratory of the mind. As in the case of scientific experiments, a thought experiment must be able to test the veracity of a hypothesis. However, it might be exaggerated to ask for every thought experiment to be *like* a laboratory experiment where an independent variable is modified in order to examine the effect on a dependent variable (for example, observing the changes of pigmentations of an organism caused by modification of its temperature).

³⁷ See (Miščević 1992). Although he defends the mental model view against Brown Platonist view, this view can also be accommodated within an *aprioristic* view (which is exemplified by the Demiurge's a priori reasoning process). My view in this chapter is that Timaeus' *eikós muthos* corresponds precisely to the construction of a mental model which can lead us to some new knowledge on the cosmos that a purely argumentative reasoning could not achieve. What matters is the manipulation of the (mainly geometrical and stereometrical) contents associates with the conclusion of the Demiurge's deductive process which is indeed *a priori*.

³⁸ As puts by (Miščević 1992) on p. 220 : « Typical examples of mental models are involved in understanding stories, or in ordinary planning of activities. When a reader encounters a description of a situation, she builds a model, a quasi-spatial 'picture' of it. As new details are supplied by the story-teller, the model becomes updated. ». See also pp. 223-224, for some justification about the direct link between mental modeling and geometry. As we will see, mental representation in Timaeus' speech is undertaken with the necessary use of geometry and stereometry.

³⁹ See (Swirski 2006).

⁴⁰ (Davenport 1983), p. 31 writes: « Fiction is an experiment because in order to understand and appreciate it we test the truth of the ideas and the lifelikeness of the methods of the author. Fiction is a thought experiment because this testing takes place in the imagination. »

⁴¹ It does seem that either a counterfactual scenario described in a few words like Putnam's *Brain in a Vat* or in the two-hours film *Matrix* are two formally different versions of the same thought experiment. Format and length don't appear to be decisive to delimitate thought experiments.

⁴² For a different list of criteria see, (Becker 2017), p. 48 and (Terodiakonou and Roux 2011), pp. 11-19.

2) A thought experiment should not be transposable into a (deductive or non-deductive) argument. This criterion is precisely the one rejected by the *argument view*. If thought experiments cannot be turned into arguments, this would imply that they are alternative tools that are used to make progress in philosophy. Since no new empirical data is used in the process of thought experimenting, the use of imagination, and more precisely the manipulation of images, must be decisive in order to reach new conclusions which could not be obtained by mere arguments.

3) Thought experiments must allow a cognitive progress. In order to distinguish thought experiments from literature, for example, it must be assumed that by the use of thought experiments, philosophers aim at new discovery and, in this way, as any scientific experiment, there must be, for every thought experiment, a before and an after⁴³.

At this point the reader might ask: what all that does have to do with Plato's *Timaeus*? Very much so I wish to argue. The fact that thought experiments were widely used in antiquity seems unpolemical⁴⁴ and amongst the most famous ones (like Archytas' edge of the universe, Theseus' ship), Plato's ring of Gyges⁴⁵ comes to mind. It does seem to satisfy criteria (1)⁴⁶ and (3)⁴⁷, but perhaps not criteria (2)⁴⁸. If the *the mental model account* is admitted then we should not limit ourselves to admit as thought experiments short counterfactual stories like Gyges' ring, but we might ask if other kinds of discourse, like the *Statesman*'s myths could be taken for thought experiments⁴⁹? It has also been defended that the whole *Republic* could be read as a political thought experiment in

⁴³ See on that (Ierodiakonou and Roux 2011) p. 24-25.

⁴⁴ For some useful consideration about thought experiments in ancient philosophy (some of them were introduced to support a theory, some to refute one and other to cause the suspension of judgment) and an analysis of a vocabulary used for such experiments (*amphidoxoumenon paradeigma*, *paradeigma*, *parabola*, *logoi*, etc.), see (Ierodiakonou 2005), (Ierodiakonou 2011) and (Ierodiakonou 2017). The objective of this chapter is to suggest that Timaeus' *eikos muthos* belongs to the same category.

⁴⁵ *Republic* II, 359a-360d.

⁴⁶ The counterfactual experience implies to examine what happen if two human beings (a just and an unjust) would do if they found a ring which can make them invisible (situation impossible in the factual world).

⁴⁷ It aims to proof (*tekmerion*) that justice is chosen only because of the fear of punishment

⁴⁸ Perhaps it could be transformed into a *reductio ad absurdum*. For the necessary use of imagination within the process of transforming the self in the Gyges' ring, see (Notomi 2019), p 8.

⁴⁹ For an analysis of thought experiments in Plato see (Becker 2017). Although this goes beyond the scope of this chapter, it has to be noted that not every Platonic image, simile, metaphor and myth are likely to be thought experiments. It will depend on the satisfaction of our three criteria. On the other hand, the *Statesman*'s myth (268d-274e), if not taken literally, might well be a political thought experiment describing some sort of state of nature. Sometimes it is suggested that the allegory of the Cave (*Republic*, 514a-518b) could be a thought experiment, but it does not seem to satisfy criteria (2) since Socrates, in 517a-c, explains the details of the images he has introduced as if it were an argument.

which the possibility of a just city is imaginatively tested⁵⁰. Without entering into the details here, it is nevertheless interesting to note that some characteristics of the *Timaeus* appear to be compatible with thought experiments. First of all, at the beginning of the dialogue, Socrates' summary (19a8: *kephalaia*) about a discussion dealing with the ideal city is an allusion to the *Republic*'s model in heaven (492b2: *en ouranōi paradeigma*), a perhaps utopian city which is described by Socrates in the *Timaeus* as a myth (26c8: *en muthōi*). This derivative⁵¹ usage of the concept of myth is opposed to the true story (20d7-8: *atopos* but *aléthēs*, 26d1: *epi talēthes deuro*) Critias will deliver on the rivalry between the archaic Athens and Atlantis. This *historical* account is the answer to Socrates' wish to see a *living* example of the *aristē politeia* he has sketched (19b3-c2). In *Republic* 499c7-d6, it is clearly stated that the ideal city, about which the realization has been described as not impossible (499d5: *adunatos*), might be found in the past, in the future or in a distant location. Critias' speech could be seen as a *possible* exemplification of Socrates' ideal city. What seems to be fundamental here is the *temporal* distance, which is precisely described by Critias, in order to detach the description of this city *in motion* from our own factual reality⁵². The crucial point is that we are looking for, at the beginning of the *Timaeus*, a possible (and also imaginary) living exemplification of the idealized best constitution. In this sense, both the *Republic* ideal city and Critias' description have mythical characteristics since they are discourses which *could* be true,⁵³ and perhaps this is why they are both *appropriate* (20d3: *epitēdeios*). The dimension of ideality is largely present in the whole *Timaeus*, not only in Socrates' summary of the *ideal* constitution and in the *fictional* history reported by Critias, but also, I wish to suggest, in *Timaeus'* *eikos muthos* which described the possible experience of the creation of the whole universe.

