

## Chapter 4

# Ancient Theories

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Ancient discussions on perception involved an important general assumption according to which cognitive capacities are distinguished by the objects at which they are directed. This assumption was explicitly formulated by Aristotle, and it was accepted in the later Platonic-Aristotelian tradition but challenged in Hellenistic philosophy. It was assumed that perception is about perceptible objects, whereas intellect is a capacity directed at what is intelligible. Further, the assumption also implies that various perceptual functions involve different sorts of objects: sight is about what is visible and sound about what is audible (1).

Another widely accepted supposition was that we perceive objects through some kind of interaction between the objects and our senses. This raises the question of how this interaction takes place and what it requires. Aristotle introduced the influential idea that perception is an interaction between two powers: the active and the passive. The terminology already occurs in Plato's *Theaetetus*, but we need not suppose that Plato was committed to this view. In the distinction, the active power is supposed to belong to objects, and the passive power to the percipient (2). Aristotle also assumed that the object of perception is its activating cause (4). In later Platonism, the understanding of perception changed: the interactive process was ascribed to the object and the sense organs, and perception came to be defined as rational judgement, reflexive awareness of or attention to the changes in our sensory system (7).

A central question concerning the interaction between the perceptible object and the percipient was how the objects affect us. Efficient causation was typically supposed to require physical contact, which seemed problematic with respect to those senses which have distant objects. In those cases, it had to be explained how the distance is overcome. While some thinkers supposed that the percipient's role is to

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be receptive (3–4), others assumed that the percipient reaches towards the object by emitting rays of light from or causing pneumatic tension through the eyes (5). These questions were also approached from an anatomical or a geometrical point of view. These considerations concentrated on the angle in which the rays of light are emitted from the eyes or on the anatomy of the eye itself (9). As a notable exception, Plotinus supposed that there can be causation at distance without physical contact due to the so-called co-affection (*sumpatheia*) within the ensouled universe (6).

Other important debates centred on the status of perceptible qualities. A central question was whether the perceptible quality exists prior to an act of perception (e.g., whether a colour exists when it is not seen). In the *Theaetetus*, Plato referred to ‘a secret theory’ according to which the quality comes into being when it is perceived, which Aristotle explicitly denied (2). Aristotle and many of the late ancient commentators operated with the idea that perceptible objects are external; they are not sense data or mental items. Qualities which we perceive exist as objective properties of external bodies. For example, a colour as a colour is an objective property of the physical body, but it also has the potential property of being perceived (e.g., visibility or audibility). This potentiality comes to be actualized in acts of perception: for example, a colour as actually seen only exists in acts of vision (2).

Ancient philosophers proposed various answers to the question of how the physical interaction between the object and the percipient is related to the change in one’s soul. In the *Timaeus*, Plato pointed out that seeing takes place when the effect which an object has on the fire emitted from the eyes is transmitted through the body to the soul, but he did not specify in detail how this transmission happens. Philoponus argued that the primary cause for perception is our psychic capacity to perceive. This capacity requires a certain physical constitution, and physical changes do take place when we perceive, but the physical changes are only contributory causes of perception. In later Platonism the view that the incorporeal soul uses the body as an instrument was widely shared (argued for in the *Alcibiades I*). It was assumed that the body as a lower corporeal thing is not capable of affecting or changing the soul which is a higher incorporeal being. Materialists such as the Stoics and the Epicureans supposed that, thanks to their material nature, the body and the soul interact with each other through physical causality (8).

Whereas Aristotle supposed that the internal nature of perception is not a central problem, as it is familiar to us through perceptions which we continuously have, the later Platonists started to analyse it in more detail. They built on Plato’s remarks on perception as a rational judgement, further developed by Plotinus. In addition to identifying perception with rational judgement, some commentators also argued that human perception must be rational: only rational capacities can be self-reflexive (7). Some argued that our reason attends to the effects which the external objects have on our sensory system. Others postulated an act in which our soul puts forward presentations for itself; it does not merely attend to the changes in the system.

Some ancient authors were sceptical about the idea that we can assert that our perceptions capture the qualities of external things accurately (10). The crux of Sextus Empiricus’ version of the argument is that it is equally possible that we do not perceive the qualities of things accurately as it is that we do. Therefore, he argued, we need to suspend judgement concerning the qualities of external things.

## 1 Cognitive Capacities Distinguished by Reference to Their Objects

a. If it must be said what each of them is, for example, what is the thinking, the perceptive, or the nutritive, it must first be said what thinking is and what perceiving is, for the activities and actions are prior in definition to the powers. And if this is the case, we must have considered their objects which are even prior to the activities, and for the same reason we must first distinguish them, such as nutrition, perceptibles, and intelligibles. (Aristotle, *De anima* II.3, 415a16–22)

b. When discussing the senses, we must first speak of the sensible objects. ‘Sensible’ is used in three ways of which two refer to things which are sensible as such, the third to what is sensible in an accidental manner. Of the former two, the first one means objects proper to the individual senses, the second one those which are common to all senses. I call ‘proper sensibles’ those which cannot be perceived by any other sense and about which we cannot be mistaken – for example, sight concerns colours, hearing sounds, taste flavours, and touch has more differences in its objects. Each sense discerns these and is not mistaken about whether something is a colour or a sound, but they may err as to what it is that is coloured or where it is, and what it is that has sound and where it is ... Movement, rest, number, figure, and size are common since these do not have proper senses but are common to all; for example, movement is sensible by touch and sight. We call that an accidental sensible when, for example, that which is white is the son of Diares; this is perceived in an accidental manner because it is accidental to the perceived white thing. This is because that which perceives is not affected by it as such. (Aristotle, *De anima* II.6, 418a7–24)

c. These are the attempts to prove that touch is not a single sense. Themistius says that they are irrefutable and that touch really is not one sense but several. About these two attempted proofs, he claims that Aristotle did not attempt to say anything about the second, but he did try to unsettle the first one [422b27–32] but he outsmarted us. As Themistius reports, Aristotle says that the other senses are not concerned with a single opposition but with several, for hearing has as its objects not only the high and low pitch, but in sounds there are rough and smooth ones, dark and light, great and small, and short ones. Similarly, in colours there are roughness and smoothness: smooth is such that it is pleasant to sight, for example, the colour of dawn; rough is such that it is painful. Themistius claims that, in saying these things, Aristotle argues falsely with us. For when saying that all senses concern one opposition of perceptible objects, it is clear that he was speaking of the proper sensibles and thus attempted to unsettle the argument that hearing is not only about high and low pitch but also about great and small ones. But the great and the small are common sensibles, and it had to be established whether the other senses have proper sensibles around several oppositions. Thus Themistius did not notice that he himself was arguing falsely. For the great and the small as said about sounds is proper to hearing alone, and therefore none of the other senses but hearing can discern the great and the small in sounds. (Philoponus, *In De anima* 408.24–409.7)

