

PLATO'S THEORY OF COLOURS IN THE *TIMAEUS*

Katerina Ierodiakonou

Colour is a prominent feature of the world as we experience it. Not only do we encounter colours wherever we look, they also play a crucial role in our ability to recognize and discriminate between things around us. It is not surprising that, when philosophers try to understand the world we live in, they take great interest in colours. One question they raise is whether colours actually are part of reality or whether they just are part of the way things appear to us. This issue presented itself in the seventeenth century as the question whether colours are primary or secondary qualities. But long before the debate in early modern philosophy about whether and in what sense colour is a primary or a secondary quality, ancient philosophers discussed, sometimes in considerable detail, the ontological status of colours, as well as epistemological issues arising in connection with colour vision. Almost from the beginning ancient philosophers, trying to explain the world as it presents itself to us, naturally also were interested in explaining what it is that makes bodies appear to be coloured, and, moreover, what makes them have the different particular colours they display. And Plato was no exception.

To inquire into Plato's views about what colours are and how they are perceived the obvious starting point is the passage 67C4–68D7 from the *Timaeus*, since it is the only text in which Plato offers a systematic and detailed account of these topics; the scattered remarks concerning colour and colour vision which he elsewhere makes are few and not always informative. This, of course, means that Plato, too, undertook to investigate the nature and perception of colour primarily in a cosmological context very similar to that in which the Presocratic philosophers had previously presented their views on colour; for Plato's attempt in the *Timaeus* is also to grasp the physical principles which determine the nature of colour as well as to make sense of the human biology which allows us to perceive the coloured objects in the sensible world. But there is, I think, an important difference: The Presocratics were genuinely intrigued by the place of colour in our world, and this puzzlement seems to

have partly determined their doctrines about the constituents of the cosmos and its transformations. By contrast, Plato probably was in the first instance concerned with establishing his theory of the primary bodies and their reduction to regular geometrical figures, which theory he then tried to apply in the case of colours.

The passage from the *Timaeus*, however, is notoriously difficult. A. E. Taylor, for instance, in his commentary claims that we may never fully understand this particular part of the dialogue.¹ Our first task, therefore, should be to try to clarify some of the central difficulties in this text. Unfortunately we, for this task, cannot rely on the ancient commentaries on the *Timaeus*; the surviving fragments from Galen's commentaries do not refer to the relevant paragraphs, while both Chalcidius' and Proclus' commentary break off much earlier and thus do not discuss our text. But I do believe that we can make some headway on at least some of the central questions this passage raises concerning Plato's theory of colours. I will focus first on the question how Plato conceives of colour, comparing Plato's notion with that of Empedocles and showing Plato's dependence on, but also divergence from, the Empedoclean tradition. Second, I will discuss the question what, according to the *Timaeus*, makes things have the particular colour they have; my interpretation is meant to give a better account of Plato's view both of what he considers as basic colours and of what he considers as mixed colours. And third, I will conclude with some remarks about the ontological status of colours on Plato's theory, in part by contrasting it with Democritus' conception of colours as secondary qualities.

Let me begin, then, with Plato's notion of colour. In the first part of our text, after having discussed smells, tastes and sounds, Plato gives us a generic account of colour (67C4–D2):²

A fourth and remaining kind of perception is one that includes a vast number of variations within it, and hence it divides subdivision. Collectively, we call these variations 'colours'. [Colour] is a flame (φλόγα) which flows forth (ἀπορρέουσιν) from each sort of body, having its parts commensurate with the visual body (ᾧψει

¹ Taylor (1928), 479.

² Τέταρτον δὴ λοιπὸν ἔτι γένος ἡμῖν αἰσθητικόν, ὃ διελέσθαι δεῖ συχνὰ ἐν ἑαυτῷ ποικίλματα κεκτημένον, ἃ σύμπαντα μὲν χροῶς ἐκαλέσαμεν, φλόγα τῶν σωμάτων ἐκάστων ἀπορρέουσιν, ᾧψει σύμμετρα μόρια ἔχουσιν πρὸς αἴσθησιν· ᾧψεως δ' ἐν τοῖς πρόσθεν αὐτὸ περὶ τῶν αἰτίων τῆς γενέσεως ἐρρήθη. τῆδ' οὖν τῶν χρωμάτων πέρι μάλιστα εἰκὸς πρέποι τ' ἂν ἐπιεικεῖ λόγῳ διεξελεθεῖν.