However, if *Timaeus'* speech somehow is an exercise of imagination, does this not create a tension with Plato's critical considerations of the fabrication of images? As a matter of fact, imagination is associated in the dialogues with the capacity to produce images, mainly by imitating a model. If it is true that from an epistemological point of view, *eikasia* is the lowest power of the soul⁵⁴, some of Plato's most important philosophical developments are undertaken by use of the production of

⁵⁰ (Miščević 2012) claims that the *Republic* is a macro-political thought experiment inside which some micro-thought experiment (like Gyges' ring) are being developed. See Aristotle, *Politics*, II, 1165a18, for some comments of the ideal and utopic aspects of the *Republic*'s project.

⁵¹ See on that (Brisson 2005), p. 43. A similar usage can be found in *Laws* VI 752a2.

⁵² Instead of Critias' pseudo-history, we could well imagine a piece of science-fiction which would describe a future Athens fighting against a dystopian Atlantis. This point is recognized by (Rivaud 1925), p. 16 and (Johansen 2008), p.45.

⁵³ In the *Republic*'s criticisms about myths (393c1), Socrates describes them as discourses invented (and consequently lies (*pseudos*)) which *might* possess some truth(*aléthes*).

⁵⁴ *Republic* 509d9- 510a3, 511e et 533e-534a

images⁵⁵. Yet in *Republic* X, 595b-597a, Socrates distinguishes two types of imitators (*mimêtês*), those who are imitating the Forms (craftsman) and those who are imitating the image of the Form (artists like painters). The problem with members of the second category is that they don't imitate the object as it is, but as it appears (597a4-5) and, by aiming at being taken for the original, they are producing illusions⁵⁶. In the *Sophist*, the art of producing images (236c6: *eidê tês eidôlopoikikês*) is divided into two sorts productions, that of copies and that of illusions (236c7: *eikastikén kai phantastikén*). Thus, a distinction between authentic images and deceptive appearances⁵⁷ must be kept in mind when considering Plato's use of images. In the case of the *Timaeus*, as it will appear, the use of an *eikôs muthos* must be understood as a necessary combination between arguments and images in order to reach a knowledge of our universe.

The Great Experiment

Timaeus' speech produces on the reader the impression of being both a rigorous piece of argumentation developing a precise chain of deductions (the Demiurge's reasonings)⁵⁸ and an impressive exercise of imagination. Imagination is used, within the discourse, in place of empirical experiences: in the whole discourse, only three experiences are described, two of them being empirical experiments (on the formation of odors (66e) and on the role of fibers in blood (85cd)), the third one being a thought experiment (63b-c) where we are lead to imagine (63a2 and 63b2: *ei*) two very Archytas-style counterfactual situations: i) imagining a person going around a sphere being placed at the center of the universe in order to conclude that the notions of "up" and "down" are relative to the position of this person on the sphere and ii) supposing that the same person could go to the upper region of the universe which is allotted to fire, stand there, detach portions of fires, weight them in the scales of balance, and then repeating the experience in the earthy region of the universe, that time weighting portions of earth, the result being that the concepts of "heavy" and "light" are also relative to the position in the universe where respective portions are weighted. Timaeus is indeed rather critical about the possibility of empirical experimenting. After having explained the nature of colors and pigmentations, precisely described as a likely myth (68d2: *ton eikota muthon*), Timaeus admits:

⁵⁵ On the importance of images in Plato's philosophy, see (Notomi 2019).

⁵⁶ In the *Phaedo* 92d2-5, arguments which are based on images are said to lead to illusions. See also *Theaetetus* 162d5-163a1.

⁵⁷ Which is exemplified by the situation of the prisoners in the Cave (*Republic*, 515c6-d4).

⁵⁸ This *a priori* process of deducing the properties of the universe is called by (Sedley 2008), p. 110, « the project of intellectualizing physics ».

*But any attempt to put these matters to a practical test would argue ignorance of the difference between human nature and divine, namely that divinity has knowledge and power sufficient to blend the many into one and to dissolve the one into many, but no man is now, or ever will be, equal to either task*⁵⁹.

The radical distinction between human and divine nature when it comes to mix the many into the one and to dissolve the one into the many⁶⁰, is precisely what the Demiurge's task is, and even if it is claimed to be beyond human capacities, we are nevertheless placed, in Timaeus' speech, inside of the mind of the divine craftsman. In other words, we are put in the challenging situation to attempt to resolve the problem of participation of the multiple in the one (and vice versa) and this resolution, not completely possible for us, implies more than only *a priori* deductions. Could then the use of imagination play a central role in Timaeus' speech? Since the procedure of experimental is, according to Timaeus, a limited one, it might be suggested that the introduction of demiurgic craftsmanship appears to be a particularly relevant device in order to test some hypotheses within the laboratory of the reader's mind.