Aristotle distinguished between reason and perception and between different senses by referring to their objects (**a**, **b**); for the objects of different senses, see also Plato (*Theaetetus* 156c). The question of how many senses there are was discussed in Presocratic natural philosophy, and Plato's answer in the *Theaetetus* was still somewhat vague (see **2a** below). Aristotle argued that there are five senses (*De sensu* 2) and this view became dominant after him. Typically, he conceived the objects of a single sense as being determined by a pair of contrary opposites and as forming a continuum between them, for example, colours as continuous between black and white. Aristotle also introduced an influential list of seven colours and tastes situated within such a continuum (*De sensu* 4, 442a20–25). With respect to touch, the continuum was not equally clear – several pairs of contraries were assumed for the objects of touch – and this raised the question of the unity of the sense of touch (**c**). Philoponus's reference to Themistius is to his *In De anima* 72.25–36.

Aristotle supposed that senses are highly reliable with respect to their proper objects. 'Perception of the proper objects is true or allows for the least possible amount of error' (*De anima* III.3, 428b18–19). He did not want to deny perceptual error altogether but explained it by reference to external conditions, such as lighting, distance, or sickness, that cause the sense organ to malfunction. Hence the sense itself as presenting what it receives actually never errs. Further, there is no error which could be articulated as 'I thought I saw a colour but it was not a colour but a sound' (**b**). Alexander of Aphrodisias added (*In Metaphysica* IV 312.20–21) that malfunction can occur in the brain as well. For the commentators' discussion concerning the explanations of perceptual error, see further, Themistius, *In De anima* 57.17–29; 90.8–9 and 93.8–10; Philoponus, *In De anima* 313.27–314.4; 513.15–20; Alexander, *De anima* 66.15–16.

## 2 Perception as Interaction Between Powers

**a.** [M]otion has two forms, each of which is infinite in number. One has the power of affecting, the other of being affected. Through the intercourse and mutual friction of these, offspring are generated which are infinite in number but always in pairs so that one is the perceptible and the other the perception, always emerging together and born with the perceptible. The perceptions have the following names for us: they are called sight, hearing, smell, getting cold and hot, pleasure and pain, appetite and fear, and there are infinitely many nameless ones, and a great number of those which have a name. The genus of perceptibles is born in the same birth as these; all visions with colours, hearings with sounds, and all the other perceptions and perceptibles are born in the same birth. (Plato, *Theaetetus* 156a–c)

**b.** Thus the eye and some other thing which is commensurate with it and has come close to it generate both whiteness and the perception which is born together with it, and they would not have come to be if each of them had approached anything else. Then, in between them movement occurs, when vision comes from the eyes and whiteness from that which cooperates in the generation of colour. And then, the eye becomes filled with sight, and then it sees and becomes not sight but a seeing eye, whereas that together with which it generates the colour has become filled with whiteness and has become not whiteness but the white thing, be it wood or stone or whatever it is that happens to be coloured with this colour. (Plato, *Theaetetus* 156d3–e7)

**c.** Because the actuality of the perceptible object and the perceptive capacity is one, even though they differ with respect to being, it is necessary that hearing and sound which are spoken of in this way [i.e., as actual], actual flavour and taste, and the others similarly are simultaneously destroyed and preserved. But if they are spoken of in the potential manner, this is not necessary. But the earlier natural philosophers did not state this correctly when they held that there is nothing white or black without sight and no flavour without taste. In one way they spoke accurately, in another not. For perception and perceptible object are spoken of in two ways: potentially and actually; and of the latter the statement holds, of the former it does not. (Aristotle, *De anima* III.2, 426a15–25)

**d.** Actual perception is spoken of similarly as intellectual apprehension but the two differ in that those which can produce the activity of the former are outside: the audible, the visible, and similarly the rest of the perceptibles. The reason for this is that actual perception is of individual objects, whereas knowledge is of the universal, and those are in some sense in the soul. For this reason intellectual apprehension is up to the person to initiate when he wants to but perception is not; for it is necessary that the perceptible object is there. (Aristotle, *De anima* II.5, 417b18–25)

**e.** For as acting and being acted on are in that which is acted on but not in that which acts, in this way the actuality of the perceptible as well as that of the perceptive are in the perceptive. (Aristotle, *De anima* III.2, 426a9–11)

**f.** For the colour in actuality is not the same as sight in actuality nor is the sound in actuality the same as hearing because colours can exist even when they are not seen, but it is not possible for the sensibles themselves to be actual without perception. (Alexander of Aphrodisias, *In De sensu* 42.7–10)

In his *Theaetetus*, Plato reported a view according to which sensible objects do not exist before the act of perception but come about through an interaction between two powers: the power of acting and the power of being acted on (**a**, **b**). While Aristotle also operated with the model of active and passive

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powers – one of his basic theoretical tools – he denied that perceptible objects would be generated and destroyed in an act of perception. According to him, perceiving and being actually perceived are twins simultaneously born, but he argued that a perceptible object such as a colour does exist as a potentiality to be perceived even when this potentiality is not actualized in the percipient (**c**, **e**, **f**). (For a debate about the distinction between a colour being a colour and it being visible, see Themistius, *In De anima* 58.27–59.5, and Philoponus, *In De anima* 444.30–32; 438.18–20.) The activator of perception is also its object, an individual external thing (**d**, see also, e.g., Aristotle, *De anima* II.5, 417b18–21, Themistius, *In De anima* 56.17–23). For the requirement that there must be a medium between the percipient and the activating cause that initiates the process of seeing through the medium, see **4** below. There is no reason to attribute the view Plato reports in the *Theaetetus* (**a**, **b**) to Plato himself, and Aristotle did not do so either but attributed it to ‘earlier natural philosophers’ (**c**), see also Themistius, *In De anima* 84.18–22. For the status of the theory of perception in the *Theaetetus*, see Burnyeat 1990, 7–19; Bostock 1991, 62–70; Chappell 2005, 48–52.