σύμμετρα) so as to produce perception. At an earlier point in our discourse we treated only of the causes that lead to the generation of the visual body; now at this point it is most appropriate to provide a plausible account of the colours.

At least three details here need some clarification:

1. colours are said to be effluences which emanate from bodies;
2. these effluences are supposed to be perceived because they are commensurate with what I, in my translation, rendering 'ὄψις', have called the 'visual body';
3. these effluences are said to be a kind of fire, a flame.

To start with the first point, in claiming that colours are effluences which emanate from bodies, Plato might seem to follow the view which he himself in the *Meno* (76D4–5) attributes to Empedocles, where colour is defined as 'an effluence from things which is commensurate with the organ of vision and is perceptible' (ἀπορροή χρημάτων ὅψει σύμμετρος καὶ αἰσθητός). But there are crucial differences between Empedocles' and Plato's understanding of colour when they talk of colours as effluences from bodies commensurate with ὄψις.

The term 'ὄψις' in Greek ordinarily means 'vision' or 'sight', in the sense either of an actual seeing or of the capacity to see. But in the definition of colour attributed to Empedocles 'ὄψις' clearly refers to our visual organs. There is abundant evidence to show that, according to Empedocles, human beings see colours because the effluences which emanate from bodies are commensurate with postulated pores in our eyes in the sense that the particles which these effluences consist of are neither smaller nor larger, but of the same size as these pores. According to Empedocles, if the effluences are larger than the pores they cannot enter into the eyes, and thus will not produce sight; and if they are smaller they will travel through the pores, as it were, unnoticed.³ In our *Timaeus* passage, on the other hand, Plato explicitly refers to an earlier passage in the dialogue in which 'ὄψις' is described not as our visual organ, but as a visual body (σῶμα) projecting from our eyes (45B2–D3):⁴

³ On Empedocles' theory of the nature and perception of colour, cf. Ierodiakonou (2005).

⁴ τῶν δὲ ὀργάνων πρῶτον μὲν φωσφόρα συνετεκτίναντο ὄμματα, τοιᾶδε ἐνδήσαντες αἰτία. τοῦ πυρὸς ὅσον τὸ μὲν κάειν οὐκ ἔσχε, τὸ δὲ παρέχειν φῶς ἡμερον, οἰκεῖον ἐκάστης ἡμέρας, σῶμα ἐμηχανήσαντο γίνεσθαι. τὸ γὰρ ἐντὸς ἡμῶν ἀδελφὸν ὄν τούτου πῦρ εἰλικρινὲς ἐποίησαν διὰ τῶν ὀμμάτων ῥεῖν λεῖτον καὶ πυκνὸν ὅλον μὲν, μάλιστα δὲ τὸ μέσον συμπιλήσαντες τῶν ὀμμάτων, ὥστε τὸ μὲν ἄλλο ὅσον παχύτερον στέγειν πᾶν, τὸ τοιοῦτον δὲ

Eyes which carry light were the first of the organs they [i.e. the gods] constructed. The reason why they fastened them there [i.e. within the head] is this. They contrived that such fire as does not burn but provides a gentle light proper to each day should become a body. Now the pure fire inside us, akin to that fire, they made to flow through the eyes; so they made the eyes – the eye as a whole but its middle in particular – smooth and close-textured, to keep out all the other coarser stuff, but to let only that kind of fire pass through which itself is pure. Now whenever daylight surrounds the visual stream (τὸ τῆς ὄψεως ῥέϋμα), which then [i.e. in daylight] leaves the eye to join what is like it, daylight coalesces with it to make up a single homogeneous body (συμπαγῆς γενόμενον, ἐν σῶμα) in a straight line from the eyes. This happens in whatever direction the internal fire encounters and presses against an external body it has come into contact with. And because this body of fire has become uniform throughout and thus uniformly affected (ὁμοιοπαθῆς), it transmits the motions (κινήσεις) of whatever it comes into contact with as well as of whatever comes into contact with it, to and through the whole body until they reach the soul. This brings about the perception in virtue of which we say that something sees.