Some scholars have defended that the Description of the pre-cosmic chaos (52d4-53b5) must be understood as a thought experiment⁶¹. This passage constitutes a description of the state of the universe *before* (53a8: *pro*) the Demiurge initiates his work, the images (*mimēmata*) of four elements already exist and appear in the Receptacle. These images are called traces (*ichnē*) of the elements which shakes Receptacles and are, in turn, shaken by it (52e). They are not yet configured by the Demiurge (by means of shapes and numbers) and they appear as affections (*pathē*) with powers (*dunameis*) that are neither alike nor evenly balanced, without proportion and measure (*alogos kai ametros*). These traces which should be identified with the images of the Forms of the four elements, would not describe a pre-cosmic state of the universe, but a thought experiment in which we should imagine how would our universe be without the Demiurge's action. This state of the universe could

⁵⁹ 68d2-7 : «εἰ δέ τις τούτων ἔργῳ σκοπούμενος βάσανον λαμβάνοι, τὸ τῆς ἀνθρωπίνης καὶ θείας φύσεως ἡγνοηκώς ἀν εἴη διάφορον, ὅτι θεός μὲν τὰ πολλὰ εἰς ἐν συγκεραννόναι καὶ πάλιν ἐξ ἐνὸς εἰς πολλὰ διαλένειν ίκανός ἐπιστάμενος ἄμα καὶ δυνατός, ἀνθρώπων δὲ οὐδεὶς οὐδέτερα τούτων ίκανὸς οὔτε ἔστιν οὔτε εἰς αὐθίς ποτε ἔσται. » On the expression *basanon lambanein*, its juridical context (torture of a slave to force him to admit his crimes) and the limits of empirical experimentation in Plato's time (measuring tool, mathematical knowledges, etc.), see (Brisson and Meyerstein 1991) pp. 69-76.

⁶⁰ See *Philebus* 15c-d for a similar expression. It is likely that it is an allusion of the relation between the one Form and the many sensible objects participating in it.

⁶¹ For example (Brisson 1974), (Carone 2005), and (Fronterotta 2010). For some arguments against a counterfactual reading and a distinction between the didactical and counterfactual interpretations, see (Vazquez 2021).

be reached through a sort of abstraction⁶² of *all* demiurgic work in the universe⁶³. However, it must be noted that when Timaeus describes this pre-cosmic state, he claims that the traces of the elements can be *seen* (52e1: *pantodapén men idein phanestai*). But seen who by, since at that moment of the universe history there is no living being yet created to see those traces? The only candidate seems to be the Demiurge. However, in order to be able to see those traces he would need to have bodily organs. It seems clear that he possesses an intellect⁶⁴, but surely not a body. What is more plausible is that it is us, when we read Timaeus' speech, who can put ourselves into the Demiurge's mind and, so to speak, look at the whole universe before and after it has been fabricated. That is, the Demiurge is an epistemological perspective we must adopt in order to *look* at the universe from outside of it. A point of view that is not empirically reachable to us and which is cannot either be reduced to abstract thinking.

In that case, it might be suggested that the thought experimental dimension of Timaeus' speech does not only concern the description of the pre-cosmic chaos. That would be a far too limited and partial interpretation since what we are led to "see" in Timaeus' myth is the great experiment of fashioning the universe and not only what would be the universe before initiating this experiment. To be sure, the description of the pre-cosmic chaos is only a part of the Timaeus' thought experiment. But would this view not be too generous? For sure, not everything that Timaeus describes could be seen as a thought experiment. In particular, all that constitutes the physiological and biological descriptions of living beings (from 69a), a work which is not completed by the Demiurge but by the young gods, seems to be a rather empirical account of how they are teleologically organized. I would like to suggest that, within the demiurgic process, the thought experimental point of view is adopted in two specific and restricted moments: the macro and the micro-investigations about the universe. That is when the Demiurge constitutes all the things that are not reachable by direct human experience: the macrocosmic dimension deals with all the characteristics of the universe that must be imagined from outside of it, and the microcosmic

⁶² The abstraction of intelligibility in the universe appears to be frequently undertaken in the dialogues (*Parmenides*, 165e2-166c2, *Theaetetus*, 201d-202c, *Sophist* (243d-244b), *Philebus* (14c-e)). However, in the case of the pre-cosmic chaos, Forms are not out of the picture since their images appear in the Receptacle. Can this process be undertaken with a mere *reductio ad absurdum* (as defended in the argument view about thought experiment)? In that case, why, if the Demiurgic work is abstracted, would the traces be *in motion*? What would be the cause of these motions? Two abstractions (or thought experiments) are made in the dialogues about what would be the state of the world without the soul (*Laws* 893c1-895b7 and *Phaedrus*, 245c5-246a2). In both cases, the absence of soul would lead to a state of complete rest.

⁶³ That is what would be the universe without the Demiurge and also without the word soul as it is fashioned by the him. This is a polemical issue since the motion of the traces is sometimes thought to be caused by an irrational part of the World Soul (as defended by (Cornford 1937), pp. 209-210) or even by an evil Soul (defended by Plutarch). However, nothing of the sort can be found in Timaeus' speech.

⁶⁴ See 28a1, 28a6-7, 39e7-9 and 46c7-e6.

dimension deals with the description of the invisible particles out of which are made the four elements. Let's examine those two dimensions.

From the macrocosmic point of view, it is clear that the Demiurgic point of view is external to the universe as a whole. When describing the body of the universe made out the whole of the four elements, Timaeus declares that there is nothing left outside of the spherically shaped universe (32c8: *exōthen*)⁶⁵. Nonetheless, one of the first claims about the universe is that it can be seen (*boratos*), touched (*haptos*) and has a body (*sôma echôn*) (28b7-8). As those properties are attributed to the universe as a whole⁶⁶, it appears that it is only from outside that the universe can be seen. That is what we could do if we were to adopt an external point of view on the universe, which happen to be the point of view of the Demiurge. But what would be gained by such a point of view? Afterall, the Demiurge's reasoning (from 29d7) seems to be *a priori* and deductive: as he is good (*agathos*), the result of his work will be the best (*aristos*) and the most beautiful (*kallistos*) possible (*kata dunamin*) result. As everything in the visible can be found in a disorderly (*ataktos*) state, he will insufflate order (*taxis*) in the pre-cosmic chaos. Now this ordering of the chaotic *milieu* is undertaken according to this line of thought: i) the sensible universe will be more beautiful if it possesses intellect (*nous*), intellect (in sensible realities) must be found within a soul which is itself united with a body, so the universe as a whole will be a living being (30b1-6) ; ii) in order to constitute the best possible world, the Demiurge must chose as a model for his work an intelligible Form, and as the universe is a living being, its model will be the Form of the Living Being (*ho estin zôion*) which possesses as parts the four Forms of the Living Species (gods, celestial, pedestrian and aquatic living beings) (30c2-31a1) ; iii) since the Model of the universe is all-inclusive and complete (*teleios*), the Demiurge, wishing the universe to be the most similar possible to this Model, constitutes a complete visible universe containing all the four species and its members (30d1-3) ; iv) since the Model is unique and the universe as its image must be resembling to is Model, the universe will be unique (31a2-31b3) ; v) to be visible and tangible, the world body must be formed by fire and earth, and in order to reach more beauty, these two elements must be unified (*sunagôgos*) with geometrical proportion (*analogia*) which implies the introduction of two middle terms (in case of a three-dimensional reality), namely air and water. (31b4-c4); vi) the world body must be bodily self-sufficient (33d1-d3), vii) possesses a spherical shape (33b1) and the circular motion which is the motion most related to intellect (34a); viii) the world-soul is the cause of this motion (36b6-

⁶⁵ In the description of the Demiurgic work between 27d-47e, they are six references to an outside of the universe (32c8, 33a4, c1, c2, 34b4 and 36e3).

