3 Aristotle on the Appearance of Colour and Other Perceptibles

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For at least a century, philosophers have introduced questions about consciousness, and more generally the mind-body problem, by appealing to the "felt" quality of mental states, a notion that is supposed to be immediate and intuitive, but turns out to be exceedingly difficult to articulate more precisely. Philosophers sometimes speak of "qualia" or "raw feels", even if only to argue that there are no such things; more frequently they just wave their hands by referring to "what it's like" to have a certain kind of experience.[1] But without such notions, we could not even begin to frame the so-called "hard problem of consciousness", the problem of how this aspect of consciousness can be accounted for within a naturalistic approach to the mind. At the same time, it should be clear that the notion itself is of interest in its own right, which is my concern here. To avoid building in any particular commitment one way or the other from the start, I will speak simply about *the way* in which the perceptible qualities of objects *appear* to us in perceptual experience or about their *appearances* for short. Accordingly, I will take "the phenomenal character" of an experience to refer to how perceptible qualities appear in that experience, whatever one's analysis. The question all theories face, then, is what are appearances more exactly?

If one asks what Greek philosophers had to say about this supposedly obvious feature of experience, though, a responsible answer is surprisingly elusive. They have much to say, of course, about the perceptible qualities of objects and how we perceive them, as well as how they might be perceived differently by different perceivers or on different occasions – one need only consider Protagoras or Gorgias or Democritus to realise that Greek philosophers engaged with these issues from early on.[2] On the other hand, discussions of the phenomenal character of experience *as such*, as a concern in its own right, are exceedingly thin on the ground, even when philosophers focus explicitly on the gulf between appearance and reality in epistemological contexts, as in ancient scepticism; answers to our question are still largely a matter of inference and interpretation.[3] Explicit textual evidence is so scarce, in fact, that it even led one scholar to declare the mind-body problem was not

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something the Greeks could even recognise.[4] Such a conclusion is of course hyperbolic. But it points to a real difficulty in the evidence.

Some scholars are more sanguine. They regard Aristotle's response to earlier philosophers in *De anima* 3.2 and *Metaphysics* 4.5 as directly concerned with the subjective character of experience. They argue that Aristotle takes colours and other perceptible qualities to exist fully only in perceivers while being perceived, much like the "Secret Doctrine" that Socrates attributes to Protagoras in Plato's *Theaetetus* (152c10, 155d10–11, 156a3). I argued in an earlier paper, "Aristotle on the Reality of Colours and Other Perceptible Qualities" (2018), that this is a mistake. Aristotle consistently rejects Protagoreanism on systematic grounds. He maintains instead that perceptible qualities are real, independent features of external objects. In his terminology, they are "first actualities", in virtue of which objects have the power to produce perceptions, whether or not they are currently exercising those powers. He does not regard them as mere dispositions, but as qualities that objects fully possess already, independent of their appearing to any perceiver. Aristotle is, therefore, a realist about perceptible qualities. But not a naïve one. Not everything about perceptible qualities is revealed in perceptual experience, as some of our contemporaries think.[5] In Aristotle's view, the essence of perceptible qualities – specifically, their formal and material characteristics – is a subject for further scientific investigation.

Although mistaken about the reality of perceptible qualities, the rival interpretation does raise an important question regarding their *appearance*, at least indirectly. Grant, as I have claimed, that perceptible qualities are best understood as first actualities on Aristotle's view. What can be said about their *second* actuality, the activity that they exercise in so far as they are perceptible? Since they are causal powers to produce a perception of themselves, their activity as perceptible qualities consists in their *being perceived as* those qualities.[6] This, I will argue, provides the key to the appearance of perceptible qualities and the quality of experience itself. Because Aristotle regards the activity of perceptible qualities as "one and the same" as the activity of perceiving them, it affects how he understands the phenomenal character of experience. But it differs significantly from the subjectivism of his predecessors, in so far as it is grounded in a realist conception of perceptible qualities.

This chapter on the appearance of perceptible qualities is thus meant to form a diptych with my earlier paper on their reality and should be understood together with it. I will begin by recapitulating briefly the main conclusions argued for there, since it provides the basis for the present discussion (Section 3.1), before turning to perceptual experience as such (Sections 3.2 and 3.3) and the way perceptible qualities appear to us, in both veridical and nonveridical experiences (Section 3.4). Lastly, I will consider a range of possible counterexamples to my interpretation and suggest how Aristotle might have responded (Section 3.5).