That is to say, Plato claims that there is a stream of fire emanating from our eyes which coalesces with daylight in such a way as to form together with the daylight a single homogeneous body which extends from the eyes to the physical body we see. It thus constitutes, as it were, an extension of our visual organs, and helps us to actively focus on, and to be, as it were, in touch with, the physical bodies we want to see. Vision results because the effluences from bodies cause in this visual body motions or changes, which are then transmitted to our eyes and from there to our soul. But this happens only when the effluences from bodies are commensurate with the fire-particles of the visual body in the sense that, as we will see in a moment, they are either smaller or larger than the particles of the visual body. Note that the daylight here is considered as a necessary condition for vision. For it is because of the daylight that the stream of fire flows from our eyes to coalesce with it and form the visual body, and it is again because of the daylight that the objects emit fiery particles, in line with the principle of attraction of like by like (ὅμοιον πρὸς ὅμοιον).

μόνον αὐτὸ καθαρὸν διηθεῖν. ὅταν οὖν μεθήμερινὸν ἦ φῶς περὶ τὸ τῆς ὄψεως ῥέϋμα, τότε ἐκπίπτει ὅμοιον πρὸς ὅμοιον, συμπαγῆς γενόμενον, ἐν σῶμα οἰκειωθὲν συνέστη κατὰ τὴν τῶν ὀμμάτων εὐθυωρίαν, ὅπηπερ ἂν ἀντερείδῃ τὸ προσπίπτειν ἐνδοθεν πρὸς ὃ τῶν ἔξω συνέπεσεν. ὁμοιοπαθῆς δὴ δι' ὁμοιότητα πᾶν γενόμενον, ὅτου τε ἂν αὐτὸ ποτε ἐφάπτεται καὶ ὃ ἂν ἄλλο ἐκείνου, τούτων τὰς κινήσεις διαδίδει εἰς ἅπαν τὸ σῶμα μέχρι τῆς ψυχῆς αἴσθησιν παρέσχετο ταύτην ἣ δὴ ὄραν φάμεν.

Yet a further difference between Empedocles' and Plato's account of colour is that the two philosophers take a different view as to what these effluences consist of. Empedocles, at least on my interpretation of his fragments, claims that only two of the four elements are involved in visual perception, namely fire and water. For the pores of our eyes are commensurate with, and thus can receive, only effluences which are streams of particles of fire and water of a certain size. According to Plato, on the other hand, the effluences from bodies which are responsible for the colours we perceive all are said to be of a kind of fire, just as the daylight and the visual stream coming from the eyes are. Indeed, Plato stresses quite early on in the *Timaeus* that bodies are visible only because they partly consist of particles of fire, just as they are tangible only because they also consist of particles of earth (31B4–6):⁵

Now that which comes to be must have bodily form, and be both visible and tangible, but nothing could ever become visible apart from fire, nor tangible without something solid, nor solid without earth.

However, the fire of the visual body is not necessarily of the same kind as the fire which emanates from physical bodies and constitutes their colour. For in the *Timaeus* Plato not only introduces the Empedoclean elements fire, air, water and earth as the four primary kinds of body, but also distinguishes varieties of them, and hence also varieties of fire. According to Plato, the four primary kinds of body consist of particles in the shape of regular solids; all particles of fire are tetrahedra, i.e. pyramids, which are the most mobile regular solids, all particles of air are octahedra, all particles of water icosahedra, and all particles of earth cubes (55D6–57D6). Elaborating his theory further, Plato explains that the surfaces of these regular solids are all constituted from triangles of one or the other of two shapes, namely right-angled isosceles triangles (the half-square) and right-angled scalene triangles (the half-equilateral). Presumably the difference between the varieties of fire is due to the difference in size of the triangles which constitute the pyramids, i.e. the particles of fire.⁶ For this is how Plato explains in the *Timaeus* the difference between the kinds of air (58D1–4):⁷

⁵ Σωματοειδές δὲ δὴ καὶ ὄρατὸν ἀπτὸν τε δεῖ τὸ γεγόμενον εἶναι, χωρισθὲν δὲ πυρὸς οὐδὲν ἄν ποτε ὄρατὸν γένοιτο, οὐδὲ ἀπτὸν ἄνευ τινὸς στερεοῦ, στερεὸν δὲ οὐκ ἄνευ γῆς.

⁶ In what follows my interpretation follows Cornford's view on the issue of whether there are basic triangles of uniform size (cf. Cornford 1937) or not (cf. Bodnár 1985 and Mueller 1996).

⁷ κατὰ ταῦτα δὲ ἀέρος, τὸ μὲν εὐαγέστατον ἐπίκλιν αἰθῆρ καλούμενος, ὁ δὲ θολερώτατος ὁμίχλη τε καὶ σκότος, ἕτερα ἄνευ ἀνώνυμα εἶδη, γεγονότα διὰ τὴν τῶν τριγώνων ἀνισότητα.