### 3 Reception of Objects Through Atomic Effluence

**a.** Empedocles speaks about all senses in a similar way and says that we perceive through objects fitting into the pores of each sense organ. This is why the senses cannot distinguish each other’s objects because some of the pores are in a way wider and some narrower than the perceptible object so that some make their way through the pores without touching whereas others cannot enter at all. (Theophrastus, *De sensibus* 7=DK A 86)

**b.** He [i.e., Democritus] explains seeing by reference to reflection, which he describes in a unique way; for the reflection does not occur directly in the core of the eye, but the air which is between sight and that which is seen becomes compressed both by the object and that which sees, since there is always effluence arising from everything. Then the air which is solid and of a different colour is reflected in moist eyes. (Theophrastus, *De sensibus* 50=DK A 135; in *Doxographi Graeci*, ed. Diels (513–515))

**c.** Indeed, there are imprints which are similar in shape to the solid bodies and which far exceed the fineness of evident things. For it is not impossible that emissions arise in the surroundings [of a body] which are suitable for producing the hollowness and fineness, or effluences which preserve the sequential arrangement

and position as they had in the solid bodies. These imprints we call ‘images’ ... And no evident thing testifies against these images being of unsurpassed fineness, from which also follows the unsurpassed speed which they have; they also are such that each pore is commensurate with them so that even though there is almost an unlimited number of them, they do not collide at all, or collide only minimally, whereas many or infinitely many atoms collide immediately. In addition to these, the generation of images happens as fast as thought. For there is a continuous flow from the surface of bodies, and there is no evident exhaustion because of the mutual replenishment, and the flow preserves the arrangement and order of atoms of the solid body for a long time, even though it sometimes is confused... and we must deem it to be the case that it is through something coming to us from the outside that we see and think of shapes. (Epicurus, *Letter to Herodotus* 46–49)

**d.** An appearance is, according to them [i.e., the Stoics], an imprint in the soul – and about this there immediately were varying views. Cleanthes understood the imprint... to be like the one that comes about from a signet ring on wax, whereas Chrysippus considered such a view to be absurd. (Sextus Empiricus, *Adversus mathematicos* VII.228–229)

In Empedocles’ version of the effluence theory of perception, each sense has certain kinds of pores which only allow objects of a certain kind, as with larger bodies of equal size, round objects cannot be made to enter square holes (**a**). However, the emphasis in Empedocles’ theory, according to Theophrastus, is on the size of the objects rather than on their form. Further, it is not only that the effluences must fit into the pores; if the pore is too large, the effluence does not produce the effect and apparently does not cause us to perceive the objects from which the effluence is emitted. For the theory, see also Plato *Meno* 76c. Empedocles might have borrowed it from Alcmaeon of Croton (Barnes 1996, 478; see also Kirk, Raven and Schofield 1983). The atomists’ main claim is that perceptual change involves a flow or a passage of some physical particles from the object to the perceiver.

Democritus’ theory of perception is rather complex (**b**). In fact, according to Theophrastus’ report, Democritus is not only saying that the objects affect the air but that both the eyes and the objects press the air between the object and the sense organs and hence shrink the distance between the two (*De sensibus* 49–55 DK A 135). For the epistemological interpretation of Democritus’ theory and a criticism concerning Theophrastus’ reliability, see Lee 2005, chapters 8 and 9; for Democritus’ theory of vision, see also von Fritz 1953 and Baltes 1975. For the account in (**b**), see also Plato, *Theaetetus* 156d5–e7 above in (**2b**); see also the comments in **5** below.

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Epicurus' account (c) responded to two problems in the earlier versions of the theory. He explained (i) why we do not see films of atoms flying in the air and (ii) how the films of large objects fit into our (relatively small) sense organs. The first alleged fact was explained by reference to the unsurpassed speed with which the films proceed from the objects to the eyes. As to the second, Epicurus argued that the films of atoms diminish on their way from the object to the eyes but that they preserve their mutual arrangement.

Even though the Stoics are usually counted in with the proponents of the extra-mission theory of vision (see 5 below), the early Stoics also talked about an imprint (*tupōsis*) in the soul, and as we see from the excerpt from Sextus, Cleanthes described this as a physical impression (d). Chrysippus, by contrast, argued that it should rather be conceived of as a change or an alteration (*heteroiōsis*) than a physical imprint (Sextus Empiricus, *Adversus mathematicos* VII.230). For the Stoic version of the extra-mission theory of visual transmission, see 5 below. For the Stoic theory of perception, see Løkke 2008; cf. Brittain 2002.

#### 4 Reception of Objects Through Medium in Aristotle and the Commentators

a. In general concerning all perception, it must be grasped that a sense is a capacity of receiving the sensible forms without matter, as the wax receives the mark of the signet ring without the iron or gold; it takes the golden or brazen mark, but not as gold or bronze. In a similar manner, each sense is affected by that which has a colour, a flavour, or a sound but not as what each of these is said [to be], but as a certain quality and according to its *logos*. (Aristotle, *De anima* II.12, 424a17–24)

b. For this is what it is to be colour: to be able to change the transparent the actuality of which is light. If someone places that which has colour upon the eye itself, it will not be seen. Rather, the colour changes the transparent, for example air, which, being continuous between the object and the organ, changes the sense organ... For seeing takes place when that which can perceive is affected in some way. While it is impossible for it to be affected by the very colour that is seen, it remains for it to be affected by the medium. (Aristotle, *De anima* II.7, 419a9–20)

c. Being acted on is not a simple expression either. First, it can refer to the destruction of a quality by its contrary. Second, it can also mean a kind of preservation of that which is potential by that which is actual, and which is like that for the actuality of which the other has the potential. The one who has knowledge comes to theorise, and this is not being altered at all (for it is a development to the thing to itself and to its actuality) but is another kind of alteration. (Aristotle, *De anima* II.5, 417b2–7)