3.1 Is Aristotle a Subjectivist about Perceptible Qualities?

It is useful to begin with the subjectivist interpretation of Aristotle, since a close examination of the textual evidence not only shows where it goes wrong but also serves as a framework for the positive interpretation I shall offer.

Aristotle categorises perceptibles (*aisthêta*) and perception (*aisthêsis*) as "relatives" (*ta pros ti*)[7]: what each is essentially must be specified by reference to something else (*touth' hoper estin heterôn legetai*) that corresponds to it (*pros antistrephonta*).[8] He continues to regard them this way, moreover, even as he introduces important qualifications, due to their causal relationship. When a perceptible quality comes into contact with a sense in the right way, it results in that quality being perceived by the perceiver. Aristotle analyses this in *De anima* 3.2 in terms of their being simultaneously in activity: their activities necessarily last and cease contemporaneously (*anankê hama phtheiresthai kai sôizesthai*, 426a17; *hama ginetai*, cf. 425b31).[9] Still, more strongly, he argues that

i. their activity is "one and the same" (*hê autê men esti kai mia*)

even though what it is to be each is not the same (*to d' einai ou to auto autais*, 425b25–27, cf. 426a15–16); and that

ii. this activity takes place *in* the perceiver (*en tôi aisthêtikôi*, 426a11, cf. a4)

since the latter is what undergoes the change (*en tôi poioumenôi*, 426a2–3; *en tôi paschonti*, a5, a10). None of this, it is important to note, is peculiar to perception or cognition. It is supposed to follow from his more general account of agent-patient interaction in *Physics* 3.3, which he alludes to throughout (426a2–11). Aristotle then draws a pivotal conclusion, arguing that his analysis pinpoints where his predecessors were right and were wrong:

> Since the activity of what can perceive and the activity of what is perceptible are one, though their being is different, it necessarily follows that hearing and sound, when spoken of in this way, cease to be and persist contemporaneously, as do flavour and taste, and the rest similarly. But this is not necessary when they are spoken of as powers. Earlier naturalistic philosophers did not address this issue well when they held that nothing is white or black without sight or is a flavour without taste. They spoke correctly in one way, but incorrectly in another. For perception and the perceptible are spoken of in two ways, in some cases as a power [*kata dunamin*] and in others as an activity [*kat' energeian*]; and while their statement holds for the latter, it does not hold for the former. But they were speaking without qualification about things that are not spoken of without qualification.[10]

Much here is contested. But the following should not be. The terms "perception" and "perceptible" are ambiguous and can be used to indicate either (*a*) the power to perceive and to be perceived, respectively, or (*b*) their corresponding activities (426a7–9, a23–24). His predecessors were right to say that the *activity* of perceptible qualities does not exist independently of perception – for how could they be perceived if there is no perception of them? But they were wrong to think that these qualities could not exist *as powers* when they were not being perceived. As powers, perceptible qualities can exist independently of being perceived and even of perceivers altogether.

This is Aristotle's stated position elsewhere too. Although relatives generally "correlate with respect to existential entailment" (*antistrephei kata tên tou einai akolouthêsin*), this is not the case with causal relatives, where the agent is prior.[11] In keeping with this, he maintains that perceptible qualities, which have the power to produce perception in perceivers, can exist even if perceivers do not, a position for which he provides additional arguments.[12] Nor should this be surprising. Aristotle argues at length in *Metaphysics* 9.3 against certain unnamed Megarian philosophers that powers in general can exist even when they are not being exercised, including the powers of perceptible qualities to be perceived. Indeed, in his view one of the unacceptable consequences of the Megarian position is precisely that perceptible qualities would not exist whenever they were not being perceived, which he refers to as "Protagoras' thesis" (*ton Prôtagorou logon*), something he takes to be manifestly false.[13]

All of this should be common ground among interpreters. But it still leaves a question unanswered. Grant Aristotle's claim that the words for perceptible qualities are ambiguous and that his predecessors were right if these words are taken in one way, but wrong if taken in another. How would he answer our question about *realism*? It doesn't help to repeat that perceptible qualities are independent of perception when understood as powers, but not when understood as activities. Which of these senses is *more fundamental* for Aristotle? Even if we recognise both senses, they are not on a par for him, where a choice between them might be based solely on context or pragmatic concerns. Does Aristotle conceive of perceptible qualities primarily as a power or an activity?