The same goes for air. There is the brightest kind that we call ‘aether’, and also the murkiest, ‘mist’ and ‘darkness’. Then there are other nameless sorts which result from inequality in size among the triangles (διὰ τὴν τῶν τριγῶνων ἀνισότητα).

Hence the fire which makes up the visual body and the fire which emanates from physical bodies can be of different kinds, because the triangles constitutive of their pyramids, and thus the pyramids themselves, are of a different size.

So much, for the moment, about the account of colour in Plato’s *Timaeus*. The colour of a body is said to be the stream of particles of fire emitted by the body.

With this we can move to the second question: What makes a body have the particular colour it has? Given that colour, any colour, is supposed to be a stream of particles of fire, I suggest that the answer, in a nut-shell, must be this: the particular colour of a body depends on the size of the particles of fire which this body emits. But how exactly do the different sizes of the particles of fire determine the differences between the colours of bodies? To understand this we should turn to the next part of our *Timaeus* passage, in which Plato describes in detail how we come to see the colours white (λευκόν) and black (μέλαν) (67D2–E6):⁸

Now the parts that move from the other bodies and impinge on the visual body are in some cases smaller, in other larger than, and in still other cases equal in size to, the parts of the visual body itself. Those that are equal are imperceptible, and these indeed we call ‘transparent’ (διαφανῆ). Those that are larger compress (συγκρίνοντα) the visual body while those that are smaller, on the other hand, divide it (διακρίνοντα), and so are akin to what is hot or cold in the case of the flesh, and, in the case of the tongue, with what is sour, or with all those things that generate heat and that we have therefore called ‘pungent’. So black and white, it

⁸ τὰ φερόμενα ἀπὸ τῶν ἄλλων μόρια ἐμπίπτοντά τε εἰς τὴν ὄψιν τὰ μὲν ἐλάττω, τὰ δὲ μείζω, τὰ δ’ ἴσα τοῖς αὐτῆς τῆς ὄψεως μέρεσιν εἶναι τὰ μὲν οὖν ἴσα ἀναίσθητα, ἃ δὴ καὶ διαφανῆ λέγομεν, τὰ δὲ μείζω καὶ ἐλάττω, τὰ μὲν συγκρίνοντα, τὰ δὲ διακρίνοντα αὐτήν, τοῖς περὶ τὴν σάρκα θερμοῖς καὶ ψυχροῖς καὶ τοῖς περὶ τὴν γλῶτταν στρυφνοῖς, καὶ ὅσα θερμαντικὰ ὄντα δριμέα ἐκαλέσαμεν, ἀδελφὰ εἶναι, τὰ τε λευκὰ καὶ τὰ μέλανα, ἐκείνων παθήματα γεγονότα ἐν ἄλλῳ γένει τὰ αὐτὰ, φανταζόμενα δὲ ἄλλα διὰ ταύτας τὰς αἰτίας. οὕτως οὖν αὐτὰ προσρητέον· τὸ μὲν διακριτικὸν τῆς ὄψεως λευκόν, τὸ δ’ ἐναντίον αὐτοῦ μέλαν.

turns out, are the affections therefrom [i.e. of those bodies which compress and divide the visual body], which, though occurring in a different class, are the same [as these other affections], but appear different for the reasons given. This, then, is how we should speak of them: white is what divides the visual body, and black is what does the opposite (τὸ μὲν διακριτικὸν τῆς ὄψεως λευκόν, τὸ δ' ἐναντίον αὐτοῦ μέλαν).

In this passage Plato does not explain why an object is said to be 'transparent' (διαφανές) when the particles of fire which it emits are of equal size to those of the visual body. Nevertheless, elsewhere in the *Timaeus* (57A3–5) Plato claims that when two things are exactly alike, they are incapable of causing any change or affection to each other. So, if we apply this general principle to the interaction among particles of fire, it is reasonable to suggest that, if the particles of fire which emanate from an object are of the same size as those of the visual body, they cannot cause any motion or change in the visual body, and thus cannot be perceived by our visual organs. On the other hand, Plato does explain in some detail what brings it about that an object is white or black. He says that a body is white when the fire-particles which it emits are smaller than those of the visual body; being smaller they divide (διακρίνειν) the visual body. He also says that a body is black when the fire-particles which it emits are larger than those of the visual body, and they thus compress (συγκρίνειν) the visual body. The obvious question here is what Plato means by 'division' (διάκρισις) and by 'compression' (σύγκρισις) of the visual body.

