

Aristotle's Perceptual Optimism

PAVEL GREGORIĆ
Institute of Philosophy, Zagreb, Croatia

In this paper, I would like to present Aristotle's attitude to sense-perception. I will refer to this attitude as "perceptual optimism". Perceptual optimism is, very briefly, the position that the senses give us full access to reality as it is. Perceptual optimism entails perceptual realism, the view that there is a reality out there which is accessible to our senses in some way or other, and the belief that our senses are veridical at least to some extent, but it is more comprehensive than that. For instance, a perceptual optimist does not admit such things as qualities which are perceptible in principle but not by us or bodies too small to be perceptible. In this paper I argue that Aristotle is a perceptual optimist, since he believes that reality, at least in the sublunary sphere, is indeed fully accessible to our senses. In the first and largest part of this paper, I will show, in seven distinct theses, what Aristotle's perceptual optimism entails. In the second and shorter part, I will put Aristotle's position in a wider context of his epistemology and show why it was important for him to be a perceptual optimist.

Keywords: Senses, direct realism, qualities, sensibles, veridicality, Democritus.

I.

I suppose it is uncontroversial that Aristotle's universe is a universe of substances and their attributes. It is equally uncontroversial that Aristotle's universe is divided in two rather different parts, the sublunary and the supralunary. Both parts of the universe are composed of material substances, that is bodies, and their attributes. However, the sublunary part is marked by all sorts of changes and transformations, which are maintained in everlasting order by the circular motions of celestial bodies and their immaterial unmoved movers. All bodies in

the sublunary world are made of elements, each element featuring a combination of two qualities: hot or cold, dry or moist.¹

So, all bodies that populate the sublunary world necessarily have a pair of these elementary qualities—some degree of hotness or coldness, some degree of dryness or moistness. Now, these elemental qualities are tactile qualities, that is qualities essentially picked up by the sense of touch. Aristotle says that tactile qualities are the distinctive characteristics of bodies *qua* bodies.

The distinctive characteristics of the body *qua* body, are tactile. By distinctive characteristics I mean those by which the elements are distinguished—hot and cold, dry and moist—and about which we spoke earlier in our discussions about the elements (*On the Soul* II.11, 423b27–29).²

So, the sense of touch puts us in contact with the most fundamental qualities, that is the qualities of the elements from which the whole sublunary world is built.³

More to the point, Aristotle thinks that human beings have especially refined sense of touch and he connects that with our intelligence.

In the other senses humans fall short of many other animals, but in regard to touch they achieve greater precision than the others. Hence the human being is the most intelligent of animals. (*On the Soul* II.9, 421a21–23)⁴

There is a complicated story in Aristotle about why humans have especially refined sense of touch and why it makes them the most intelligent of all animals (*phronimōtaton tōn zōiōn*). Suffice it to say that this has something to do with the heart, which is not only the central organ in Aristotle's theory, but also the proper sense organ of touch. Aristotle argues that the human heart is composed of flesh made from the finest mixture of elements, its hotness is well balanced by respiration through our large lungs and by the inherent coldness of our large brain, and also the central position of the heart inside an erect body of human beings relieves it of the pressure from the upper parts, so it can

¹ Fire is thus hot and dry, air is hot and moist, water is cold and moist, earth is cold and dry. The transformation of elements is effected by way of preserving one and replacing the other elementary quality, e.g., air turns into water when it replaces hotness with coldness while preserving moisture.

² All translations of Aristotle are mine. Apart from the Revised Oxford translation of Aristotle's Complete Works in Barnes (1984), I consulted three recent English translations of *De anima*, Shields (2016), Reeve (2017) and Miller (2018).

³ Apart from the two elementary qualitative ranges (hot-cold, dry-moist), Aristotle sometimes adds further qualitative ranges to the domain of tactile qualities, such as soft-hard, rough-smooth, light-heavy. Aristotle's understanding of sensible qualities stands in stark contrast with that of Democritus, who says: "For by convention sweet, by convention bitter, by convention hot, by convention cold, by convention color, but in reality atoms and void" (fr. B125 Diels-Kranz, Taylor's translation); see also fr. A37 quoted below in n. 20.

⁴ See also: *On the Sense* 4, 441a1–2: "...the sense of touch is most precise in comparison with all the other animals." *Parts of Animals* II.16, 660a12–13: "The human beings are the most perceptive of animals with respect to the tactile sense."

function optimally.⁵ In any case, Aristotle seems to believe that our exceedingly refined sense of touch guarantees that we get the elementary qualities right.

Of course, bodies may have further qualities which are related to the other senses as tactile properties are related to the sense of touch. Such properties Aristotle calls “special sensibles.” Special sensibles are properties which are perceived directly, or in themselves (*kath’ hauto*), and they are accessible to one special sense only, e.g., colours are accessible only to the sense of sight and sounds only to the sense of hearing. As such, special sensibles are properties with reference to which each special sense is *defined*, e.g., the sense of sight is essentially the ability to perceive colours.⁶ Whatever else is perceived by sight, it is perceived by way of, or in accompaniment of, colours that are being seen. To return to my main point, apart from the tactile qualities, most bodies have colours—or show colours of other bodies, in the case of transparent bodies—some of them have flavours, some emit smells and some produce sounds when struck. Equipped with the five senses—touch, taste, smell, hearing and sight—we can access all the aforementioned properties of bodies. I shall return to this point presently.