Most scholars who have commented on the passage in the last 50 years have assumed that perceptible qualities, in the full and actual sense, should be identified with the activity (*energeia*) – a position one might be more easily tempted by if one translates *energeia* as "actuality", much like *entelecheia*, rather than as "activity" – and concluded that Aristotle either rejects realism outright or rejects naïve forms of it in favour of a more "subtle" realism.[14] On such a view, colour and other perceptible qualities are *subjective*: they exist in a genuine or full sense only while being perceived, and indeed exist in this way only in perceivers, even if the causal basis for this activity can exist apart from perception.

Such a result would be surprising, though, since it would effectively take Aristotle to accept something like the "Secret Doctrine" ascribed to Protagoras in the *Theaetetus*, which explicitly says that *there is no colour* such as white

except during perception. When a perceptible object and a sense come into contact with one another, for example, a plank of wood and an eye, their interaction "fills" the eye with seeing and the plank with the colour white: it is only through their "intercourse" that the plank "together [with the eye] gives birth to the colour" (*sungennêsan to chrôma*) – only at the point does the plank *become* white (*egeneto … leukon*).[15] So even though the object and the sense can exist apart from the perceptual encounter, the perceptible quality cannot exist apart any more than the perceiving can: both come into being only in that encounter. Such a view might seem moderate in one way because it grants that objects *can* exist independently of being perceived and that they are part of the causal basis for perception. It thereby avoids the Megarian view that powers exist only while being exercised since the "Secret Doctrine" takes the causal power to exist prior to and independent of that encounter. But it is still a form of Protagoreanism, at least as regards perceptible qualities. For in their case it not only entails the Measure Doctrine for perceptible qualities.

(P): Whenever things appear a certain way to some subject *S*, they *are* so but its converse as well,

($\bar{\text{P}}$): Things *are* a certain way *only when* they *appear* so to some subject *S*.

Objects are coloured, flavoured, and so on *only while* being perceived, even if they independently have the power to be perceived. Such a view is plainly antirealist: reality *cannot outstrip experience*, at least with regard to the perceptible qualities, since they cannot exist unperceived. So while it may not be as radical as some forms of Protagoreanism, this sort of Moderate Protagoreanism is radical enough.

Some have explicitly taken this passage to express essentially the same view as the passage from *De anima* 3.2 quoted above, or at any rate a polite version of it, in so far as it still permits one to say that perceptible qualities *do* exist in a way, prior to and independent of being perceived.[16] But they still would not exist in a full and genuine sense outside of the perceptual encounter, and this is importantly different from the way in which such qualities would exist apart, namely, as the mere disposition to cause such experiences. Indeed, on this reading Aristotle goes a step further than the "Secret Doctrine", since he insists that the activity of the perceptible quality occurs *in* the perceiver (*en tôi aisthêtikôi, DA* 3.2, 426a11), rather than "between" the subject and the object, as the "Secret Doctrine" claims (*metaxu ti, Tht.* 154A1–2). Colour and other perceptible qualities would then exist for Aristotle *only in the mind of the perceiver*. So understood, he would be both a subjectivist and an antirealist about perceptible qualities in the strict sense.

A more attractive alternative, I would suggest, is to take "perceptible" in the sense of a power to be more fundamental in our passage from *De anima* 3.2, just as Aristotle regards vision and the other senses, and indeed the soul

itself in *De anima* 2.1. Vision is something animals genuinely and fully possess even when it is not being exercised, and Aristotle appeals to this fact to argue that the soul should be understood analogously, as a power, on the grounds that the whole should be understood in the same way as its part (412b18–413a3). Each is a "first actuality" (*entelecheia hê prôtê*), as powers we *actually* possess, even when they are not in activity (412a22–28, b5).[17] Nor are they "merely potential": according to Aristotle, this is what vision and the soul *are* (*ti esti*, 412b10), even if their definitions specify this by reference to their corresponding activities (*proterai … kata ton logon*, 2.4, 415a16–20). In our passage from *De anima* 3.2, moreover, Aristotle insists that perceptibles should be treated symmetrically in this regard (426a7–9, a23–24). So, since we genuinely have vision even when we are not using it, on his view objects will be genuinely coloured even when they are in the dark or simply not seen by anyone. Both perception and perceptibles should equally be understood as first actualities, and as such each can occur without the other. Of course, perceptible qualities won't *be perceived* without a perception of them, and so if there were no perceivers, they never would be. But that doesn't prevent there *being* perceptible qualities, if they are simply first actualities.[18] On this reading, *De anima* 3.2 is fully in line with the passages from the *Categories* and the *Metaphysics*, which hold that these qualities can exist, in a full and genuine sense, independently of being perceived.