Plato draws a parallel to the other senses which may be of some help. For since he himself stresses the analogy between white and black, on the one hand, and hot and cold, or pungent and sour, on the other, we could try to intuitively understand what 'διάκρισις' and 'σύγκρισις' of the visual body may mean, by thinking about how touch reacts to hot and cold, and taste to pungent and sour in terms of some kind of expansion and contraction. Indeed, this is how 'διάκρισις' and 'σύγκρισις' have been interpreted in the past, for instance by Taylor and by Brisson.⁹ But it still is unclear how the expansion of the visual body should cause the sensation of the colour white, whereas its contraction causes the sensation of the colour black.

I suggest that a more promising way to understand Plato's theory is to reconsider the meaning of 'διάκρισις' and 'σύγκρισις' in the light of his account of the transformations of the four primary bodies into each other which he presents earlier in the *Timaeus*. For Plato there uses the very same

⁹ Taylor (1928), 480; Brisson (1999), 170.

terms ‘διάκρισις’ and ‘σύγκρισις’ (*Timaeus* 58B7), when he describes how the primary bodies fire, air and water interact with each other and are transformed into one another. In particular, Plato claims (56E7–57B7) that in certain situations the smaller particles of primary bodies divide or break up the larger ones, so that we may get two pyramids of fire from one octahedron of air; similarly the larger particles may cause the smaller ones to be compressed or combined, so as to get one octahedron of air from two pyramids of fire, or one icosahedron of water from five pyramids of fire.

Now, in the case of vision, it is fire-particles of different sizes which interact with each other. Hence, I submit, the particles of fire which emanate from a body and are smaller than those of the visual body are thought to divide the visual body in the sense that they break up the larger fire-pyramids which constitute the visual body into smaller pyramids. That is to say, the division of the visual body results in the visual body’s now consisting of a larger number of smaller pyramids, namely pyramids of the size of the fire-particles emitted by the body. On the other hand, the particles of fire which emanate from a body and are larger than those of the visual body are said to compress the visual body in the sense that they combine the smaller pyramids into larger pyramids. Therefore, the compression of the visual body results in the visual body’s now consisting of fewer but larger pyramids, namely, again, pyramids of the size of the fire-particles emitted by the body. Thus, I believe, it is because the particles of fire of the visual body are transformed by, and assimilated in size to, the fire-particles which white and black bodies emit that we are able on Plato’s theory to perceive the colours of these bodies through the visual body.

Having discussed the colours black and white, Plato turns to what he calls the colour ‘bright’ (λαμπρόν) or ‘brilliant’ (στίλβον) (67E6–68B1), and the colour red (έρυθρόν) (68B1–5). Something is bright when the particles of fire which it emits are much smaller than those emitted by white bodies; they therefore have a more penetrating motion which makes them not only divide the fiery particles of the visual body right up to our eyes, but even force their way through the whole of the visual body and into the passages of our visual organs. This disturbance in the visual organs causes tears to come out from our eyes which consist of both fire and water, since the inner part of our eyes consists of both of these elements. So, when the fire and the water from our eyes come in contact with the fire emanating from the object, they are mixed together in different proportions, and this results in the dazzling effect due to which we see all kinds of colours. In this case we call the object ‘bright’ or ‘brilliant’. Something similar, though not the same, is supposed to happen in the case of the colour red. Something is red when the particles of fire which

it emits are bigger than those emitted by a bright body, but smaller than those emitted by a white body. They, because of their size, have such a speed as to reach the moisture of our eyes and blend with it; and it is their blending with particles of water through which they shine that causes us to see the colour red. There are interesting and puzzling details in Plato's account of the colours bright and red, but what I want to point out here is that Plato obviously thinks that, contrary to our modern intuitions, not just red, but also bright is a colour; for they both are streams of fire-particles of a specific kind emanating from a body each of which produces a distinctive visual experience. In both these cases, moreover, as opposed to the case of white and black, the particles of fire are of such a kind as to interact not only with, and change, the visual body; they also interact with the particles of water, or fire and water, of our visual organs, and hence produce a distinct visual experience.