⁶⁶ (Taylor 1928), p.69-70, argues that this affirmation is false, since the world cannot be seen and touched as a whole. Against this idea, see (Araújo 2021).

c4)⁶⁷. It is constituted as a blending of intelligible and sensible beings (34b10-35b3) and is in consequence an intermediary between these two levels, being capable to be in contact with both of them (36e5-c3).

The details of these arguments are rather complex, but what matters to us is that they are all parts of a deductive chain which aims to establish what is the best manner for the Demiurge to bestow proprieties of the model on the visible universe. If the parts of it that deals with empirical data might seem to be an exercise of *reverse engineering* (for example, the Form of living being is constituted by four parts *since* there are four species and four elements in our universe), all that cannot be empirically verified appears to qualify as a Brownian Platonic thought experiment. The Demiurge deduced the propriety of the universe by evaluating the best way to transfer the proprieties of the model in the universe. Argument (iv) is a prime example of this procedure:

(P1) The model of the universe is unique,

(P2) If a model is unique, then its image must be unique in order to resemble its model as much as possible,

(C) The universe must be unique.

It is true that (P2), which cannot be found in the argument given by Timaeus, is implicit⁶⁸. Timaeus claims that *in order* to make the image like the model in respect to its uniqueness, the universe has to be unique. (P2) can be supplied if we admit that for any image, in order to resemble more to its model, it must possess the propriety of the model *qua* model⁶⁹. The classical relationship between intelligible and sensible contains a *one over many* assumption that implies that there is one unique Form over many particulars participating in it (for example one Form of human being and many sensible human beings). In this way (P2) seems to be false. However, the Demiurge reasoning appears to admit that, *in the specific case of the universe as a whole*, if it has to be the best possible image

⁶⁷ The world soul is mathematically structured according to arithmetic, geometric and harmonic proportions. These proportions will help to explain the motions of the planets and the fixed stars, all commensurably reduced to two fundamental motions (the Same and the Other). Time, in turn, is an image of eternity which progresses according the number (*kat' arithmon iousan*) of the celestial clock (38c-39e).

⁶⁸ Timaeus affirms in 31a8-b2: « Accordingly, to the end that this world may be like the complete Living Creature in respect of its uniqueness, for that reason its maker did not make two worlds nor yet an indefinite number. » / « ἵνα οὖν τόδε κατὰ τὴν μόνωσιν ὅμοιον ἡ τῷ παντελεῖ ζῷο, διὰ ταῦτα οὔτε δύο οὔτ' ἀπείρους ἐποίησεν ὁ ποιῶν κόσμον».

⁶⁹ This inference has been harshly criticized by (Keyt 1971). See also (Parry 1979) and (Lennox 1985), pp. 214-217. Alternatively (Burnyeat 2005), pp. 161-162, claims that we are facing here is not a deduction but a piece of practical reasoning as described by Aristotle's famous example: ““I should make something good; a house is something good”; at once he makes a house” (*De Motu Animalium* 7 701a16-17). The crucial point depends on the acceptance or not of (P2).

of an intelligible model, it must not only be a whole organized and unified by mathematical proportions, but is also must be unique⁷⁰. Nevertheless, this affirmation seems to enter in conflict with another premise admitted by the Demiurge: the product of his work will be better if it is all-inclusive (30d-31a). For this very reason, the Demiurge constitutes the four living species (all of them related to both one of the four elements and a respective region in the universe⁷¹). In the context of this argument, the Demiurge concludes that a complete and diverse cosmos is better than a universe which would contain only one species (a universe inhabited only by celestial gods for instance. Better yet, with only one planet exemplifying a perfect circular motion). Would not the universe be more complete if it were to be constituted by more than one cosmos? This possibility is explicitly recognized in 55c4–d6 after having described the constitution of the five solids that can be constructed out of the two basic triangles (right angle isosceles and right angle scalene) which are the basic constituents of all bodily realities. As four of these solids are associated with each one of the four elements, the function of the fifth (the regular dodecahedra) remains open. Two possibilities are suggested : i) this solid might be attributed to the universe as a whole (which seems to contradict the previous affirmation in 33b that the universe has a spherical shape) and ii) there is a suitable ((55c7: *emmēlōs*) possibility of a plurality of universes, more specifically, asks Timaeus, why would we not admit five *cosmoi* (each of them possessing the shape of one of the five solids) (55d2-3)? It is interesting to note that Timaeus acknowledges that it is quite reasonable to feel a doubt about it (55d4: *eikotōs diaporēsai*) and, someone else, looking at other considerations, might have a different opinion (55d6: *etera doxasei*). Timaeus will stick to the idea that the universe is unique, but, as he says, his choice is made according to the likely account (55d5: *kata ton eikota logon*)⁷².

The fact that Timaeus interrupts his myth and claims that, when reconstructing the Demiurge's choice, we must admit the possibility of alternative hypotheses, is quite significative. What cannot be ruled out is that the Demiurge would build a universe constituted out of five *cosmoi*. After all, this choice would respect the requirement of completeness: exactly as the universe is more complete (and perfect) since possessing all the living species, it would also be more perfect if the

⁷⁰ The argument is completed by another one: the bodily self-sufficiency of the universe (which is involved by the exclusion of any external threat that could lead to the cosmos destruction) implies that the Demiurge must use the whole of the four elements masses in order to fashion a unique universe (33a-b).

⁷¹ From above to the center of the universe: Fire (god) – Air (celestial beings) – Water (aquatic beings) – Earth (pedestrian beings).