Another important thing about Aristotle’s theory of perception is his talk of “reception of form without matter,” of the sense becoming “like” its object, and of the “identity” between the sense and its object. Here are some representative passages:

That which can perceive <i.e. a sense> is in potentiality like that which can be perceived <i.e. sensible> is already in actuality, as it has been said. For the former is affected when it is not like the latter, but after it has been affected it has become like it and similar to it. (*On the Soul* II.5, 418a3–6)

We should assume, then, concerning all sense-perception that a sense is that which can receive perceptible forms without matter. (*On the Soul* II.12, 424a17–18)

Now, then, by way of summarizing the things which have been said concerning the soul, let us say again that the soul is in a sense all existing things; for what exists is either objects of perception or objects of thought; and knowledge <i.e. a fully actualized faculty of thought> in a way *is* the objects of knowledge, and perception <i.e. a fully actualized faculty of perception> in a way *is* the objects of perception. (*On the Soul* III.8, 431b20–28)

These and related passages have been widely discussed by scholars, some arguing that the eye becomes literally red when we see an apple (“literalism”), others arguing that there is no physical change that underlies an act of seeing an apple, at any rate not in the way Aristotelian matter underlies form (“spiritualism”), still others that neither of these

⁵ For the composition of the heart and the erect posture of human beings, see Aristotle’s *Parts of Animals* II.1, III.4 and IV.10, Gregoric (2007: 40–51) and Gregoric (2005).

⁶ In fact, there are two types of special sensibles of the sense of sight, colours and phosphorescent things, the former requiring light and the latter requiring darkness; cf. Gregoric (2018).

two positions is quite right.⁷ Without taking a definite position on this long and often very subtle debate, I think Aristotle's position is as follows. When we see an apple, our sense of sight takes on the red colour of the apple without taking on the apple's matter. It is not that our sense of sight takes on some sort of copy of the apple's red colour, some sort of representation or encoded information which then gets suitably interpreted. Rather, our sense of sight takes on the very property instantiated in the apple, the token of red colour that is in the apple, and likewise with the other senses and their special sensibles. I understand Aristotle's talk of "taking on the form without matter" and the sense becoming "like" the object, then, as a strong version of direct realism about the perception of special sensibles. On that point I side with a number of scholars who take Aristotle to be a direct realist, though this is not entirely uncontroversial.⁸

If the sense takes on the token quality out there, or to the extent that it does, the sense cannot go wrong about it. Indeed, Aristotle writes at several places in *On the Soul* and in other works, that the senses do not go wrong concerning their special sensibles.

"That which can be perceived" <i.e. a "sensible"> is spoken of in three ways: in two ways it is perceived in itself, and in one accidentally. Of the first two, one is special to an individual sense and the other common to them all. By "special" I mean that which cannot be perceived by another sense and concerning which there cannot be deception, as sight is of colour, hearing of sound, taste of flavour, whereas touch has several different qualities. But each sense discriminates concerning these qualities and is not deceived that there is colour nor that there is sound, but what or where is the colored object, or what and where is the object that emits sound. (*On the Soul* II.6, 418a8–16)

That is why the senses are deceived about these <viz. the common sensibles>, but are not deceived about the special sensibles, e.g. sight about colour or hearing about sound. (*On the Sense* 4, 442b8–10)

As for truth, to show that not everything that appears is true: first, perception, at least of the special sensible, is not false, though appearance is not the same thing as perception. (*Metaphysics* IV.5, 1010b1–3)

Although Aristotle does not quite say so, I take it that the senses are veridical concerning their respective special sensibles *because* there is a sort of identity between the senses and their objects in acts of perception.

⁷ For a thorough overview of the debate, with a detailed map of different positions, see Caston (2005).

⁸ See, e.g., Owens (1981), Burnyeat (1992), Broadie (1993). One source of controversy are the passages in which Aristotle describes the special sensible as a *logos* between the two extremes on a qualitative spectrum, on the one hand, and the sense as a *logos* and a "mean" affected by the sensibles, on the other hand. This allows for an interpretation according to which perception consists in the sense instantiating the same *logos* that the object instantiates with the special sensible. Though this is not quite the same as representationalism, it is not direct realism, either. For a defence of this sort of view, see Caston (2005: 299–315). See also Caston (1998) for his earlier challenge to the view that Aristotle was a direct realist, with an interesting response by Putnam (2000).

At one point, however, Aristotle says that the senses are subject to error *in the smallest degree* with regard to the special sensibles:

Perception of the special sensibles is true, or is subject to falsity in the smallest degree. Second, perception is of that to which the special sensibles accidentally belong; and already here it is possible to be mistaken. For there is no mistake in that it is white; but that the white is this or other, there is mistake. Third, perception is of the common sensibles which accompany the accidental sensibles to which the special sensibles belong (I mean, for instance, motion and magnitude); concerning these it is in fact especially possible to fall into error with respect to perception. (*On the Soul* III.3, 428b18–25)

The qualification in the first sentence most probably refers to abnormal circumstances, such as illness or fatigue, special condition of the sense organ, unusual state of the medium, large distance and other unfavourable conditions of perceiving. In normal circumstances, however, a sense gets its special objects right, and I take it that it gets them right because it is *in-formed* by them, for the sense takes on the very sensible form of the object.⁹

Let me now briefly pause to state the first three components of Aristotle's perceptual optimism.

First, all material substances necessarily have some properties that directly, in themselves, activate our senses. In other words, there are no material substances in the sublunary world which are fundamentally imperceptible, that is imperceptible because they do not have any special sensibles. I will call this the “universal perceptibility thesis.”¹⁰

Second, the perceptible properties that directly, in themselves, activate our senses—that is the special sensibles—are as real as the material substances to which they belong, and they are perceived because the special senses take them on and become identical with them in acts of perception. This is the “direct realism thesis”.