**d.** On the basis of this it is clear, then, that in reality the activities from visible objects travel through the air without affecting it and come to be in the sense organs... and perceptual discernment occurs through the sense organs being affected in this way by them [i.e. the visible objects]. (Philoponus, *In De anima* 335.26–30)

**e.** As the liquid on the eyeball, being transparent itself, receives the imprints of colours from the external transparent medium and transmits them to sight, the air in the ears also receives sounds from the [air] outside and transmits them to hearing. (Themistius, *In De anima* 65.4–7)

**f.** It must be known that neither is the organ of touch qualified by every perception, nor, when it grasps heavy and light, glutinous and friable, rough and smooth, does the flesh become like that, but receives them only cognitively. For, as has often been said, every body is constituted by a mixture of moist and dry, warm and cold, and because of this whatever it undergoes through them, as a sense, it apprehends and cognises them, whereas as a natural body it is materially affected by them. (Philoponus, *In De anima* 432.36–433.4)

**g.** For the sense organ undergoes two effects, one as simply a body, another as a sense organ. As a body it is affected by body, as a sense organ by the activities of the sensible objects. For example, an eye as a sense organ is affected by being compressed or enlarged by the activities of colours; as a body it is, when it so happens, affected by fire, by being warmed, and an ear, similarly, as a sense organ is affected by sounds but as a body by the forceful movement of the air. (Philoponus, *In De anima* 439.15–21)

As to the question of how the active power of the object can activate the passive power of the percipient from a distance, Aristotle responded that, contrary to what the atomists had suggested and contrary to Plato's analysis in the *Timaeus* (see **5a** below), there is no effluence from the object to the eyes, nor are the eyes emitting fire or rays of light. Rather, it is the medium, i.e., illuminated air or water in between the object and the percipient that is capable of affecting our sense organs so that our capacity to perceive is activated (**b**). The colour affects the medium, the medium affects the eyes, and this change is instantaneous. The sense organ needs to have a suitable physical constitution to allow the form to be received without its matter (**a**). The change resulting from the interaction between the object and the percipient is not a simple change of quality (**c**). Rather, it is a change in which our natural capacity to perceive becomes activated. For perception as reception of forms without matter (**a**), see also Aristotle, *De anima*, II.12, 424b2; III.2, 425b22–23; III.4, 429a13–18; III.12, 434a29. For the necessity of the medium (**b**), see also Philoponus, *In De anima* 349.34–352.1 and Themistius, *In De anima* 62.12–19. It is surprising that, contrary to his account of perception in the

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*De anima*, in the *Meteorologica* (III.2, 372a29–34) Aristotle seems to say that optics confirms an extra-mission theory (cf. also *De caelo* II.8, 290a17–22).

Philoponus disagreed here with Aristotle about the instantaneousness of the change through the medium (**d**). He allowed that the activities (*energeiai*, a term Philoponus introduced to describe the effects that the perceptible qualities have on air) are travelling (*khōrousaí*) through the air, and the covering of the distance between the object and the percipient takes time but is really swift (413.6–7; 327.7–12). Philoponus adds that sounds move more slowly in the medium than the activities of visible objects; this is why we first see the lightning and hear it only later (Philoponus, *In De anima* 413.4–9 with reference to Aristotle's *Meteorologica* 369b7–11). In discussing the question of what happens after the object has in some way affected our sense organs, Themistius specifies that the sense organs transmit the effects caused by the objects to the senses themselves (**e**).

Philoponus affirms that the sense organs as sense organs are not strictly speaking altered (**f**, **g**; see also Themistius, *In De anima* 56.39–57.10 and 78.5–10). Rather, Philoponus puts it, the sense organs are affected in a cognitive manner (*gnōstikōs*), and such an effect can even take place in the flesh as the organ of touch (for Philoponus on the organ of touch, see *In De anima* 417.13–434.5). Even though Philoponus characterises this change as 'cognitive' (see also *In De anima* 438.10–15), he does not altogether deny its physicality. For example, when it comes to colours, he says that our eyes are compressed or expanded by their activities (**g**). He might refer to the fact that the size of the iris varies according to changes in lighting conditions (for expansion and compression, see also **5b** below). In sum, Philoponus indicates that a physical change in the organ is required for perception to take place, but perception is to be defined as a cognitive rather than a physiological process. For a somewhat different account of the commentators' theories of perception, see Sorabji 1991, 2005, vol. 1, 47–52; for the commentators' accounts of problems related to the metaphysical status of qualities in the medium, see Ellis 1990.

Contemporary debates concerning Aristotle's theory of perception have mostly concerned the question of whether the sense organ is changed by the perceptible quality and whether this accounts for perceptions. Richard Sorabji (1974) introduces the literalist position according to which something in the inside of the eye must turn white when we perceive white. Myles Burnyeat argues against this and introduces a different reading according to which there is no physical change in the organ at all; see Burnyeat 1992, 1993/1995, 2001, 2002. For Sorabji's response to Burnyeat (1992 and 1993/1995), see Sorabji 2001. For intentionality and its relation to Aristotle's theory of perception, see also Caston 1998. For other versions of the thesis that physical change is

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necessary for perception, see Everson 1997; Nussbaum and Putnam 1992. For an elaborate defence of the view according to which physical change is not essential in perception, see Johansen 1998. A counter-argument to all positions which favour one kind Aristotelian cause at the expense of others, see Bolton 2005. The core point of Bolton's view is that, according to Aristotle, all four modes of causes are necessary to define natural occurrences. Despite Burnyeat's claim to the contrary (2002), there is conceptual space between his position and Sorabji's and, as many other scholars have also claimed, Aristotle's theory should be located in this space. For the controversy, see also Caston 2005; cf. Caston 1997.