⁷² At the beginning of the Critias, Timaeus claims that alternative explanations about the universe are possible (106b1-5). See on the difficulty to discover the Demiurge's choices and reasonings, (Sedley 2008) p. 113 and (Burnyeat 2005) p. 162.

five solids were to be exemplified as shapes of five different *cosmoi*⁷³. By walking into the Demiurge's footsteps, in trying to deduce from the intelligible model the properties of the universe, we are led to undertake an exercise of testing different hypotheses and reconstruct alternative configurations of the universe. This experimental process, as it appears, needs to be done within our mind⁷⁴. One might argue, however, that the use of imagination in these cases (visualizing different possible configurations of the universe) is only a didactic tool but by no means necessary. Does a divine external view on the universe really allow to obtain new non empirical information about the universe? In fact, it could help to take a step back from the chain of deduction and visualize how the individual members of this chain can be combined together as to offer the best possible description of the universe, given the limits of human knowledge and the acceptance of competing hypotheses.

Furthermore, the Demiurge does not offer us only an external point of view on the universe, but also an internal one. When describing the invisible constituents of all things, the Demiurge could be seen as a kind of *microscope* which helps us to visualize the interior of corporeal bodies. Bodies in (and of) the universe are made of the four elements, but those are not the ultimate constituents of bodies. Timaeus develops the following argument: i) the four elements are bodies and ii) bodies have depth, iii) depth must be bounded by surface, iv) every surface, which is rectilinear, is composed of triangles (53c). Two kinds of triangles which are said to be the most beautiful (53e1: *kallista*), namely the right-angled isosceles and the right-angled scalene are chosen to be the basic constituent of bodies. From these two basic triangles, the Demiurge will constitute two more complexes plane surfaces (square and equilateral triangles). Those two plane surfaces will then be combined in order to obtain four regular solids: from the square, the demiurge will build the cube,

⁷³ Since beauty is primarily related to the idea of a unified and ordered whole, in the hypothesis of the five *cosmoi*, these latter should be unified proportionally as are the four elements in the universe with the geometrical proportion. Provided that the five *cosmoi* could be proportionally related one to the other and unified by *philia*, nothing in this possibility is absurd.

⁷⁴ Another famous example visualization of possible other choices in constructing the universe can be found when the young gods fashion the human head. They have two possible alternatives: a stronger resistance of the head (and so a longer life) but a lesser sensibility and ability of the soul to be in contact with the outside world, or the opposite. They opt for the latter solution as they believe human beings will be able to lead a happier (but shorter) life that way (75b-d). Nothing prevents to imagine an alternative universe inhabited by human beings with more resistant heads. This of course is not our universe. But visualizing alternative versions of our universe helps us to understand on which premises our factual world is based and how these premises *combined* together. In the case of the young gods, their productive work consists in imitating what the Demiurge has already built (the universe as a whole), taking in consideration the best possible way to persuade the material necessity, and not in bestowing the properties of the intelligible on the sensible as in the case of the divine craftsman. These alternate versions of our universe are not *possible worlds* since this notion is generally introduced in the context of modal logic. Timaeus' aim is not to investigate the necessary, possible and impossible properties of the universe, but to show how our universe is the best possible image of an intelligible model. However, by placing us inside of the mind of the divine craftsman, he seems to be a precursor of the medieval approach on thought experiments which consists in testing hypotheses by confronting them to God absolute power. See on that (Grellard 2011).

and from the equilateral triangle, he will build the pyramid (tetrahedron), the octahedron, the icosahedron. Each of these four solids will be then assigned to a primary body (55d-56c). In 56c-57d and 58c-61c, Timaeus shows how the transformation of the elements will occur between them according to three premises: i) because they are made from two different basic triangles, isosceles for earth, scalene for fire, air and water, only transformations between those three later elements will occur. Earth cannot be transformed into any other element and reciprocally; ii) the four regular solids (and their respective parts) are not, as such, visible because of their smallness (56c1: *diasmikrotēta*), however, when a certain number of the solids are aggregated, the masses constituted by them can be seen; iii) the transformation between the elements can be calculated since it depends on the number of basic triangles⁷⁵. The different aspects of this economical geometrical atomism are based on a stereometry *in motion*. We should then imagine these triangles as *moving* configurations of the Receptacle. Mechanical motion is indeed caused by the heterogeneity (58d1: *anômalotēs*) that can be found between a mover and a moved object (in that case the inequality (*anison*) of size (of their sides, angles, etc.) between the triangles⁷⁶). That is, to get the complete picture of the transmutation of the elements, we are led to visualize a sort of like “a child puzzle”⁷⁷ or a “Legoland”⁷⁸, and imagine how different combinations can happen in the microscopic parts of the universe, combinations based on the arithmetical laws of equivalences (see footnote 74).

This mental experiencing is at the heart of Timaeus myth when applied to the transformations of metals(59c5-d3). In fact, Timaeus recognizes that providing an exhaustive description of their transmutations, within the myth (59c6-7: *tēn ton eikotōn muthōn idean*), would cause a great deal of recreative (59d2: *paidia*) pleasure. As it seems, working out all the cases of transmutations in the universe is, like a children game, an activity which would cause some pleasurable results. As is also, I think, the activity of placing ourselves inside of the Demiurge’s mind and undertaking the great experiment of fashioning the whole universe. Exactly as in the eventuality of a multiple *cosmoi*, Timaeus admits that his choice of the two most beautiful triangles is not certain: he leaves open the possibility that a friend (54a5: *philos*) could find a better kind of triangle and contradict (54b1: *elenksanti*) his theory⁷⁹. At any case, due to the complexity of the enormous task of creating the

⁷⁵ 1 particle of fire = 4 equilateral triangles (e.t.) / 2 particles of fire = 2×4 e.t. = 1 particle of air = 8 e.t. / 1 particle of fire + 2 particles of air = 4 e.t. + 2×8 e.t. = 1 particle of water = 20 e.t. / $2 \frac{1}{2}$ particles of fire = $2 \frac{1}{2} \times 8$ e.t. = 1 particle of water = 20 e.t.. Furthermore, each primary body can be found in different grades of size (57c-d).

⁷⁶ Although void is excluded, small interstices (58b5: *diakena*) exists between the different microscopic particles of elements of different sizes.

⁷⁷ (Cornford 1937), p. 213.