Third, because the senses take on special sensibles and become identical with them in acts of perception, there is no room for error, at least in normal circumstances. I propose to call this the “qualified perceptual veridicality thesis.”

I call this veridicality thesis “qualified” for two reasons. First, because Aristotle admits abnormal circumstances in which the senses can go wrong about their special sensibles. Second, because Aristotle recognized other types of sensible items, namely the common and the accidental sensibles, with regard to which the senses can and often do go wrong.

The common sensibles are properties such as shape, size, motion and number, which are perceived insofar as they accompany special sensibles, and they invariably do accompany special sensibles. We cannot perceive white without this white being of a certain shape and size,

⁹ Recent literature on the subject includes Johnstone (2015) and Koons (2018).

¹⁰ This thesis stands in stark contrast with the teaching of Democritus: “For by convention sweet, by convention bitter, by convention hot, by convention cold, by convention color, but in reality atoms and void” (fr. B125 Diels-Kranz). See also fr. A37 quoted below in n. 20.

in motion or at rest, one or many. They are called “common” because they are perceived by two or more special senses. There are different views as to how precisely the common sensibles are perceived, but everyone agrees that the senses need to be unified in some way or other in order to grasp the common sensibles.

Accidental sensibles are substances and their locations,¹¹ but presumably also classes and relations, possibly even facts. All such things are perceived insofar as a set of special and common sensibles accidentally happens to be this or that. Because a certain combination of colours of some shape and size happens to be Thomas, I perceive Thomas. There are various ways to understand this. Some scholars think that accidental perception is not perception at all, but a way of reporting perceptual events, some think that this is a sort of “association of ideas” which requires either a minimal conceptual apparatus or an involvement of non-rational capacities such as memory and imagination (*phantasia*), and still others construe it as a genuine sort of perception.¹²

In any case, I should like to emphasize that Aristotle is not a Protagorean relativist or an Epicurean who subscribes to the view that all perceptions are true.¹³ No, there is only one type of sensible items which we get right, according to Aristotle, namely the special sensibles, and we get them right only in normal conditions; that is why this is a *qualified* perceptual veridicality thesis. But it is a veridicality thesis nonetheless, at the very fundamental level.

Aristotle's perceptual optimism runs much deeper than these three theses. In *On the Soul* III.1, Aristotle raises the question why we have more than one special sense.

Could it be in order that the accompanying and common sensibles (e.g. motion, magnitude and number) may be less likely to escape our notice? For if there were only one sense—say, sight of white—the common sensibles would rather have escaped our notice and would seem to be the same because colour and magnitude always accompany one another. But in fact, since the common sensibles are found also in the other type of sensible <i.e. magnitude accompanies not only colours but also tangible properties>, this makes it clear that each of them is different. (*On the Soul* III.1, 425b5–11)

According to this passage, then, we have a plurality of senses in order to increase the accuracy of perception of the common sensibles, with respect to which perception is most likely to go wrong. The gist of Aristotle's argument seems to be the following. Every time we perceive a colour, we perceive a patch of some shape and size, it is either one or many, moving or resting. If we had only the sense of sight, the argument goes, there would be nothing to make us aware of the fact that

¹¹ See, e.g., Aristotle's examples in *On the Soul* II.6, 418a16–17, 20–23.

¹² The classic paper on accidental sensibles is Cashdollar (1973). A discussion of different positions on accidental perception, with extensive bibliography, can be found in Perälä (forthcoming).

¹³ See, e.g., Lee (2005: 133–180), Striker (1977) and Everson (1990).

colour is a different property from shape, size, number and motion. But, as things are, we have the sense of touch too, and every tangible quality that we feel also comes with some shape and size, one or many, moving or static. Because shape, size, number and motion accompany not only colours but also tangible qualities, we realize that they are in fact different properties from both colours and tangible qualities.

On the face of it, this is not a convincing argument. Why could not one realize that colours are different from shapes and sizes by noticing that colours of a certain shape and size can change while the shape and size remain the same, as when a chameleon turns from brown to green? Or by noticing that a certain shape and size change while the colour remains the same, as when one moulds a chunk of wax? Aristotle might respond to this that such cases would inform the perceiver that colours and shapes can vary independently of one another, but not that they are two independent *types* of properties. To understand that, the perceiver needs to have access to shapes as they accompany tangible qualities and realize that the shape which accompanies a colour of an object is the very same property that accompanies the tangible qualities of that object.¹⁴

Still, Aristotle's argument explains, at best, why we have two senses—touch and sight—not why we have all five of them. Indeed, the other three senses are not particularly good at perceiving the common sensibles, anyway. I mean, smell or taste hardly allow us to perceive much of the common sensibles. The real and more fundamental reason why we have five senses is, no doubt, to enable us to receive the five different types of special sensibles: colours, sounds, odours, flavours and tangible qualities. Aristotle does not say so in as many words, but this is clearly what follows from his teleological framework.¹⁵

Now, to understand the extent of Aristotle's perceptual optimism, it is important to observe that the five different types of special sensibles, for which we have five different senses, are *all* such properties that exist in the universe. That is to say, there are no further properties of this sort, some sixth type of special sensible which defines some sixth sense that we do not happen to be endowed with. This is what follows from Aristotle's argument against the existence of a sixth sense from the beginning of *On the Soul* III.1, 424b22–425a13.

This passage reveals two crucial things for my story. First, Aristotle is convinced that each sense is receptive of the *whole* range of qualities that fall under its province.

¹⁴ George Berkeley famously denied that the shape or size we see is in fact the same property as the shape or size we feel. For instance, in §127 of his *Essay towards a New Theory of Vision*, he wrote: "The extension, figures, and motions perceived by sight are specifically distinct from the ideas of touch called by the same names, nor is there any such thing as one idea or kind of idea common to both senses."