Finally, Plato presents a list of nine colours which on his view are produced by mixing the colours white, black, bright and red (68B5–c7). Orange (ξανθόν), for instance, is produced by mixing white, bright and red, purple (άλουργόν) is generated by mixing white, black and red, and grey (φαίον) by mixing white and black. This is a list of which he explicitly says that it is by no means exhaustive. Now, since the mixed colours all are produced by mixing two or more of white, black, bright and red, these four colours should be regarded as basic colours, though Plato himself does not refer to them in this way. There is in fact an obvious connection between Plato's choice of these four colours as basic and Democritus' choice of white, black, red and green (χλωρόν), or according to some sources yellow (ώχρόν), as simple colours from which the other colours are derived by mixture. Again, I will not pursue this.

I rather want to ask: What does it mean in Plato's case that orange, for instance, is produced by mixing together white, bright and red? Should we understand Plato here as referring to something like the painters' practice of mixing together different pigments to produce new hues? This is how Cornford interprets our passage.¹⁰ But I think this is mistaken. In order to understand what Plato really means when he talks about a mixture of colours, we need to keep in mind Plato's definition of colour at the beginning of our *Timaeus* passage; for this definition must be applicable to all colours. That is to say, both the basic colours white, black, bright and red, as well as those produced by mixing two or more of them are not, according to Plato, pigments or mixtures

¹⁰ Cornford (1937), 278. For the most recent interpretations of Plato's account of the production of mixed colours, cf. Levidis (2002) and Struycken (2003).

of pigments, but streams of particles of fire which emanate from physical bodies and interact with the visual body. Hence the peculiarity of mixed colours is the following: whereas the particles of fire which emanate from white and black, or bright and red bodies, are homogeneous in size, the streams of particles of fire which emanate from bodies of mixed colour are mixtures of particles of different sizes; and the different sizes of these particles are the sizes characteristic of particles of different basic colours. Let us take, for example, the simple case of the colour grey which is said to be a mixture of white and black. This, I suggest, is to be understood in the following way: a grey body emits fire-particles of two different sizes; namely they are pyramids which, separated according to size, are of the kind emitted by white and by black bodies, respectively. The pyramids of these two different sizes emitted by the grey body interact with and transform the particles of the visual body into smaller and larger particles so that the visual body ends up containing the same proportion of pyramids of these two sizes as the grey body emits.

Is there a way, however, to understand the exact proportion of different particles of fire needed for the production of a mixed colour? Plato strongly denies it. Right after he introduces the first mixed colour, namely orange, he says (68B6–8):¹¹

But it would not be wise to state the proportions (τὸ μέτρον) among them, even if one could know them. For of these matters there is no necessity (μήτε τινὰ ἀνάγκην) nor a likely account (μήτε τὸν εἰκότα λόγον) that one might be able to give, even approximately.

And, at the end of his list of the nine mixed colours, Plato adds (68C7–D7):¹²

As for the other colours, it should be fairly clear from the above cases by what mixtures they are to be represented in a way that preserves our likely story. But if anyone in considering these matters were to put them to an actual test (βάσανον), he would demonstrate his ignorance of the difference between the human and the divine. It is god who possesses both the knowledge and power required to mix a plurality into a unity (τὰ πολλὰ εἰς ἓν συγκεραννύναι) and, conversely, to

¹¹ τὸ δὲ ὅσον μέτρον ὅσοις, οὐδ' εἴ τις εἰδείη, νοῦν ἔχει τὸ λέγειν, ὧν μήτε τινὰ ἀνάγκην μήτε τὸν εἰκότα λόγον καὶ μετρίως ἂν τις εἰπεῖν εἴη δυνατός.

¹² τὰ δὲ ἄλλα ἀπὸ τούτων σχεδὸν δῆλα αἴτις ἂν ἀφομοιούμενα μείξεσιν διασῶζοι τὸν εἰκότα μῦθον. εἰ δέ τις τούτων ἔργῳ σκοπούμενος βάσανον λαμβάνοι, τὸ τῆς ἀνθρωπίνης καὶ θείας φύσεως ἡγνοηκῶς ἂν εἴη διάφορον, ὅτι θεὸς μὲν τὰ πολλὰ εἰς ἓν συγκεραννύναι καὶ πάλιν ἐξ ἑνὸς εἰς πολλὰ διαλύειν ἱκανῶς ἐπιστάμενος ἅμα καὶ δυνατός, ἀνθρώπων δὲ οὐδεὶς οὐδέτερα τούτων ἱκανὸς οὔτε ἔστι νῦν οὔτε εἰς αὐθίς ποτε ἔσται.

dissolve a unity into a plurality (ἐξ ἑνὸς εἰς πολλὰ διαλύειν), while no human being could possess either of these, whether at the present time or at any time in the future.