⁷⁸ (O’Meara 2017), p. 75.

⁷⁹ Timaeus also affirms that justifying why those two kinds of triangles would take too much time (54b1 : *dioti de, logos pleiōn*) and that, beyond these two triangles, can be found some principles yet more remote (*tas archas anōthen*) that are

whole universe, the use of mental representations appears to be fundamental. Of course, the importance of geometrical images (510b8: *eikôn*) in order to reach the knowledge of the Forms was clearly highlighted in the *Republic* (511c6-d6)⁸⁰. However in the case of Timaeus' speech, the use of geometrical and stereometrical representations don't aim at reaching a knowledge of the Model, but are complementing the *a priori* deductive process of the universe properties and, by doing so, contribute to grasp the universe in its macro and microcosmic dimensions and, more decisively, how these dimensions are integrated to each other⁸¹. In other words, it could be suggested that the Demiurgic point of view allows us to construct inside of our minds a prototype of the universe. A partial example of a such a prototype (focused on astronomical questions) is alluded in 40d2 when Timaeus claims that due to the complexity of the celestial motions, a visible representation (*mimêma*)⁸² would be necessary to reach a complete knowledge. In the case of the universe, the ultimate prototype would not only involve the description of the planetary motions but a complete visual representation of the universe in all its details⁸³. The demiurgic point of view allows us to try, as far as we are humanly capable of, to produce a living representation and, as Socrates wished with regards to the ideal city he has described at the beginning of the dialogue, an *image*⁸⁴ *in motion* of the universe.

A Demiurge, what for?

known to the God and to such men that are friends of the God (53d4-7). What are those ultimate principles? Lines? Points? Numbers? The One? For an overview of the different possibilities, (Karfík 2007), n. 138, p. 149.

⁸⁰ The nature of mathematical objects is a much-debated question which depends on the interpretation of the analogy of the line (an analysis which Socrates himself treats with much caution in *Republic* 533e7-534b2) and the status of the World Soul described by Timaeus (34a-36b) as being a mathematized intermediary between the sensible and the intelligible. For a defense of the intermediary level of mathematical objects identified (as by Xenocrates) with the World Soul blending, see (Karfík 2007), section V.

⁸¹ With regards to the importance of visualization in all deductive reasonings that involve geometrical content, (Giaquinto 2007), p. 76, commenting on the *Meno* slave example, writes : « (...) while the experience of visualizing is similar to the experience of seeing, the epistemic role of visualizing can be utterly different from the primary, evidence-providing role of seeing (...). So the fundamental mistake here is to assume that the epistemic role of visual experience, whether of sight or imagination, must be to provide evidence. In view of its non-evidential role we can say that visualizing (...) is part of an *a priori* means of (...) discovery. »

⁸² This seems to be an allusion to an armillary sphere.

⁸³ Another partial (since it does not allow to see the microscopical details of the universe) example of that might be found in the Bardesanes representation of the universe *paradeigma*. See (O'Meara 2017) pp. 42-43.

⁸⁴ In the *Statesman* 285d9-286a4, the Stanger claims that perceptible representations (*aisthêtai tines homoiotêtes*) can be used to give explanation without complication. However, about incorporeal entities (*asômata*) no such representation can be found. There is no consensus if these realities are intelligible Forms. This passage has been interpreted in various ways (see (Brission and Pradeau 2011), pp. 243-244, n. 217, (Dixsaut et al. 2018), pp. 436-441 and (Owen 1973)). What seems important for us is that no concrete visual representation (outside of our mind) of the cosmos is possible due to the high degree of complexity induced by the fact that it is an image of an intelligible model.

If the Demiurge is merely a point of view which allows us to visualize the universe, then three difficulties seem to arise: i) what should we make of the fact that the Demiurge is causally responsible for the World Soul? ; ii) how should we interpret the act of geometrization of the traces of the elements by the Demiurge ? and iii) what is the function of the young gods who seem to take over the demiurgic work? These three questions, which all deal with a putative ontological role of the Demiurge, can be answered if we admitted that the function of the Demiurge is fundamentally an epistemological one. In 35a-b, Timaeus describes how the Demiurge constitutes the world soul mixture as an intermediary mixture between (intelligible and sensible) being, sameness and difference. This mixture is first divided (into intervals) and then unified (intervals are being filled) with the use of three mathematical proportions (35b-36b). Finally, the intermediary mathematized blending acquires a third-dimension by acquiring the form of two interconnected circles (the same and the different) which are described as the causes of the motions of celestial bodies in the universe (36b-e) and possess the ability to access both intelligible and sensible objects (36e-37c). The world soul, which is said to be invisible (36e6: *aoratos*), is characterized as a (circular) self-moving motion (37b5: *en tōi kinoumenōi huph' autou*)⁸⁵. Strangely enough, the Demiurge *gives* its uniform circular motion to the world soul (36c2-3). Must we really admit that the Demiurge is the cause of the motion of the soul? This could be seen, as some scholars argue⁸⁶, to point out the ontological dependence of the soul on the Demiurge. Thus, if the World Soul ontologically depends on the Demiurge, then we have apparently identified a proper function for Demiurge. However, the only dependence that can be found in the text, is the one of the body on the soul. The soul is indeed older (34c2: *presbuteron*) than the body, that is *prior (proteros) to body and more venerable in birth and excellence (genesei kai aretei)* (34c3-4). Now the fact that the soul has been created is a necessary consequence of the kind of discourse adopted, but it should not at any rate implies an ontological dependence on the Demiurge. If the divine craftsman represents a point of entrance into understanding the complexity of the universe, and more specifically into matters that cannot be empirically verified, then it makes perfect sense that, through the process of fabrication of the world soul, we get to understand better the nature of the cause of ordered motions in the universe, a cause which is described as an intermediary between the sensible and the intelligible. The constitution of the word soul is part of Timaeus' great experiment: by reenacting its fabrication, we could try to understand its nature and functions. The perspective about the world soul constitution exemplifies the two dimensions of Timaeus' thought experiment: an external point of

⁸⁵ See *Phaedrus*, 245e7-246a1, *Laws*, 895e10-896a2 and 896b3.