¹⁵ See, e.g., *On the Sense* 1, 436b10–437a17 and 5, 444b19–20, *History of Animals* IV.8.

As things are, we have perception of everything of which touch is the sense, for all tangible qualities are perceptible by us by means of the sense of touch. (*On the Soul* III.1, 424b24–25)

What Aristotle is saying here, I take it, is that there is no type of tangible quality such that it falls outside of the range to which our sense of touch is receptive. Admittedly, the same applies to the other senses, e.g. there is no shade of colour which is invisible to us. So, something like infrared or ultraviolet is out of the question for Aristotle. The sense of sight is sensitive to *all* colours there are.

Of course, this does not mean that animals or individuals within the same species do not differ in the sharpness of their sense of sight. Indeed, Aristotle thinks that people with blue eyes have better sight in the dark, whereas people with dark eyes have better sight in light.¹⁶ Moreover, some people can see farther than others and others have a higher resolving power at close distances.¹⁷ In all such cases, sharpness of sight has something to do with the constitution of the sensorium—that is the eye as the peripheral sense organ, the blood or *pneuma* as the internal medium of transmission, and the heart as the central sense organ.

Despite these variations across species and among individuals of the same species, however, none of the senses is fundamentally lacking by being restricted only to a part of the range of its corresponding special sensible. Rather, each sense is receptive of the *full range* of qualities that constitute its special sensible (and with reference to which each sense is defined and about which it does not go wrong in normal circumstances). Let us call this “the full-range receptivity thesis.”

The second thing that Aristotle's argument reveals is even more astonishing from a modern point of view. Aristotle maintains that there are no other than the five senses.¹⁸ His argument goes like this. If there were an extra sense, there would be an extra sense organ. But sense organs—or their crucial parts which are receptive of special sensibles—can only be made of simple bodies. There are only four simple bodies in the sublunary sphere: earth, fire, air and water. Now, earth either cannot serve as a sense organ, or else it enters the constitution of the sense-organs of the contact senses, touch and taste. Similarly, fire either cannot serve as a sense organ, or it is common to all the sense-organs, given that all sensitive beings are warm. This leaves us with air and water. Being transparent and thus receptive of colours (and easily ensconced), water is used up for the sense-organ of sight. Being conductive of sounds, air is used up for the sense organ of hearing, and either

¹⁶ *Generation of Animals* V.1, 779b12–780a25. See also *Generation of Animals* V.1, 780a25–36 and *Parts of Animals* II.13, 657a31–34 for the thinness of skin surrounding the eye contributing to the sharpness of sight.

¹⁷ *Generation of Animals* V.1, 780b14–781a13.

¹⁸ Aristotle's argument can be interpreted also modally, to the effect that there can be no other than the five senses; cf. Shields (2016: 255–257). This should be contrasted with Democritus' fr. A116 (Diels-Kranz): “Democritus says there are more senses <than the five>, for irrational animals, wise men and gods.”

water or air is used up for the sense organ of smell. So, given that there are no other simple bodies, there can be no other sense organs, and hence there can be no other senses.¹⁹ In Aristotle's own words:

Consequently, if there is no other <simple> body and no quality such that it does not belong to any of the <simple> bodies in this world, no sense would be left out. (*On the Soul* III.1, 425a11–13)

This is not a particularly convincing argument. If one simple body can serve as an organ of two senses, e.g. water as an organ of sight and hearing, why can it not serve as an organ of three or more senses? The prominent place of this argument in the treatise *On the Soul*, ushering in a new stage of Aristotle's account of the perceptual faculty of the soul at the beginning of Book III, suggests that he found it rather important. And we can see why it is important for Aristotle to rule out the possibility that there are senses beyond the familiar five ones: if another special sense existed, it would be defined with reference to its range of special sensibles of which we have no idea, and this would mean that bodies have properties which are fundamentally perceptible—but not by us. In other words, this would mean that there is a whole segment of reality to which we humans have no access. And if there were such a segment of reality, we would rightly question whether the rest of our knowledge of the world is correct. That is to say, if there were a segment of reality to which we have no access, that would mean that our inductions are seriously compromised, which in turn means that we may not have gotten all the universals, or that the universals we did get may be incomplete or ill-founded. Admitting the sheer possibility of an extra sense, then, would compromise Aristotelian science and make it vulnerable to sceptical objections.

Aristotle's perceptual optimism runs still deeper. In the following pages I would like to discuss two further component theses. Both of these additional theses are found in passages from Aristotle's less known work, the short treatise *On the Sense and the Sensibles* (*De sensu et sensibilibus*) from the collection *Parva naturalia*. In this treatise Aristotle raises various problems related to the senses and the special sensibles. One of the problems is whether there are invisible magnitudes.

This problem is mentioned for the first time in chapter 3 of *On the Sense*, where Aristotle discusses various theories of colours.

Hence, if it is not possible for a magnitude to be invisible, but rather every magnitude is visible from some distance, the superposition theory too might pass as a theory of mixture of colours. Indeed, on the juxtaposition theory too, there is nothing to prevent some combined colour from appearing to viewers at a distance. That there is no magnitude such as to be invisible has to be discussed later on. (*On the Sense* 3, 440a26–31)

It is clear from this passage that Aristotle thinks that there are no invisible magnitudes. He explicitly says that “every magnitude is vis-

¹⁹ See also *On the Sense* 5, 444b19–20.

ible from some distance". (For all practical purposes, we can replace his term "magnitude" here with the term "body".) One should be reminded that, according to Aristotle, a body is visible on account of colour—either its own or colour of other bodies seen through it, if the body is transparent. Of course, colours are always accompanied by some shape and size, they are either moving or at rest, but these common sensibles are not visible without colours.