That is to say, Plato claims that, though it is possible to have an idea about the colours which need to be mixed together to produce another colour, it is certainly impossible for us human beings to determine by some kind of actual test (βάσανος) the exact proportions used by the Demiurge for the generation of the various colours of bodies. Even if we were to find out about them, we would still lack the understanding of how these proportions would generate the particular visual experience we have in seeing a mixed colour. For on Plato's view there is no necessity in these matters of the kind we have, for instance, in mathematics, and no likely account of the proportions of the basic colours needed could explain how the specific visual experience of a mixed colour is produced. I refer to these enigmatic remarks not just to indicate the extent to which Plato doubts whether we are able to fully understand the way the visible world is constituted by the Demiurge; the fact that he does think of the world as largely the product of an intellect also seems to me to be of relevance when we try to determine the ontological status colours have in Plato's theory.

Thus we can turn to the third and final point I want to discuss. On the theory of the *Timaeus* a body has a certain colour insofar as it emits a stream of fire-particles of a certain kind. It does so independently of whether it is perceived or not. What makes it the colour it is is not that it is perceived by us in a certain way, but rather that it is an effluence of fire of a certain kind. What is true, though, is that we normally identify the colour of a body by the distinctive way we perceive it. Yet it is not the distinctive character of the visual experience which makes the colour the colour it is.

Plato's colours then are perfectly real and objective. But a moment's reflection shows that Plato's view of colour is remarkably similar to Democritus' conception of colours as secondary qualities. In Democritus atoms do not have colour, and ordinary bodies, that is composites of atoms, do not have colour, either. What ordinary bodies do have is a surface structure characterized by the size, shape, orientation and order of the atoms. This makes us perceive bodies as having the colours we attribute to them. But Democritus does not identify the colour of a body with its surface structure or a disposition or a power the body has in virtue of its surface structure, and hence for him colours do not exist in reality. Now for Plato, too, individual particles of fire do not have colour, and bodies do not have a coloured surface, either. Bodies emit a stream of particles of fire and this makes us perceive physical bodies as having certain colours.

So what is the difference between Plato and Democritus? Democritus understands colour as something we ascribe to bodies on the basis of a characteristic visual experience produced in us by the atomic surface structure of a body. And it is in this sense that he claims that colours only exist by convention. We have the convention to call bodies which under normal circumstances produce a certain kind of visual experience in us ‘white’ or ‘red’ or whatever, depending on the kind of visual experience we have. But in reality objects themselves do not have colours. Plato, by contrast, in defining colour as an effluence of a certain kind, makes it something objectively real. But in identifying it with an effluence, the question arises whether Plato is defining the property or quality of anything; for streams of fire are just that, not properties or qualities. We might think, though, that Plato, on the basis of an analogy with perceptual characteristics like smells, tastes, and sounds, considers colour as something a body gives off in the form of some effluence. And it is in this sense that Plato presents colour as a property a body has independently of any observer.

Thus, Plato’s theory of colour in the *Timaeus* differs greatly from the account we find in the *Theaetetus* in the context of his reconstruction of Protagoras’ secret doctrine (153E5–154A4):¹³

According to this theory [i.e. that there is nothing which is, in itself, one thing], black or white or any other colour will turn out to have come into being through the impact of the eyes upon the appropriate motion; and what we naturally call a particular colour is neither that which impinges nor that which is impinged upon, but something which has come into being between the two, and which is private to the individual percipient. Or would you be prepared to insist that every colour appears to a dog, or to any other animal, the same as it appears to you?

According to this passage, the colour we see an object to have is nothing but a private object of experience of the individual observer. To be more precise, there are no stable objects or observers here; for Plato in this passage describes a doctrine according to which both the object and the observer themselves are slow motions. When we say that eyes see something white, for instance, this should be understood as actually meaning that one slow motion affects the other slow motion in such a way as to generate two further motions, which