⁸⁶ According to (Brisson 1974), the soul is temporally ungenerated (as stated in the *Phaedrus* 245d1: *agenēton*) but ontologically dependent on the Demiurge.

view and the description (the soul envelops the heaven all round on the outside (36e2) of invisible components (the three ingredients being divided and unified) of the soul (which is itself invisible).

Why then assigns to the Demiurge a specific ontological function with regards to the world soul? Not only its nature, but its two functions (self-moving and cognitive) do not appear to depend on anything else than its position between the intelligible and the sensible. To be sure, the world soul can contemplate the intelligible Model (36e5-c3) and then, via the regular planetary motions, be the cause of the cosmic ordered life. Apparently, no need to a supplementary separated intellect. For sure, the world soul's causality could certainly be associated with a full range of phenomena taking place in the universe (growing processes, changes, destructions...) and it certainly is possible to identify it with a demiurgic activity. In other words, would the efficient causality of the world soul be sufficient in terms of bestowing the intelligibility of the Model on the universe? When Timaeus interrupts his speech in order to introduce the role played by Necessity in the universe, he makes a distinction between proper causes (41d2: *aitiai*) and auxiliary causes (41d1: *sunaitiai*). The first one are rational causes (46d8: *tas tēs emphronos phuseōs aitias*) always associated with intellect (46e4: *meta nou*), whereas the second ones are deprived of reason (46e5: *monōtheisai phronēseōs*) producing their effects by chance and without order (46e5 *tuchon atakton*), in virtue of the action of necessity (46e1-2: *kata anankēs*). Within this distinction, demiurgic work must be associated with the first kind of cause as it produced beautiful and good effects (46e4: *kalōn kai agathōn démiourgoi*). It is noticeable that within this reasoning, the demiurgic cause is, a few lines later, identified with soul: « For we must declare that the only existing thing which properly possesses intelligence is soul (...) »⁸⁷. This seems to be a more general affirmation that the one in 30b3 according to which, in sensible objects, intellect must be found in a soul. Here in 46d5-6, Timaeus appears to attribute *any* productive causality in the universe to the intellect of the world soul. Consequently, in the case of the World Soul's description, the Demiurge needs not be anything else than an *ontological-scope* through which we can “see” the nature and function of the soul.

The same line of thought can be defended about participation. In Timaeus' speech two aspects seem to be distinguished when it comes to describe participation: first the traces of the four elements appear in the Receptacle and then these traces are geometrized by the Demiurge with numbers and figures (that is by giving them the shape of the two basic triangles). As traces, those

⁸⁷ 46d5-6: « τῶν γὰρ ὄντων ὃ νοῦν μόνῳ κτᾶσθαι προσήκει, λεκτέον ψυχήν ».

pre-elements could either be, not yet, or no longer, images of the elements.⁸⁸ If it is true that strictly speaking those are traces “*of the elements*, not of the models of the elements”⁸⁹, it nevertheless seems that the setting of the pre-cosmic chaos just after the description of the four elements which are called images (*mimêmata*) of the Forms of the Four Elements (especially in 52c), strongly suggests that the *traces* should be identified with the *images* of the Forms. Those traces are said to be without proportion and measure (69b5), and when Timaeus returns to talk about them in 69b, he claims that they should not even be called elements (69b7). The distinction between a proto-participation (the reflexion of the Forms in the Receptacle) and a higher degree of participation obtained by the action of demiurgic geometrization has led some scholar to associate the divine craftsman as a necessary cause of participation⁹⁰. Another possibility, which I think more likely, consists in conceiving the Demiurge as, once again, an epistemological tool which allows us to “construct”, inside of our minds, the process of participation. In order to do that, it is necessary to visualize what would be the sensible without participation. If we suppress participation, what would then be the sensible? It could not be nothing at all, since in that case we would have to admit that nothingness participates to Forms, which is impossible. A solution to this problem, would be to artificially isolate a pre-cosmic state in need of participation. This counterfactual construction depicts the traces of the element appearing in the Receptacle⁹¹. Remember that traces can be either the result of a previous participation or an anticipation of a participation yet to come. This second alternative is the correct one: in order to understand what participation is, Timaeus isolates a pre-participation state of affair and describes a progressive process of participation (the geometrization of the traces) which is, in reality, constantly occurring in the universe. At the end, participation, for sensible objects, equals to their direct relation to different Forms and the presence of these Forms in them must be understood in terms of a mathematical structure⁹². The demiurgic point of view

⁸⁸ For a suggestion that the term *ichnon* does not refer to the relation between a particular and a Form, see (O’Meara 2017), pp. 60-61. For an occurrence of this term in Plato, and the difference between the heuristic and causal aspect of a trace, see (Harte 2002), n. 6, p. 133. For an interpretation of the traces within a literal approach, see (Vazquez 2021).

⁸⁹ O’Meara (2017), p. 60.

⁹⁰ For example (Brisson 1974), pp. 401-405 and (Karfik 2007) section IV and V, for whom the role of the Demiurge is i) to look at the Forms, ii) then bestow their intelligibility on mathematical objects (which are identified with the World Soul mixture), and iii) then use them as an intermediary model in order to geometrize the traces of the elements.

⁹¹ As it seems, the introduction of the Receptacle (which is either related to space or to matter or to both) is also a part of the great experiment, since it allows a visualization of the *milieu* in which every three-dimensional entity must be situated. To help us to visualize the Receptacle (*hypodokhē*: 49a6, 51a5), Timaeus introduces images: it is like a mother (*mètēr*: 50d3), a nurse (*tróphos*: 88d6, *tithénē*: 49a6, 52d5, 88d6), and a place (*khóra*: 52a8, 52b4, 52d3, 56a6, *topos*: 52a6, 52b4, 57c3, *edra*: 52b1, 53a6). It is described in ways that might make think of it as space *and* matter (Timaeus uses the metaphor of gold (50a5-b5), an impress or mould (50c2-3) and an odourless base of perfumed ointments (50e8-51a1)). See (Harte 2002), pp. 247-264.

⁹² This does not need to be limited to the Forms of the four elements. Every participation (in Beauty, in Justice, in Humanity etc.) could be reduced to the acquisition of a mathematical structure, which, in turn, must be understood in

allows us to experiment this participation *in motion*.