The promise of a fuller discussion of this problem is met in Chapter 6 of *On the Sense*. There Aristotle frames the question explicitly with reference to all special sensibles. He wonders "if every body is infinitely divisible, are sensible qualities also infinitely divisible, for example, colour, flavour, smell, sound, heavy and light, hot and cold, hard and soft?" (445b3–6). Could Aristotle really mean to say, quite contrary to plain common sense, that there are no bodies so small as to escape being seen, heard, felt, etc.? Yes, he could, though his view is quite nuanced. Here is the whole passage:

Since, then, the properties must be spoken of as species, though continuity is always present in them, we must take into account that potentiality is different from actuality. And for this reason, when one sees a grain of millet, a ten-thousandth part of it escapes notice, even though sight traversed it, and the sound within a quarter-tone escapes notice even though one hears the entire melody which is continuous. It is the interval between the extremes which escapes notice. Likewise with very small parts in the case of other objects of perception, too. Namely, they are potentially visible, but not actually, as long as they are not separate. For a foot length is potentially present in a two-foot length, but actually only after it has been removed. It is reasonable to suppose that, when they are separated, such tiny increments would be dispersed into their surroundings, like a flavoured droplet poured into the sea. However that may be, since the increment of sense-perception is neither itself noticeable nor separable (for the increment is potentially present in the more precise sense-perception), it is not possible to perceive actually such a tiny object of perception, either. However, it remains perceptible nonetheless; namely, it is so potentially already, and actually when added <to a larger object that actualizes one's sense>. (*On the Sense* 6, 445b29–446a15)

This is a difficult passage, but my understanding of it, in a nutshell, is as follows. Aristotle argues that something can be too small to be *actually* visible—his example is a ten-thousandth part of a grain of millet—while remaining always *potentially* visible. And it remains potentially visible in two ways. First, it remains potentially visible *while* integrated with the whole grain, because we actually see the whole grain, not an aggregate of parts, though of course the grain is potentially divisible into parts, and when we actually divide the grain into parts, we then see these parts. Second, a ten-thousandth part of a grain of millet, if we somehow managed to separate it off from the whole—Aristotle seems to suggest—would remain only potentially visible, because it would be immediately "dispersed to its surroundings." I take Aristotle to be saying that such a tiny part would immediately merge with another body

in its surrounding, thus becoming only potentially visible in the first sense, as a part of this body with which it merged. Again, we would perceive the whole of this body, and only potentially its parts.

Thus, Aristotle accommodates the common-sense view that there are bodies too tiny to be actually seen, yet he prevents the inference that, therefore, there are bodies which are fundamentally invisible, that is bodies which are not characterized by colours. Of course, this is precisely what the ancient atomists advocated, namely that there are imperceptibly small bodies of different shapes, sizes and motions, but no colours, flavours or temperature.²⁰ Aristotle, by contrast, believed in the qualitative world from the smallest to the largest of scales.²¹

So, the sixth component of Aristotle's perceptual optimism is the thesis that there are no bodies fundamentally inaccessible to our senses.

The seventh and the last component of Aristotle's perceptual optimism that I wish to discuss is the thesis that there are no imperceptibly short intervals of time. Aristotle argues in support of this thesis in chapter 7 of *On the Sense*. This thesis is part of his reply to the problem of simultaneous perception. The question is whether two special sensibles can be perceived at the same time, which seems to be a problem for the individual senses, because Aristotle argued that only one thing can bring about one act of perception at one time. One possible way out of this problem is to propose that, in fact, we cannot perceive two special sensibles at the same time, but if the time between perceiving one and perceiving the other is too short to be perceptible, it will seem to us that we perceive two special sensibles at the same time. However, Aristotle does not like this solution precisely because he does not like the idea of imperceptibly short intervals of time.

Aristotle supplies two arguments against imperceptibly short intervals of time. Here is the first argument:

For if, when someone perceives himself or anything else in continuous time, it cannot at that time escape his notice that he exists; but if there is within the continuous time some part which is so short as to be entirely imperceptible, it is clear that at that time it would escape his notice that he himself exists, sees and perceives. (*On the Sense* 7, 448a26–30)

The gist of this argument is that, if there were imperceptibly short intervals of time, we would not perceive anything in such intervals,

²⁰ See, e.g., fr. A37 (Diels-Kranz), which comes from Aristotle's lost treatise *On Democritus*: "Democritus thinks that substances (viz. atoms) are so small as to elude our senses, but they have all sorts of forms and shapes and differences in size. So he is already enabled from them, as from elements, to create by aggregation bulks that are perceptible to sight and the other senses."

²¹ One might think that instruments such as the microscope and the telescope disprove Aristotle's thesis. However, they only redefine the threshold between actual and potential perceptibility, but do not eliminate it. Aristotle could point out that the bodies we see through a microscope or a telescope are coloured much like the bodies we see around us with the naked eye. So, far from undermining his sixth thesis, the instruments actually support it. Of course, the telescope would create problems for Aristotle on different grounds.

and hence we would not be aware of our own existence—we would not be conscious—in such intervals. However, our awareness of our own existence is continuous and uninterrupted, hence our perception is continuous and uninterrupted, therefore there are no imperceptibly short intervals. Of course, few of us today will find this argument convincing, not only because we know for certain that there in fact are intervals of time too short to be detected by our unaided senses, but also because few of us would be prepared to use the subjective diachronic unity of consciousness as a criterion of objective states of affairs in the world.