¹³ καὶ ἡμῖν οὕτω μέλαν τε καὶ λευκὸν καὶ ὅτιοῦν ἄλλο χρῶμα ἐκ τῆς προσβολῆς τῶν ὀμμάτων πρὸς τὴν προσήκουσαν φορὰν φανεῖται γεγενημένον, καὶ ὃ δὴ ἕκαστον εἶναι φαμεν χρῶμα οὔτε τὸ προσβάλλον οὔτε τὸ προσβαλλόμενον ἔσται, ἀλλὰ μεταξύ τι ἐκάστῳ ἴδιον γεγονός· ἢ σὺ διισχυρίσαιο ἂν ὡς οἶον σοὶ φαίνεται ἕκαστον χρῶμα, τοιοῦτον καὶ κύνι καὶ ὄτρωδον ζῶω;

are quick motions; one of them is the sight of white, the other is the colour white. Hence, the colour exists only as long as this particular observer interacts with this particular object in such a way as to generate the colour white on the side of the object. But this view is attributed to Protagoras' secret doctrine and should not be taken to be Plato's own. Besides, Plato later in the same dialogue (184B ff.) rejects the idea that the eyes perceive anything; it is rather the soul which sees by means of the eyes. He there seems to treat perceptual features as properties of objects which they have independently of an observer, though they are accessed by perception through the way they affect the organs; and this is the view which he seems to further elaborate in the *Timaeus*.

However, Plato's view in the *Timaeus* is more complex than this in the following way. In our *Timaeus* passage Plato calls colours 'affections' or 'παθήματα'. This is also the term which he uses in an earlier passage in which he stresses that in order to know something about perceptual properties such as the colour of a body we need to inquire into both the bodies which have these affections and the sense organs by means of which one becomes aware of the affections (61C3–D4):¹⁴

We have now pretty much completed our presentation of the kinds of bodies that are distinguished by their multifarious shapes, their combination and their transformations into one another. Now we must try to shed some light on what has caused them to come to have the affections they do. First we need at every step in our discourse to appeal to the existence of sense perception, but we have so far discussed neither the origin of flesh, or of what pertains to flesh, nor of the part of the soul that is mortal. It is the case, however, that we cannot give an adequate account of these matters without referring to perceptual affections, but neither can we give an account of the latter without referring to the former, and to treat them simultaneously is all but impossible. So we must start by first assuming the one or the other, and later revisit what we have assumed.

But if Plato identifies the colour of a body as a certain stream of fire the body emits, or perhaps with its emitting this stream of fire, why should he insist

¹⁴ Καὶ τὰ μὲν δὴ σχήμασι κοινωνίαις τε καὶ μεταλλαγαῖς εἰς ἄλληλα πεποικιλμένα εἶδη σχεδὸν ἐπιδέδεικται τὰ δὲ παθήματα αὐτῶν δι' ἧς αἰτίας γέγονεν πειρατέον ἐμφανίζειν. πρῶτον μὲν οὖν ὑπάρχειν αἴσθησιν δεῖ τοῖς λεγομένοις ἀεὶ, σαρκὸς δὲ καὶ τῶν περὶ σάρκα γένεσιν, ψυχῆς τε ὅσον θνητόν, οὐπω διεληλύθαμεν· τυγχάνει δὲ οὔτε ταῦτα χωρὶς τῶν περὶ τὰ παθήματα ὅσα αἰσθητικὰ οὔτ' ἐκεῖνα ἄνευ τούτων δυνατὰ ἰκανῶς λεχθῆναι, τὸ δὲ ἅμα σχεδὸν οὐ δυνατόν. ὑποθετέον δὴ πρότερον θάτερα, τὰ δ' ὑποτεθέντα ἐπάνωθεν αὐθις.

that one cannot understand the perceptual properties or affections of bodies without studying the perceptual apparatus of living beings and their soul which is able to perceive these properties? To understand this we have to remember that the *Timaeus* offers a particular kind of teleological account of the world, namely as one created by an intellect. Plato seems to think that sentient beings, on the one hand, and physical bodies, on the other, are created in such a way that bodies have perceptual properties which can be perceived because living beings have been endowed with a perceptual apparatus which allows them to discriminate these properties and thus to discriminate between bodies in virtue of these properties. If this is so, it is straightforwardly true that we cannot fully understand bodies and their affections independently of the organization of perceiving animals, and the other way round. But this does not in any sense change the fact that colours, according to Plato, are properties which bodies do actually have independently of the sentient beings which perceive them. Or, to be more precise, and to conclude, that bodies, according to Plato, have colours insofar as they emit effluences of a certain kind quite independently of the sentient beings which perceive them.

Department of Humanities
National Technical University of Athens
Zografou 15780, Athens
Greece

<katierod@central.ntua.gr>

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