## 5 Extra-Mission Theories of Vision

**a.** The fire which is inside us... and unmixed, they made to flow through the eyes so that it is smooth and dense as a whole, but it particularly compresses the middle part of the eyes so that this part excludes everything coarser and only filters what is pure. Whenever there is daylight around the stream of vision, then like makes contact with like and becomes compacted together so as to form one body of light on the straight line from the eyes, and there that which strikes from the inside is pressed against that which encounters it from the outside. Because this body is uniform, it becomes similarly affected whenever it comes into contact with something, or something else comes into contact with it; and when it transmits these movements throughout the whole body up to the soul, it generates the perception we call 'seeing'. (Plato, *Timaeus* 45b–c)

**b.** [Of the particles carried from the objects] some are larger, some are smaller, and the former compress and the latter dilate the visual ray and are thus siblings to the hot and cold in the case of flesh and those which are sour in the case of the tongue, and all such things that produce heat and that we hence named 'pungent'. Black and white are the same as these affections, even though they belong to another class and produce other appearances because of these reasons. Thus we must name them like this: white is that which disperses the visual ray, black is what does the opposite. (Plato, *Timaeus* 67d–e)

**c.** Seeing happens when light is stretched conically between sight and its object, as Chrysippus says in the second book of his *Physics*, and Apollodorus agrees. Thus a conical shape of air is formed, the tip towards the organ of sight and the base towards the object, and that which is looked at is conveyed by the stretched air as with a stick. (Stoics reported by Diogenes Laertius, *Lives of Philosophers* VII.157 = SVF 2.867)

In the *Timaeus*, Plato presented a view of visual transmission according to which our eyes contain inner light that reaches out from them when there is light outside, and thus a body of light is generated. Vision occurs when something external touches this body of light, and the movements caused by this collision are transmitted to the whole body and reach the soul (**a**). The size of the particles carried from colours to the eyes explains the perception of different colours: the particles which are larger than the visual ray (*opsis*) compress the ray and produce the perception of black whereas smaller particles dilate the ray and cause the perception of white (**b**). The explanation reported in the *Timaeus* diverges from the one in the *Theaetetus* in the following respect: whereas in the *Timaeus* the light is proceeding from the eye and the external body simply comes in the way of this body of light, in the *Theaetetus* there is a two-way spatial movement (*Theaetetus* 156d2 and 181c–d) between the object and the percipient: vision comes out from the eyes and colour comes from the object, and these two meet in between the object and the percipient. This resembles Democritus' view as interpreted by Theophrastus (see **3** above). For a later version of the theory according to which the eyes emit visual rays, see also Galen, *On the Doctrines of Hippocrates and Plato* VII.5, 5–10 and VII.5, 32 and below in **9**.

Despite the 'materialist' account outlined in the *Timaeus*, Plato suggested that the physical interaction between internal and external light is not sufficient for seeing. In order for seeing to take place, the effects must 'reach the soul'. However, he did not explain in further detail how the physical processes are assumed to attain the supposedly immaterial soul. For the relation between soul and body in perception, see **8** below. For the view according to which the transmission to the whole body causes vision, see Democritus according to Theophrastus (*De sensibus* 54). For the Stoic view (**c**), see also Aëtius, *Placita* IV.15, 3 (= SVF 2.866); Calcidius, *In Timaeum* (= SVF 2.863); Aulus Gellius, *Noctes Atticae* V.16.2; cf. Cicero, *On the Nature of Gods* II.83. The metaphor of the walking stick reappears in Descartes, see below p. 87. The idea that visual transmission takes place through a cone-shaped intermediary is also found in Euclid, see **9** below.

## 6 Visual Transmission Without Physical Contact

**a.** If it is in the nature of a given thing to be sympathetically affected by another thing because it has some resemblance to it, the medium is not affected, or at least not in the same way (Plotinus, *Enneads* IV.5.1, 35–38).

**b.** This [i.e., the presence of forms in the air] is not a bodily affection but one in accordance with a greater psychic power of a sympathetic living unity. (Plotinus, *Enneads* IV.5.3, 36–38).

Plotinus introduced a view as to how the objects of vision affect the percipient that significantly deviated from those of other ancient schools (**a**). As opposed to most others, Plotinus held that not even mediated physical interaction between the object and the percipient is needed. Rather, the effect is transmitted through a ‘sympathetic’ influence from a distance (or ‘co-affection’, *sumpatheia*) explained non-physically (**b**). Cf. Plotinus, *Enneads* IV.5.4, 28–30. In IV.4.23, however, Plotinus indicates that some kind of bodily affection is needed in human sensory perception. Even in the case of a medium, he does not deny that there is something, for example, air, between the object and the percipient, but his claim is that this air or other material does not have a role in visual transmission; for Plotinus’s theory of visual transmission, see Emilsson 1988, 36–62.

## 7 Perception as Judgement, Attention, Reflexive Awareness

**a.** The soul as a whole extends to the senses, which are functions of it, like branches of a tree from the ruling faculty, to be reporters of what they sense, while it itself like a king passes judgment on what they have reported. The things which are sensed are, as bodies, composite, and each sense perceives one particular thing, this one colours, another sounds ... and in all cases as present; no sense remembers what is past or foresees the future. It is the function of inner deliberation and consideration to understand the affection of each sense, and to infer from the reports what the object is, and to apprehend what is present, remember what is absent, and foresee what will happen. (Stoics according to Calcidius, *In Timaeum* 220=LS 53G)

**b.** Perceptions are not said to be affections, but activities and judgements concerning affections. While affections arise from another, that is, a body having such and such a quality, the judgement arise from the soul, and judgements are not affections. (Plotinus, *Enneads* III.6.1, 1–4)

**c.** Just as sight having both potential and actual modes of being is the same in essence and its actuality is not an alteration, but it simultaneously approaches that to which it is essentially related and which it knows and discerns without being affected, similarly the reasoning part is related to the Intellect and perceives ... (Plotinus, *Enneads* III.6.2, 34–38)