The second argument is perhaps less naive and certainly more elaborate.

Moreover, there would be neither a time in which he perceives nor a thing that he perceives, except perhaps in the sense that he sees in some part of the time or sees some part of the thing—if indeed there is any magnitude, either of time or of the thing, which is entirely imperceptible due to its smallness. For if he sees the whole line and perceives it in the corresponding continuous time, he does not see it by means of some part of it. Let CB, in which he does not perceive, be removed <from the whole interval AB>. Then perception of the remaining part of the interval <i.e. AC>, or of what is perceived in that part of the interval, is like perceiving the whole earth on account of perceiving this particular part of earth, or like walking the whole year on account of walking in this particular part of year. But in CB he perceives nothing. Therefore, because he perceives in some part of the whole interval AB <viz. in AC>, he is said to perceive in the whole interval and the whole corresponding thing. And the same holds also in the case of AC. For one always perceives in some part of the interval and some part of the corresponding object, whereas the whole can never be perceived. Therefore, all things are perceptible, though they do not appear as large as they are. (*On the Sense* 7, 448a30–b13)

This is a *reductio ad absurdum* argument which can be reformulated as follows. Take a perceptible interval of time AB. That interval is perceptible because in its duration we perceive some one object, say line XY. Now, take out an imperceptibly short segment of the interval AB, let us call it CB. In CB, then, we do not perceive anything. In other words, in CB we do not perceive any part of line XY. Well, then, what happens in the remaining interval of time, AC? Clearly, in AC we perceive some part of line XY, let us call it XZ. Of course, once we admitted an imperceptibly short segment of the whole interval AB, we must admit it also for interval AC. Removing the imperceptibly short segment of AC, in the remaining part of it we perceive only a part of XZ, and so on *ad infinitum*. What follows is that the whole line XY can never be perceived—if imperceptibly short intervals of time are admitted. Indeed, nothing can ever be perceived, since any perceptible interval of time can be divided into an imperceptible interval and the correspondingly shorter perceptible interval. Therefore, there are no imperceptibly short intervals of time.

The second argument will probably remind the reader of Zeno's paradoxes and Aristotle's solution to it. As is well-known, Aristotle tackled

the paradoxes by arguing that magnitudes (bodies, spatial extensions, temporal intervals) are infinitely divisible only in potentiality, not in actuality. However, it is important to note that Aristotle's denial of infinite divisibility is very different from that of the atomists. Atomists denied infinite divisibility because they thought there was a ground level at which magnitudes cannot be further divided, that is the level of atoms of matter, atoms of spatial extension, atoms of time.²² By contrast, Aristotle was a staunch continuist who thought that a magnitude cannot possibly be built from items that are not magnitudes. If something is a magnitude, Aristotle thought, in principle it is divisible. Atoms, being in principle indivisible, are not magnitudes. And you can never get a magnitude from items that are not magnitudes: a line is not a collection of points, a place is not a collection of indivisible locations, a time-interval is not a series of indivisible "nows", and likewise a body is not an aggregate of uncuttable atoms. Similarly, a perceptible interval—that is a period of time in which we perceive something—does not consist of imperceptibly short intervals. This is the seventh and the last thesis that I propose to identify as constitutive of Aristotle's perceptual optimism.

Observe that the case of imperceptibly short intervals of time is parallel to the case of imperceptibly small bodies. Aristotle would happily concede that in any given interval of time there are segments that are only potentially perceptible, just as in any given body there are parts that are only potentially perceptible, but he would deny that any segment or part is so small as to be fundamentally imperceptible. In fact, the sixth and the seventh thesis go together. There are no fundamentally imperceptible intervals of time *because* there are no fundamentally imperceptible bodies. For, if there were actual imperceptibly short intervals of time, there would have to be actual imperceptibly small parts of bodies that are grasped in such intervals. However, since there are no imperceptibly small bodies in actuality, there cannot be imperceptibly short intervals of time in actuality, either.²³

To summarize, I have identified seven theses that constitute Aristotle's perceptual optimism:

1. Universal perceptibility—all bodies have some special sensibles and are hence fundamentally perceptible.
2. Direct realism—special sensibles are real and the senses become "like" them.
3. Qualified perceptual veridicality—in normal circumstances the senses do not go wrong about their special sensibles.
4. Full-range receptivity—the senses are receptive of the whole spectrum or range of qualities that constitute their special sensible.

²² This is certainly true for Epicurus, whereas it is an open question whether the earlier atomists argued for atomism of space and time.

²³ Not just the last two theses, but every single one of the seven identified theses constitutive of Aristotle's perceptual optimism seems to go against the teaching of ancient atomists.

5. No sixth sense—there are no extra senses and hence no extra ranges of qualities that would constitute their special sensibles.
6. No bodies fundamentally inaccessible to our senses—there are no bodies, regardless of their size, such that we cannot perceive them at least potentially.
7. No imperceptibly short intervals of time—there are no intervals of time, regardless of their length, such that nothing can be perceived in their duration.

I hope to have shown that Aristotle believed the universe, or at any rate its sublunary sphere, to be fully accessible to our senses. There are no scales, no unknown qualities, and no unknown ranges of otherwise familiar qualities, that are inaccessible to our senses. The qualities that exist and that are open to us, are knowable for what they are. In normal conditions we get them exactly as they are. Because we get these qualities right, we have a solid basis for perceiving correctly other types of properties too, although that may require some honing of our senses. That is to say, we can and naturally do improve our perception of the common sensibles as we become more experienced perceivers, and I suppose the same goes for the accidental sensibles. And because our perception is fundamentally veridical, Aristotle can rest assured that our knowledge based on perception is sufficiently well-founded.