In fact, the case is stronger still. The argument above holds for anything in so far as it is specified by reference to perception or some form of it – that is, in so far as it is perceptible, visible, audible, tangible, and so on – and so as relative to the corresponding form of perception. But that is not where Aristotle leaves matters. He argues that because these are causal relatives, they are *not* "simultaneous" or coordinate in nature (*hama têi phusei*). On the contrary, the perceptible quality is prior because it is the agent that brings about perceptual activity and so is "responsible for its being" (*aition tou einai*); and because it is prior, it can exist apart from perception – it does not entail perception's existence.[19] It should not be surprising, then, that Aristotle distinguishes this relational characteristic from the quality that plays that role: what it is to be visible, he points out, is *not* the same as what it is to be a colour.[20] This is not merely because colour is not coextensive with the visible.[21] It is because vision is not even mentioned in colour's definition, the specification of its essence:

> Colour is what is on the outside of things that are intrinsically visible, though it is intrinsically [visible] *not* by definition [*ou tôi logôi*], but because [colour] has within it what is responsible for its being visible [*to aition tou einai horaton*]. Every colour is able to effect change in what is actually transparent, and this is its nature [*phusis*].[22]

Colour on Aristotle's view is thus definitionally prior to vision – vision's definition makes reference to it (2.6, 418a25), but not *vice versa* – even though

colour is intrinsically and necessarily visible. He is therefore in a position to explain why colour is visible without circularity[23]: it possesses "within itself" (*en heautôi*) the ground responsible (*aition*) for being visible to perceivers.[24] And in fact, Aristotle specifies the formal and material nature of colours in the *De sensu* independently of vision: each colour consists in a ratio of light and dark, as a result of the mixture of earth and transparent material in the coloured body, where the colour of each body is determined by the mixture of underlying bodies.[25] He thus rejects a "simple view" of colour or primitivism,[26] or equally any view that holds colour can be exhaustively characterized as the mere disposition to produce an experience of a certain kind. On Aristotle's view, we can learn more about the formal and material nature of colour, which explains why it affects the medium as it does, through scientific investigation. An analogous story should hold generally for qualities like tones, odours, flavours, heat, and moisture, which are perceptible yet need not be specified relative to the senses (unlike characterisations of them as visible, audible, tangible, and so on).

The activity discussed in *De anima* 3.2 is not the perceptible quality itself, but what the perceptible quality *does* when it acts as a perceptible quality, in virtue of its nature. Aristotle states explicitly that "the activity *of the colour*" (*hê tou chrômatos*), for which there is no Greek term, is comparable to actively seeing (*horasis*, 426a13–14). This shows that the word 'colour' itself refers to the first actuality, parallel to sight (*opsis*), not the second actuality, which is its activity (*energeia*). The quality itself – the colour, fragrance, flavour, and so on – is a power, a causal power to affect a medium and thereby a perceiver in such a way as to get the perceiver to perceive it as the quality it is; and it exists in the external object even when that power is not being exercised and hence when the quality is not being perceived. But it is not a mere disposition to produce a conscious state with a specific phenomenal character. Rather it is a quality whose nature consists in a certain formal structure and material constitution, which is intrinsically able to produce an effect on the medium and thereby on the sense organ.[27] That is the realism of Aristotle's theory of perception. It recognises perceptible qualities as genuine, real properties of external objects, which figure essentially in causal explanations of perception, without reducing them to something else.[28]

3.2 Public Objects, Personal Experiences

But even if we accept this realist interpretation, it still leaves us with an important question. What does Aristotle think about the *second* actuality of perceptible qualities, that is, the activity of colours, sounds, fragrances, flavours, heat, and moisture, in so far as they are perceptible? In one sense, of course, we already know. It is their *being perceived*, their being seen, heard, smelled, tasted, or felt. We also know that Aristotle takes this activity to be "one and the same" as the perceiver's perceiving them, even though they

differ "in being". Is it possible to say more about how he conceives of this joint activity? In particular, does it show how colour and other perceptible qualities *appear* when a perceiver perceives them – does it reveal how he thinks of the phenomenal character of the resulting experience?