**d.** When the soul senses in the body, it is not acted on by the body but acts more attentively upon the passions of the body, and these actions, whether easy because of agreeableness or difficult because of disagreeableness, do not lie hidden from the soul. And all this is what is called sensing. (Augustine, *De musica* VI.5)

e. Neither is it sensible to maintain that a body can make something in the spirit, for the spirit does not serve as the matter for a making body. That which makes is namely in every way more excellent than that out of which it makes something. And body is not in any way more excellent than spirit ... Although first we see a body which previously we were not seeing, and from then its image begins to be in our spirit by which we will remember the body when it is absent, nevertheless it is not the body that produces its own image in the spirit but the spirit which produces the image in itself with wondrous speed. (Augustine, *De Genesi ad litteram* XII.16 (467))

f. Through the example of the point he has sufficiently shown [Aristotle, *De anima* 427a9] the unaffected and active [nature] of perceptual judgement. (Pseudo-Simplicius, *In De anima* 200.14–15)

g. Clearly, the perceptible object, being individual and external, has to be there for the perceptive faculty; and it not only needs to be there but to present to the perceptive faculty so that it can act in a way on the sense organ and, the organ's being affected this way, the perceptive soul projects the common concepts of the perceptibles which are within it in a way appropriate to the effect, recognises the object in accordance with its own activity and being in accordance with the sensible object. (Pseudo-Simplicius, *In De anima* 124.32–125.2)

h. But clearly the perceptible object is perfected and brought to activity by the perceptive soul itself and it also projects the form of the perceptible from itself, but it has been stimulated to the projection by the change which occurs in the sense organ caused by the perceptible object. This is because neither is the perceptive life entirely separate from bodies nor does it project the appropriate concept on the perceptible object immediately but on the vital effect or the passive activity in the sense organ. (Pseudo-Simplicius, *In De anima* 192.12–18)

i. But more recent interpreters neither tremble at Alexander's frown nor pay heed to Plutarch, but pushing Aristotle himself to one side they have devised a newer interpretation. They say that it belongs to the attentive part of the soul to lay hold of the activities of the senses. For the rational soul, according to them, does not have only five powers, intellect, thought, opinion, rational wish, and choice; they add another sixth power to the rational soul, which they call 'attentive'. This attentive power, they say, stands over what happens to the human being ... If, then, they say, the attentive power has to go through all, then let it run through the sense and say: 'I saw', 'I heard'; for it is up to that which grasps one's own activities to say these things... (Pseudo-Philoponus, *In De anima* 464.30–465.34)

For the Stoics, it was an integral part of their theory of perception that we need to understand or interpret the appearances which come to us from the outside. This implies that, for adult human beings, perception is a function of 'internal reflection and reasoning' (*intima deliberatio et consideratio*, a).

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For an analysis of the content of Stoic perceptual appearances, see Barney (1992). Plotinus also defined perception as a judgement (*krisis*) which the soul makes concerning the affections of the sensory system (**b**). He emphasised that in this activity the soul is approaching or attending to what it has (**c**; cf. Fleet 1995, 96–97). In another context, he connected this idea with reflexivity: when the soul approaches what it has, it turns to itself (*Enneads* V.1.12, 12–20). What exactly it is that it turns or attends to is not completely clear. The most promising suggestions would seem to be appearances (*phantasiai*), notions, or even propositions. Plotinus' notion of judgement (*krisis*) is similar to Plato's and deviates from the one used by Aristotle (and such commentators as Themistius). For Plato and Plotinus, *krisis* means rational judgement, whereas for Aristotle it is the discernment of objects from others (see also *Posterior Analytics* II.19, 99b35).

According to Augustine, corporeal things cannot affect the immaterial soul (*anima*) or the spirit (*spiritus*) because the soul or the spirit is a higher entity than the body (**e**). He combined the view that the sensible form has an effect on the sense organ with the idea that perception itself is an act of attention of the soul (**d**). When he explained seeing, Augustine argued that the active intention of the soul guides the process in which a likeness of the external visible form is created in the sense organ (*De trinitate* XI.4.7; see also *De trinitate* XI.2), implying that we are aware of the changes in the organs. However, this is not what perception is, but, in addition, the soul produces an inner image which allows us to imagine and remember the object. When the soul is aware of the external things in perception, it is aware of this very image (**e**). In his account of visual transmission, Augustine adopted the Stoic simile of the stick touching objects (*De quantitate animae* 41–44). See O'Daly (1987, chs. 3–5), Brittain 2002. For the expression 'does not lie hidden from the soul' in (**d**), see also *De quantitate animae* 48. For the idea that the body cannot affect the soul in Augustine's theory, see also *De trinitate* XI.2.3.

In a commentary which some manuscripts mistakenly attribute to Simplicius (for the discussion concerning the authorship, see Bossier and Steel 1972; Hadot 1987, 2002), perception proper is identified with the projection of common concepts the perceptive soul performs when the sense-organs are affected by the external objects (**f**, **g**). The projection is not strictly speaking caused by the effects in the organs (and thus by the external objects), but the soul has been 'stimulated' or 'awakened' to the projection by the change in the organs (**h**). The kind of passive or receptive activity which Aristotle sees as an actualization of a perceptible object *as perceptible*, is in Pseudo-Simplicius ascribed to the sense organs and it cannot, for him, amount to the full perception of the object that needs to derive from the activity of the perceptive soul which he understands as being rational.

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Thus, for Pseudo-Simplicius, human perception is rational and needs to be identified with rational judgement rather than with the receptive activity (187.27–29), and this, together with rational self-reflexivity (187.29–36) distinguishes human perception from perception in other animals. Proclus denied this claim and argued that all animals that have a cognitive faculty (which he specified to mean appearance, memory, and perception) are also rational, and hence human and non-human perception do not diverge in this respect; see *Platonic Theology*, ed. Saffrey and Westerink III.6, 23, 25–24, 2; translated in Sorabji (2005, 60). Pseudo-Simplicius attributed the supposition that perception is rational to Iamblichus (Pseudo-Simplicius, *In De anima* 187.37). For further references, see Lautner (2000, 435–436 and Lautner 2004). The crucial difference between Augustine’s theory (**d**, **e**) and the projection (*proballein*) found in Pseudo-Simplicius (**g**) seems to be that whereas in Pseudo-Simplicius there is a projection of common concepts on the perceptible objects and their effects on our senses, for Augustine the intention creates an object of its own, an image. Pseudo-Philoponus (in a commentary which has been mistakenly transmitted under Philoponus’ name) did not talk about projections, presentations, or images which the soul would make for itself. Rather, he argued that there is a separate rational part (*to prosektikon*) which attends to everything that takes place in the soul (**i**). This was not restricted to the sensory soul but also included growth and other vegetative functions (465.1–5). For his view, see also Pseudo-Philoponus *In De anima* 467.5–9; 477.21–482.6; 560.9–561.18.