II.

Aristotle's perceptual optimism is part of his general cognitive optimism: Aristotle believes that human beings can, in principle, know everything there is to be known in the universe. This is the view he shared with Plato, who divided the universe into the world of changing material objects that we perceive and the world of unchanging immaterial objects, called "forms" or "ideas", that we grasp by thinking. Aristotle diverged from Plato as to how material objects and forms are related and also how perception and thought are related. Very briefly, for Aristotle forms are the internal causes of material objects, not separately existing objects; and thinking is *founded* on perception, not something best performed *independently* from perception, as Plato had argued. According to Aristotle, if we perceive a sufficient number of objects and facts in a certain domain, if we remember them in an organized way, and if we then start to inquire about the causes of these objects and facts, we will naturally come to have an intellectual grasp of the relevant forms and of the explanatory relations among them, and that is precisely what it means to think (*noein*) in the primary sense of that verb. So, to grasp forms it is not that we must emancipate ourselves from the senses, recollect and engage in rigorous dialectical reasoning, as Plato had taught, but, on the contrary, we must first and foremost engage in extensive and systematic use of our senses.

If we fail to use the senses to acquire relevant data, not only does the move from the perception of particulars to the grasp of universals,

essences and explanatory relations among them become deeply problematic, but also an understanding of the universals, essences and explanatory relations among them is undermined. This is how Aristotle puts it:

It is evident also that if some perception is wanting, some knowledge must also be wanting—knowledge which it is impossible to get if we learn either by induction or by demonstration, if demonstration depends on universals and induction on particulars, if it is impossible to study universals except through induction (...) and if it is impossible to make an induction without having perception, for particulars are grasped by perception. It is not possible to get knowledge of these items—neither from universals without induction nor through induction without perception. (*Posterior Analytics* I.18, 81a38–b9)

Similar empiricist statements can be found in several other places in Aristotle's works, most famously in *Posterior Analytics* II.19 and *Metaphysics* I.1. Despite such statements, however, it would be a mistake to call Aristotle an empiricist, since he agrees with Plato that there can be no scientific knowledge without grasping forms, and grasping forms is the task of a special and entirely independent cognitive capacity called "intellect" (*nous*), which requires development and which is, when fully developed, infallible.²⁴ It is important to point this out, because Aristotle is far from thinking that scientific knowledge (*epistēmē*) is reliable simply because and insofar as the senses supply correct data. Reliability of scientific knowledge is based, according to Aristotle, on the infallibility of the intellect at least as much as on the veridicality of the senses for supplying correct data. So, even though scientific knowledge can never be reduced to the correct use of the senses, the senses nonetheless have to be veridical for scientific knowledge to obtain. To quote one of the leading contemporary interpreters of Aristotle:

Any truths that mortal minds may contemplate are obtained, directly or indirectly, by way of the five senses; and it is highly plausible (to say no more) to suppose that the objects of the mind's contemplation will be true only if the perceptual reports from which they were somehow obtained are also true. Thus rational creatures like us cannot achieve the good unless their senses are veridical. But nature does nothing in vain. Hence the senses are veridical. (Barnes 1987/2014: 608)

This is a statement of general cognitive optimism of the distinctly Aristotelian variety. Plato was also a cognitive optimist, as I have pointed out, but his cognitive optimism was based solely on the intellect, that is on recollection and dialectic in emancipation from the senses, whereas Aristotle's cognitive optimism was based to a large extent also on the senses.

If all our knowledge is ultimately founded on the senses, as Aristotle thought, the senses had better be veridical, at least at some fundamental level. The belief in veridicality of the senses, supported by direct realism and universal perceptibility, is the cornerstone of Aris-

²⁴ For a fuller presentation of Aristotle's position, see Frede (1996).

totle's perceptual optimism. However, even with these first three theses granted, knowledge would still be on shaky foundation, (i) if there were some qualities inaccessible to us but accessible to living beings endowed with extra senses, (ii) if familiar qualities had parts of their ranges inaccessible to our senses, (iii) if there were bodies in principle bereft of qualities that directly stimulate our senses, or (iv) if there were imperceptible periods of time, that is periods of time in which things can be or happen in ways that are inaccessible to us. To exclude these possibilities, and thus to give perception as solid grounding as possible, these additional four theses were needed. So, Aristotle was quite an optimist regarding perception in order to provide as secure foundation for scientific knowledge as possible, while at the same time avoiding the extreme view of the relativists and the Epicureans who claimed that all perceptions are true.

The preceding discussion allows us to conclude that Aristotle's perceptual optimism was a reaction to two varieties of perceptual pessimism, Democritus' and Plato's. Democritus argued that the ultimate constituents of reality are corporeal (atoms) and that we have only indirect access to them, through reason. This puts a great strain on Democritus' theory of knowledge, of which he seems to have been acutely aware, and which made him something of a cognitive pessimist.²⁵ Plato, by contrast, taught that the ultimate constituents of reality are incorporeal and ontologically independent of bodies (forms), and he argued that we have direct access to them, through intellect, which made him a cognitive optimist. Aristotle embraced Plato's cognitive optimism, but rejected his perceptual pessimism. This had something to do with the fact that Aristotle agreed with Plato that the ultimate constituents of reality are incorporeal forms, but he disagreed that forms are independent of bodies. If forms are found in bodies, as the organizing principle that determines the shape and behaviour of bodies, forms cannot be discovered and understood except through perception. However, Aristotle readily admits that perception itself is not sufficient for this task. One needs to have intellect, too.²⁶

²⁵ There are various takes on Democritus' epistemology, as one can see from an informative overview in Lee 2005: 188 n. 31, but my claim finds support in several fragments from Diels-Kranz: "In reality we know nothing, for truth is in the depths" (B117); "By this principle man must know that he is removed from reality" (B6); "Yet it will be clear that to know what kind of thing each thing is in reality is impossible" (B7); "That in reality we do not know what kind of thing each thing is or is not has been shown many times" (B8); "The argument too shows that in reality we know nothing about anything, but each person's opinion is something which flows in" (B9).