In so far as this activity is perceptual, it surely involves a kind of awareness. One might worry, though, that Aristotle's primary emphasis here is on the intentionality of perception and how this is structured. To claim that perceiving a perceptible quality is "one and the same" as that quality's being perceived is to deny that perception is purely an activity of the perceiver alone – rather it involves both the subject and the object. It is not a relation, moreover, that can hold between just any perceiver and any perceptible object, but only in those cases where a certain kind of causal interaction is taking place, where the quality perceived is acting on the subject to produce that perception. It is precisely this last feature that allows him to apply the causal doctrines of *Physics* 3.3 regarding the joint activity of agent and patient to the case of perceptual awareness. What one is *aware of* is something that is (i) responsible for producing the very activity in question and (ii) external to the perceiver (*DA* 2.5, 417b18–21). Aristotle makes these points elsewhere too. Perception, he says in *Metaphysics* 12.9, is "always *of something else*" (*aei allou*), of something distinct from the activity of perceiving (1074b35–36). Earlier in the *Metaphysics*, he takes this to follow from the causal nature of perception:

> For surely perception isn't just itself of itself [*autê heautês*]; rather there is something else distinct from the perception that is necessarily prior to the perception. For what produces change is naturally prior to what undergoes change, even though they are characterised in relation to one another.[29]

What is perceived is prior to perceiving and therefore distinct from it, precisely because it *produces* the perceptual activity, a causal role Aristotle repeatedly invokes.[30] The perceptible qualities of external objects are not, then, merely present to us in perception. They *get themselves* perceived: what we are perceptually aware of is the perceptible quality causally responsible for producing that very perception.

Aristotle expands on the distinctness of the object from the experience in a somewhat neglected passage from *De sensu* 6 while addressing puzzles about intersubjective disagreement. This larger discussion starts from an *aporia* about different perceivers who are at a distance from one another: given that they smell an odour or hear a sound at different times, do they smell and hear the same thing?[31] In response, Aristotle characteristically splits the difference: in one way they do hear the same thing, but in another way not (*esti men hôs to auto akouei … esti d' hôs ou*, 446b15–17). But then he

sets the question of a time lag aside and considers more generally whether perceivers ever smell, hear, *or even see* the same thing:

> Some people think there is a problem even about this, since they claim it is impossible for one person to hear or see or smell the same thing as another. For many people cannot hear or smell [the same thing], if they are separate [from each other], since then a single thing would be separate from itself.[32]

Aristotle does not name the philosophers who raise this worry. One might suspect the "Secret Doctrine" attributed to Protagoras in Plato's *Theaetetus* again, since it concludes that what is perceived is "unique" or even "private" to each individual (*hekastôi idion*).[33] But in fact the *aporia* in *De sensu* 6 occurs almost verbatim in Gorgias' *On Not Being*, as reported in the pseudo-Aristotelian *On Melissus, Xenophanes, and Gorgias*:

> But how will the listener have the same thing in mind [*to auto ennoêsei*]? For it is not possible for the same thing to be in several people who are separate, since then one thing would be two. But even if, [Gorgias] says, the same thing were in several [people], nothing prevents it from appearing dissimilar to them, given that they are not in every way alike or in the same [place]; for if they were in the same place, they would not be two, but one.[34]

In this formulation, the puzzle arises due to the object's singularity. If to have an object "in mind" (*ennoein*) is for the *object itself* to be present in the subject (cf. 980b1–8 at b3, b5), then when different subjects perceive the same object at the same time, the whole object would have to be in several places at once, so that one thing would be many. Aristotle, characteristically again, doesn't want to deny either intuition completely, but reaches for a way to reconcile them:

> Or is this rather the case? What first initiates the change [*tou kinêsantos prôtou*], which they all perceive – the bell, for example, the frankincense, or the fire – is one and the same in number, while what is unique is different in number, though the same in kind. For this reason, many people see or smell or hear [the same thing] at the same time. [What differs in number] are not bodies, but a certain type of modification and change [*pathos kai kinêsis tis*] – since otherwise this case could not have occurred – though they are not independent of body either.[35]

Aristotle sees the distinction between bodies and the changes they produce as crucial to his solution.[36] What we perceive is a single public object, shared in common by the various perceivers – the bell, frankincense, or fire – even though the *effect* (*pathos*) that the object produces is unique (*idion*) to each

perceiver and so distinct from the effect in others.[37] This effect is not itself a body, but only "a certain type of modification and change" (*pathos kai kinêsis tis*) that occurs in a body; and unlike individual bodies, modifications and changes can be multiply instantiated. So nothing prevents the effect in different perceivers from being of the *exact same type*, thereby undermining a key assumption in Gorgias' argument.