The Neoplatonic commentators on Aristotle often maintained the view that reception of forms is necessary for perception (e.g., Pseudo-Simplicius, *In De anima* 188.3; 190.6–10) but identified perception rather with rational judgement. For more texts on these developments, see Sorabji 2005, vol. I, 33–43.

## 8 Psychophysical Interaction in Perception

**a.** Socrates: So, a human being uses the whole body?

Alcibiades: Very much so.

Socrates: And that which uses and that which is used are different things?

Alcibiades: Yes.

Socrates: Thus the human being is different from his or her body.

Alcibiades: So it seems.

Socrates: What, then, is the human being?

Alcibiades: I cannot say.

Socrates: But you can say that it is that which uses the body.



Alcibiades: Yes.

Socrates: And what else uses the body rather than the soul?

Alcibiades: Nothing other. (Plato (?), *Alcibiades I*, 129e–130a.)

**b.** Having shown that those which do not have sense are also affected by the sensible objects (for that which is actually transparent is affected by colours and the air by odours and sounds) he reasonably enquires – because the sense organs are also affected by them – how the sense organs differ from those which are not sensitive, given that both are affected by sensible objects; for both seem to be affected in the same way ... It does not suffice for perceiving to be capable of receiving the form without matter, but a psychic power is needed, which is not in all that are capable of receiving the form without matter. If something is somehow affected by a sensible object, it does not yet perceive, for otherwise also water and air and mirrors would perceive, but a power is needed which is capable of distinguishing these kinds of things, the effects which the sensible objects have on us, and which is not in every body, but only in a natural body with organs, as he has shown, and, in that body, not in its every part, but in a part that because of such proportionality and suitable mixture is capable of receiving this power. (Philoponus, *In De anima* 444.11–26)

**c.** We must know that it is as a material cause that flesh is a cause. For it is not productive of thought unless as a contributory cause. It is because of a conjunction that the psychic movements have joint dispositions with the mixtures of the body, and the psychic movements are not generated by the mixture, but without such mixtures they could not come about in this way. (Philoponus, *In De anima* 388.23–27)

**d.** I account for it thus: as a living body is illuminated by the soul, each of its parts taking part in the soul in accordance to the organ and its suitability for a certain function, and it has the power which accords to the execution of the function; in this way it must be said that in the eyes lies the seeing power, in the ears the one for hearing, and in the tongue for tasting, for smell in the nose, and the sense of touch is present throughout; for such apprehension the whole body is an instrument at the soul's service. (Plotinus, *Enneads* IV.3.23, 1–9)

In the *Alcibiades I*, a dialogue originating from Plato's school, we find the view according to which the soul uses the body as an instrument (**a**). This account seemed to state that the priority in explanation is from the soul to the body, not the other way around. Even though Philoponus assumed that sense perception requires physical changes, these changes are not the primary causes of perception (**b**, **c**). Rather, what is crucial is that we have a psychic capacity to perceive, and our material constitution and the physical changes in

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the process are necessary for perception. In Philoponus' terms, the material is not the productive (*poiētikos*) cause of our psychic qualities and capacities but only a contributory cause (*sunaition*; for the notion of a contributory cause, see also Plato's *Timaeus* 46c–d, 47e–48a, 68e–69a). The productive causes are the psychic powers. Following the *Alcibiades I*, late ancient Platonists laid great stress on the general view according to which the organs and bodily parts are instruments of the immaterial rational soul. This general assumption was expressed by Plotinus (d) and it also occurs in Augustine, see (7d). For the Stoics, it was an important argument for the physicality of the soul that it needs to have causal effects (for the soul, even the rational soul, as *pneuma*, see Diogenes Laertius, *Lives of Philosophers* VII.138–139=LS 47O; see also Philo of Alexandria, *Allegories of Laws* II.22–23=LS 47P).

## 9 Geometry, Anatomy, and the Visual Field

a. Let it be hypothesized:

1. That the rectilinear lines proceeding from the eye cover the transversal extension of large magnitudes.
2. That the shape that comprises those visual streams that are emitted from the eyes is a cone the apex of which is in the eyes and the base adjacent to the limits of the things seen.
3. That those things on which the visual streams fall are seen and that those things are not seen on which the visual streams do not fall.
4. That those things that are seen from a larger angle seem larger and those from a smaller angle smaller, and those that are seen from an equal angle seem equal.
5. That those things that are seen through higher rays seem higher and things that are seen through lower rays seem lower.
6. And similarly, those things that are seen through rays that are more to the right seem to be more to the right and those that are seen through rays that are more to the left seem to be more to the left.
7. That those things that are seen from a greater number of angles appear more clearly. (Euclid, *Optica I HOR*, 1–19)

b. The structure [of the eyes] teaches you that some *pneuma* is transmitted through these passages [optic nerves] to the eyes; [this is also shown by] the fact that when one of the eyes is closed, the pupil of the other one widens, and when the eye is opened, the pupil immediately returns to its natural size. It is not difficult to grasp that when the grape-shaped membrane [i.e., the choroid membrane] is stretched by some substance and when the substance fills its inner space, it is necessary for the aperture in the pupil to be widened, otherwise it would be impossible; and that the

speed of the emptying and filling is not one of a liquid flowing in, but is solely the function of a pneumatic substance. And because both passages [optic nerves] lead to the same point – and dissection shows this clearly – it is reasonable that this common space receives the *pneuma* from both passages. (Galen, *On the Doctrines of Hippocrates and Plato* VII.4, 10–13)