²⁶ Earlier versions of this text were presented as a paper at the conference "Experience and Reasoning in Scientific Methodology: Between Antiquity and the Early Modern Period" in Prague (9–11 May 2019) and as an invited lecture at the University of Oslo (13 June 2019). I am grateful to the audiences at both events, especially to Matyaš Havrda and Robert Roreitner in Prague and to Thomas K. Johansen and Franco Trivigno in Oslo, for their incisive comments and encouragement. I owe thanks also to Filip Grgić, Istvan Bodnar, Klaus Corcilius, Stephan Herzberg and Arnold Brooks, whose remarks helped me clarify certain

References

- Barnes, J. (ed.). 1984. *The Complete Works of Aristotle. The Revised Oxford Translation*, 2 vols. Princeton: Princeton University Press.
- _____, 1987. "An Aristotelian way with scepticism." In M. Matthen (ed.). *Aristotle Today. Essays on Aristotle's Ideal of Science*. Edmonton: Academic Printing and Publishing: 51–65; reprinted in *Proof, Knowledge, and Scepticism*. Oxford: Oxford University Press, 2014: 602–616.
- Broadie, S. 1993. "Aristotle's Perceptual Realism." *Southern Journal of Philosophy* 31: 137–159.
- Burnyeat, M. F. 1992. "Is An Aristotelian Philosophy of Mind Still Credible? A Draft." In M. Nussbaum and A. Oksenberg Rorty (eds.). *Essays on Aristotle's De Anima*. Oxford: Clarendon Press: 15–26.
- Cashdollar, S. 1973. "Aristotle's Account of Incidental Perception." *Phronesis* 18: 156–175.
- Caston, V. 1998. "Aristotle and the Problem of Intentionality." *Philosophy and Phenomenological Research* 58: 249–298.
- _____, 2005. "The spirit and the letter: Aristotle on perception." In R. Salles (ed.). *Metaphysics, soul and ethics in ancient thought: Themes from the work of Richard Sorabji*. Oxford: Clarendon Press: 245–320.
- Diels, H. and Kranz, W. (eds.). 1959. *Die Fragmente der Vorsokratiker. Zweiter Band*. 9th ed. Berlin: Weidmann.
- Everson, S. 1990. "Epicurus on the truth of the senses." In S. Everson (ed.). *Companions to ancient thought 1: Epistemology*. Cambridge: Cambridge University Press: 161–183.
- Frede, M. 1996. "Aristotle's Rationalism." In M. Frede and G. Strike (eds.). *Rationality in Greek Thought*. Oxford: Clarendon Press: 157–173.
- Gregoric, P. 2005. "Plato's and Aristotle's Explanation of Human Posture." *Rhizai* 2: 183–196.
- _____, 2007. *Aristotle on the Common Sense*. Oxford: Oxford University Press.
- _____, 2018. "Aristotle's Transparency: Comments on Katerina Ierodiakonou, 'Aristotle and Alexander of Aphrodisias on Colour.'" In B. Bydén and F. Radovic (eds.). *The Parva naturalia in Greek, Arabic and Latin Aristotelianism*. Zurich: Springer: 91–98.
- Johnstone, M. A. 2015. "Aristotle and Alexander on Perceptual Error." *Phronesis* 60: 310–338
- Koons, B. 2018. "Aristotle's Infallible Perception," *Apeiron* 2018 (ahead of print).
- Lee, M.-K. 2005. *Epistemology after Protagoras: Responses to Relativism in Plato, Aristotle, and Democritus*. Oxford: Clarendon Press.
- Miller, F. D., Jr. 2018. *Aristotle: On the Soul and Other Psychological Writings*. Oxford: Oxford University Press.
- Owens, J. 1981. "Aristotelian Soul as Cognitive of Sensibles, Intelligibles, and Self." In J. R. Catan (ed.). *The Collected Papers of Joseph Owens*. Albany: State University of New York Press: 81–98.

points and avoid some errors, and to two anonymous referees who made helpful suggestions. This work has been fully supported by Croatian Science Foundation under the project IP-2018-01-4966.

- Perälä, M. Forthcoming. "Aristotle on Incidental Perception." In C. Thomsen Thörnqvist and J. Toivanen (eds.). *Sense-perception in the Aristotelian Tradition*. Leiden: Brill.
- Putnam, H. 2000. "Aristotle's Mind and the Contemporary Mind." In D. Sfondoni-Mentzou (ed.). *Aristotle and Contemporary Science*. Vol. 1. New York: Peter Lang: 7–28.
- Reeve, C. D. C. 2017. *Aristotle: De Anima*. Indianapolis–Cambridge: Hackett.
- Shields, C. 2016. *Aristotle: De Anima*. Oxford: Oxford University Press.
- Striker, G. 1977. "Epicurus on the Truth of Sense Impressions." *Archiv für Geschichte der Philosophie* 59: 125–142; reprinted in *Essays on Hellenistic Epistemology and Ethics*. Cambridge: Cambridge University Press, 1996: 77–91.
- Taylor, C. C. W. 1999. *The Atomists: Leucippus and Democritus*. Toronto: University of Toronto Press.