It is thus a mistake to think that *what is perceived* is private to each perceiver, even if the modification in each perceiver belongs to it uniquely. On Aristotle's view, it is the external, public object that we see or hear or perceive with our other senses, not its effect on us, the activity of that sense. The latter is "private" only in the sense that each of us undergoes a change of our own and so has an experience of our own. But what we perceive with our senses, the object of that experience, is something we share in common. There may even be intersubjective agreement regarding the phenomenal character of these experiences, since it is possible in principle for the changes in different perceivers to be type-identical, however rare that might be due to differences in their points of view and their internal conditions. So it doesn't follow that experiences *must* differ phenomenally, as Gorgias intimates, just because they are instantiated in different subjects.

We can go further. The change in us that Aristotle refers to either *constitutes* or *just is* the activity of perceiving, which he contrasts with the external object itself. So while this activity may be "one and the same" as the activity of the object, it does *not include* the external object itself.[38] Their joint activity is something that takes place *in us*: as with causal interactions generally, the activity of the agent occurs in the patient (*DA* 3.2, 426a2–11). The fact that the "kind of modification and change" involved in the perceptual case is of a distinctive sort, as he argues in *De anima* 2.5, does not alter this basic framework.[39] Immediately before our passage from *De sensu* 6, Aristotle himself indicates that perceiving exhibits the hallmarks of activity or *energeia*: as soon as one perceives, one has perceived; and this activity does not itself undergo a process of coming into being.[40] This distinguishes it from the processes that precede it in the medium, for example, when a sound or odour travels through the medium towards the perceiver and may undergo transformations along the way.[41] But these qualifications don't prevent Aristotle from speaking of the resulting activity in the perceiver as "a kind of modification and change" (*pathos kai kinêsis tis*, 446b25–26), and it should not prevent us from identifying them in this context either.[42] Aristotle doesn't think it affects his solution to the *aporia*. Accordingly, I will sometimes speak of the change or modification that a perceptible quality produces in us as the activity or *energeia* of that quality, bracketing the differences those terms signify in other contexts.

Aristotle goes on to note that perception differs from relations like equality, where things can be related in that way independent of their proximity or interactions. One thing sees and another is seen, he says, "*not* by just being disposed in a certain way, as equal things are" (*ou gar dê tôi pôs echein to*

men horai to de horatai, hôsper isa estin), but because one is *in a position to affect* the other.[43] Perception is not merely an extrinsic relation. It is an effect in us resulting from the causal interaction with the object of perception.

Elsewhere Aristotle gives further details that extend his account here. The effect on a perceiver is not limited to the perceptual stimulations (*aisthêmata*) of the peripheral sense organs, which themselves lead to downstream effects on the primary sense organ, issuing in a perceptual experience.[44] These subsequent stages open up the possibility that there might be alternative ways to produce the same ultimate effect on the primary organ, other than in the normal way, which requires a causal chain reaching all the way back to the external perceptible object; and indeed, Aristotle explicitly invokes such alternate causal chains in his theory of *phantasia*.[45] On his view, the content and phenomenal character of such experiences will be similar to the quality of perceptual experience and may even be indiscernible in some cases. But they will not be perceptions themselves, properly speaking (see Section 3.5.1). So I will put them largely aside in this chapter.[46]

3.3 Awareness of the Activity of Perceptibles

What, then, is it *like* to have such perceptual experiences? Are we aware of the phenomenal character of such experiences when we have them? And if so, how on Aristotle's view are we aware, not of external objects and their qualities, but of our awareness of them?

In the most basic form of perception, what we are aware of is a perceptible quality of an external public object, in virtue of undergoing the "modification and change" the quality produces in our senses. We are not aware of this quality, it should be emphasised, *by being aware of* the change it produces in us, as indirect realism holds.[47] We are aware of the quality simply *by undergoing* this sort of change in one of our senses: because the sense possesses a mean along the relevant range of perceptible qualities, whenever this change occurs in it, we perceive the external quality. In contrast, the inanimate medium, which lacks any such mean, does not perceive it, but merely transmits the object's effect to the perceiver.[48]