**c.** We say that in fact the optic *pneuma* comes down from the brain through optic nerves and reaches down to the lens, where their endpoints are. For this reason also the discernment of the visible objects happens there, and for this reason the lens is also transparent: in order for the activities of the visible objects to be transmitted through it to the optic nerve. (Philoponus, *In De anima* 336.33–37)

**d.** Sight sees in accordance with straight lines and, according to the first account, it perceives colours but it also cognises together with them the coloured body and its size, shape and location, the distance, number, movement and rest, roughness and smoothness, evenness or unevenness, sharpness and bluntness, and its constitution, whether it is watery or earthy, for example, and liquid or solid. However, its proper object is colour because we cognise colours through sight alone. The coloured body, the place in which the seen object happens to be, and the distance between the seer and the seen follow immediately, together with colour ... Because sight cognises its proper objects from a distance, it necessarily follows that sight by itself sees the distance, and the size is seen by sight itself when its appearance can be caught at a single glance. In cases where the object of sight is larger than what can be seen with one glance, vision also needs memory and reason. For then it sees the object only partially and not as a single whole; and thus it is necessary for sight to pass from one to another ... When the number of the objects is greater than three or four, such that cannot be seen at a single glance, and with respect to the movements and shapes of polygonal things, they cannot be grasped by sight alone but always with memory and reason ... The only function of the sense by itself is that which affects the sense in one impact; that which affects the sense through several impacts are not the functions of the sense alone but also of memory with reason as has been shown above. (Nemesius of Emesa, *De natura hominis* 7, 59.18–61.5)

Almost all the 58 theorems of Euclid's optics were based on the seven postulates given in **a**. Euclid's geometrical optics excluded all such aspects of the visual process that are not strictly reducible to geometry. However, one important assumption was made in the theory, namely, that there are visual streams or rays proceeding from the eye to the object. Ptolemy deviated from Euclid in postulating a continuous visual flux in the form of a cone, not discrete and numerable visual rays. Ptolemy complemented Euclid's theory by explaining

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that the quality of the object affects the visual cone, and the cone then affects the eyes; cf. the Stoics above in **5c**. For Euclid's and Ptolemy's theories, see Lindberg 1976; Cohen and Drabkin 1958, 257–258. For the optics of Claudius Ptolemy, see also Smith 1996.

Philoponus also discussed at some length the geometry of perception (e.g., *In De anima* 339.17–341.9) but denied the supposition of visual rays or streams. The geometry he applied was somewhat similar to that found in Euclid, but Philoponus talked about activities (*energeiai*) coming from the objects rather than rays or streams (*opseis*) emitted from the eyes. For Galen's discussion concerning the anatomy of the eye (**b**), see also *De usu partium*, book X. Galen's views of the brain, *pneuma* and nerves, particularly as systematised in later Galenism, strongly influenced the late ancient authors (such as Philoponus **c**; for the Galenic influence on Philoponus, see also Todd 1984; see pp. 106–107 for the *De anima* commentary). Plotinus also took it as a basic fact that the nerves start from the brain (*Enneads* IV.3.23, 1–9 quoted above in **8d**). He argued that the sensitive part of the brain is the medium through which reason operates. Therefore, he appropriated the Aristotelian vocabulary of the medium by dropping Aristotle's assumption according to which the external medium affects us (**4b**).

Nemesius of Emesa described visual perception as an active and complex process in which information from other cognitive capacities, such as memory and thought, are also used to create a more comprehensive visual field. Nemesius also stressed that our visual experience is of bodies, shapes, and distances, not just of colours, but this requires that memory and thought aid our sight (**d**). For a somewhat similar analysis, see also Strato of Lampsacus, fragment 111 in Wehrli 1950. For the co-operation of sight with memory and reason, see also Galen, *On the Doctrines of Hippocrates and Plato* VII.6.24 (460.26 in De Lacy); for ample notes on parallels for Nemesius' view, see the translation of his *De natura hominis* by Sharples and van der Eijk (2008, 107–108). As to the question of how distances are seen, Galen also proposed the influential view that we calculate the angle in which the visual rays emitted from our two eyes meet the object (*De usu partium* 10.12). The idea of the explanation is that we register the angle and calculate the distance almost automatically.

## 10 Sceptical Reactions to Perception

**a.** That what is evident is deemed by our opponents to be that which is grasped by itself and does not need anything else to attest to it. But nothing is of such a nature as to be grasped by itself, rather everything is grasped through an affection, which

is different from that which produces it and the object of appearance. For when I have received honey and become sweet, I estimate that the external substance of honey is sweet, and when I have warmed myself by the fire, I take my own condition as a mark that the external substance of fire is hot, and with the other sensible objects I make the same inference. Since that which is grasped through something else is agreed to be non-evident, and all things are grasped through our affections that are other than those things, all external things are non-evident and hence unknown to us. In order for the non-evident things to be known to us, something evident needs to be present, and if it is not present, the apprehension of the non-evident also disappears. Nor is it possible to say that even though, on the basis of the above argument, external things are non-evident, they will be grasped by us with certainty because the affections are secure signs. (Sextus Empiricus, *Adversus mathematicos* VII.364–367)

**b.** The affections are graspable. They [the Cyrenaics] affirm this but not those from which the affections come. (Cyrenaics reported by Diogenes Laertius, *Lives of Philosophers* II.92)

With respect to Sextus' argument (**a**), it is important to note that his conclusion is not that we cannot know anything about the external objects' qualities. He does not claim that it would be impossible that our senses give us information about qualities of external things themselves. Rather, his point is that we cannot assert with certainty whether or not they do. For his argument, see also *Adversus mathematicos* VII.354. Even though the Cyrenaic dictum (**b**) seems to imply some sort of perceptual scepticism or subjectivism, we do not know the context well enough to determine how we should understand the passage. This is because it is possible that the fragment is related to the Cyrenaics' ethical hedonism and is not a developed position concerning whether we can grasp anything external at all. For the interpretation that the passage entails epistemological subjectivism, see Tsouna (1998). For the claim that affections can be known but objects not, see also Sextus Empiricus, *Outlines of Pyrrhonism* I.215; Plutarch, *Adversus Colotem* 1120c–d.