Finally, we should address the question of the young gods. The Demiurge is responsible for the constitution of the divine specie as well as the immortal part (the *nous*) of the soul of the living beings, made out of the same mixture (although slightly less pure) than the world soul. The divine specie is composed by the invisible (the traditional gods briefly evocated in 40d-41a) and visible gods (the planets and the fixed stars). The visible gods, which are smaller reproductions of the universe, are composed of spherical bodies joined with immortal souls. A spherical shape is assigned to them so that they can imitate the shape of the cosmos (40a4: *panti proseikazón*). Their body is made out of the four elements, mainly out of fire (40a3: *ek puros*), and their soul is responsible for their own rotative motion (they also participates in the motions of the world soul's two circles), as well as their ability to think constantly the same things about the same things (40a8-b1: *peri tōn autōn aei auta heautōi dianoumenōi*). As the members of the divine specie are imitations of the universe, they also are eternal (although, in theory, they could be dissolved by the Demiurge, they are in fact non-dissolvable (*alutos*)). As a matter of fact, since the Demiurge is good and wishes to realize the best possible work, all that he produces will be unified by the best possible bonds. Nonetheless, the three remaining mortal species must for the universe to be complete and they must consequently be constituted by *someone else* than the Demiurge. The only possible candidates are the (visible and invisible) gods. The Demiurge does not only delegate an important part of his work (fashioning *all the members* of all three remaining species) to the young gods, but gives them instructions about how to do their work (41a-d). In his speech them, the Demiurge declares that i) they won't be dissolved nor taste death, "finding my will a bond yet stronger and more sovereign than those wherewith you were bound together when you came to be"⁹³ and ii) they should undertake their artisanal work by imitating his power (41c5: *mimoumenoi tēn emén dunamin*). After having given his orders, the Demiurge asks the young gods do their work and "continue to abide by the wont of his own nature" (42e5-6: *en tōi heautou kata tropou éthei*)⁹⁴.

Must we really believe that an important part of the fabrication of the universe is actually undertaken by created gods? In that case, there would be two irreducible levels of craftsmanship which should be distinguished. Yet, is it not strange to suppose that all the members of the three other species have been fashioned by the first one? Does it make sense to suppose that Jupiter and

terms of taking part to Identity (equality) and Difference (inequality). For such interpretation, see (O'Meara 2017) pp. 75-79.

⁹³ 41b4-5 : « τῆς ἐμῆς βουλήσεως μείζονος ἔτι δεσμοῦ καὶ κυριωτέρου λαχόντες ἐκείνων οἵς ὅτ' ἐγίγνεσθε συνεδεῖσθε. »

⁹⁴ On the different interpretations of this sentence, see (Vazquez 2021).

Mars, for example, have fabricated the fish and the cows? This idea must probably be interpreted (as we know from *Republic* 509b, the sun is indeed responsible for life on earth) since the visible gods, being associated with the motions of the world soul, have certainly a role to play in maintaining the life of the other species. However, their productive role must be understood as an inferior one in relation to the Demiurge since they imitate divine craftsmanship. They are in the same position with regards to the intelligible as the imitative artists in *Republic* 595c-602b, one step further away from real being than proper craftsmen. They imitate an imitation of the intelligible: as we have seen, bestowing the nature of the intelligible requires a complex process of deductions and visualizations (the Demiurge's reasoning leads him to choose the spherical shape as an imitation of intelligibility, and geometrical proportion as the most unifying bond (*desmos*) between the four elements), whereas the young gods' work is rather *more pragmatic*: they imitate what the Demiurge has already done (they opt for the same spherical shape for living beings, that is the shape of their heads to which the rest of their body will be added as an useful tool to interact and move in the universe, and as *desmoi* between the elemental constituents of the living bodies, not indissoluble bonds, but “welding them with a multitude of rivets too small to be seen” (43a3 : *dia smikrotēta aoratois puknois gomphois suntēkontes*)). In fact, all work performed by the young gods is aimed to suggest how the remaining constituent of the universe are teleologically organized and, in this way, is more concerned with biological and physiological considerations than metaphysical ones. In short, whereas the Demiurge's perspective properly is, as we have defined it, thought experimental, the young gods point of view embodies an account of Timaeus empirical knowledge on living beings, and is not, for that matter, part of the Demiurgic thought experiment.

If we come back to the question of the function of the Demiurge, a last objection must be raised. In his own discourse, the Demiurge himself seems to suggest that beyond the bonds that can be found between the constituents of the universe (as the geometrical proportion for the four elements), since every bond can be in theory dissolved by the one who has established it, we must suppose the existence of a *stronger and more sovereign bond*, the Demiurge's *boulesis*. Apparently two levels of bonds exist in the universe, and one, the Demiurge's wish, cannot be reduced to the bonds of mathematical proportion that can be found within the universe structure. If this is the case, then, it seems that the Demiurge should not be considered as a mere perspective but must indeed play an ontological role. Nevertheless, as it was stated in the *Phaedo*, the divine bond is “the good and “binding” that truly binds and holds together” (99bc5-6: *hōs alēthōs to agathon kai deon sundein kai sunechein*). In other words, the Demiurge does not only embody a perspective about the nature of the universe, but a specific point of view which offer us a contemplation of the universe as the best possible ordered whole. The Demiurge represents, I think, a specific perspective unveiling to us

the good in the universe and, in that sense, he can be said to be the most excellent of intelligible and eternal things (37a1: *tōn noētōn aei ontōn*). To be sure, the divine craftsman is not the Form of the Good, but the macro—and microscope allowing us to understand and visualize the beauty and the goodness of the universe. The Demiurge is then an epistemological point of view, transforming Timeus's speech into a thought experiment that combines argumentation and visualization. It also satisfies the three criteria highlighted at the beginning of this chapter: Timaeus' speech offers a counterfactual fiction (1), which, because of the necessary visualization process involved in some aspects of the universe, could not be converted into a mere deductive and non-deductive argumentation (2), which lead us (in fact, some of us: the friends of the God) to new pieces of knowledge on the nature of the universe (3). If so, there is not necessity to attach to the Demiurge the ontological function of a separated *nous*. The universe is ordered by the world soul as its intellect contemplates the intelligible Model and the Good. Consequently, the world soul is responsible for the moving structural order of the cosmos. The Demiurge, to whom we shall finally *not* say goodbye, is Plato's device that makes it possible for us to contemplate the whole complexity of this moving image that is our cosmos.

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