Fine and good. But is the resulting activity *itself* something we are aware of? In *Physics* 7.2, Aristotle says that when perceiving we are "*not unaware* of undergoing change" in the senses (*ou lanthanei paschon*).[49] While arguing against his predecessors in *De sensu* 2, he likewise claims that it is "not possible to be unaware of perceiving and of seeing something seen" (*mê esti lanthanein aisthanomenon kai horônta horômenon ti*, 437a27–28).[50] But elsewhere he puts it even more strongly in terms of positively *being aware of* perceiving. At the beginning of *De anima* 3.2, he argues that "we perceive that we see and hear" by means of the activity of perceiving itself (425b12–25).[51] The activity is not the primary object of perceiving, which we perceive with the five senses, as we saw above, but something we are aware of only "on the side" (*hautês d' en parergôi*).[52] But it is an awareness he believes we have whenever we perceive (*EN* 9.9, 1170a29–b1; cf. *Sens*. 7, 448a26–30).[53]

This higher-order awareness is itself a type of phenomenal awareness for Aristotle. On his view, we are aware of perceiving *by perceiving* it, as opposed to merely inferring or otherwise accessing the information that we are perceiving.[54] But does Aristotle say anything to indicate that this is more than just awareness of its representational content – that is, that it also includes awareness of the *phenomenal character* of the first-order perceiving? There is one passage, I believe, where he does address the issue, even if it is not as explicit as one might like. But its implications are clear, at least when taken in context. Having argued in *De anima* 3.2 that we perceive that we see by means of the activity itself, he raises a worry inherited from Plato. If, Aristotle says, "to perceive by sight is to see, and colour or what has [colour] is seen", then mustn't "what sees" (*to horôn*) be coloured too?[55] Our eyes of course are coloured, quite literally; but Aristotle does not think that the senses perceive themselves generally (2.5, 417a2–9). On the other hand, it is hard to imagine that the *activity* of perceiving is literally coloured. In Plato's *Charmides*, Socrates considers such a view to be "exceedingly implausible" (*apisteitai sphodra*, 168E4, 169A1), when he raises an analogous objection: if sight cannot see anything uncoloured, then it cannot plausibly see itself (168D9–E1).[56] It would take "a great man", Socrates says, to solve the puzzles in full detail (169A1–2).

Aristotle initially responds to Socrates' challenge with the observation that perceiving with sight is not limited to perceiving colours, since it is also by sight that we discern that we are *not* seeing.[57] But while surely correct, this point is essentially negative and so doesn't make much headway in answering Socrates' concern regarding the central case, which is one where we *are* seeing. So the question still remains *how*.[58] Aristotle immediately goes on to offer a more positive suggestion, though, which grants that there *is* a way in which the activity is coloured after all:

> Further, what sees in fact is in a way coloured. For each sense organ is able to receive the perceptible without the matter. Hence perceptions and quasi-perceptual representations are present in the sense organs even when the perceptibles have gone away.[59]

Now in saying that "what sees" – on my reading, the *activity* of seeing – is in a way coloured, Aristotle cannot have in mind a position like that of the sense datum theorist, where part of the visual field is literally coloured and so can serve as an object of direct awareness, since then he would not need to use the qualification "*in a way* coloured" (*hôs kechrômatistai*). At the same time, if his response is to genuinely meet the challenge from the *Charmides*, it must refer to something *observable* in the experience itself, since it would be no answer merely to say that it is *of* or *about* a colour.[60] Aristotle's solution aims to link these two points. The activity of seeing is observable in some way *because* it is of or about a colour – its phenomenology is *due to* its intentionality. That is the point, I believe, of his invoking the doctrine of "receiving form without the matter" (*aneu tês hulês*) from the opening of *De anima*

2.12,[61] which he here specifies in terms of the organ's ability to receive the perceptible quality (*to aisthêtêrion dektikon tou aisthêtou aneu tês hulês*, 3.2, 425b23–24). Once again, Aristotle cannot mean that the eye becomes literally coloured, since then he would have been able to answer the challenge directly, without any hedging or qualification. So when he says that what sees is "in a way coloured", he must mean instead that the character of the change that the organ undergoes is (*a*) essentially related to the colour affecting it, but (*b*) without literally replicating it: it is in pertinent ways like the colour, even though it does not literally take on that colour. I have argued elsewhere that it does this by instantiating an essential feature of a colour, namely, the ratio that defines a given colour, but not in the same contraries (light and dark) that yield that colour; and analogously for the perceptible qualities in the range of other senses. In this way, the information the senses receive from perceptible qualities allows them to "report many differences" in the perceiver's environment (*pollas eisangelousi diaphoras*), as Aristotle says in *De sensu* (1, 437a2), in virtue of instantiating relevantly similar properties.[62] The additional point he makes here in *De anima* 3.2 is that the organ's taking on these characteristics makes the resulting activity similar to the colour in another respect, namely, that it is the sort of thing we can be *perceptually aware of* as well, at least peripherally or "on the side" (*en parergôi*). The activity itself is in some way observable, even if not in the way we paradigmatically see a colour. How the activity appears to us is distinct from how the external quality appears to us directly in that experience. The way the external quality appears does indeed "colour" our experience, in so far as it determines the character of our experience, but not by making our experience literally coloured. It is *what it is like* to perceive coloured things and for their qualities to appear to us. And similarly for the other senses.

This conception of phenomenal character has points of contact with late 20th century conceptions such as we find in Shoemaker and Peacocke.[63] The latter, for example, speaks of red′ to indicate a quality of the experience, distinct from the actual redness in external objects, but connected to it and dependent on it. The important point is that it is the external quality that has priority: the phenomenal character of perceiving has to be understood in terms of the external quality that we are perceiving, and not *vice versa*, as on dispositional accounts of colour. We saw earlier that Aristotle is already committed to the *ontological priority* of the external quality, in so far as the latter can exist apart from perception and indeed without any perceivers at all, due to its role as a cause. What we find here is that the external quality is *conceptually prior* as well. To explain how the activity of perceiving can itself be perceived, we need to make reference to the external quality. Aristotle appeals to a quality that the activity of the sense possesses in virtue of the external quality's causal effect on it, and this explains why we can perceive the activity of seeing. In acting on the perceiver's sense organs, the perceptible quality is received by the organ "without the matter"; that is, in such a way that the organ embodies certain essential characteristics of this quality, without

literally replicating the quality itself, like the wax and the signet ring in *De anima* 2.12. Aristotle's point in *De anima* 3.2 is that the organ's taking on these characteristics thereby makes the activity itself perceptible, at least in an extended sense, and gives it its distinctive quality. The phenomenal character of the activity of the sense is determined by the character of the features the organ receives from the external quality.

If the external perceptible quality is conceptually prior in this way, one might take this to have a further implication. In contrast with the quality's effect on the sense organ, *no more proper description* of the phenomenal character itself is possible beyond referring to the external perceptible quality that standardly produces it or even just the kind of object that typically exemplifies it.[64] The phenomenal character of experience, then, is grounded in the external perceptible qualities that produce it. How things appear depends, both ontologically and conceptually, on how things are.

3.4 The Appearance of Perceptible Qualities

This priority allows Aristotle to take full advantage of his realism. The most basic perceptible qualities – the "fundamentally perceptible" ones (*ta kuriôs aisthêta*) – are those which are intrinsically perceptible (*kath' hauta aisthêta*) to a single sense exclusively (*idia, DA* 2.6, 418a24–25). And when we perceive them with that sense, these external qualities *appear exactly as they are*. They are real features of the external world, revealed to us in perception.[65]

This, I would contend, is the true import of Aristotle's repeated claims that this most basic form of perception is infallible.[66] It is not that we cannot make mistakes about the colour of objects or their flavours, odours, temperature, and so on. We obviously can and do, something Aristotle acknowledges on many occasions. He notes that we often make mistakes about (i) *which particular* object a quality belongs to; (ii) *which type* of object it belongs to; and (iii) *where* it is located.[67] This makes it possible for him to remain consistent when citing examples from the earlier tradition about conflicting appearances: how, for example, a certain food or drink tastes under different conditions or how an object looks from a distance or through haze, in addition to common mistakes about the number, motion, and distance of various objects.[68] We can be wrong about how a specific object appears, about which qualities it possesses. What we do not and indeed cannot make a mistake about, he claims, is *which quality* we are perceiving on a given occasion; our mistakes are confined to what it belongs to and its location.[69] Aristotle draws this distinction while replying to his predecessors about perceptual variation:

> There is not even disagreement at a different time when it comes to *the modification* [*peri ge to pathos*], but just when it comes to *what* the modification *belongs to* [*peri to hôi sumbebêke to pathos*]. I mean, for example, that the same wine might seem sweet at one time and not sweet at another, if either it undergoes change or [one's] body does. But

> *what sort* of thing sweet is *when present* [*hoion estin hotan êi*] doesn't ever undergo change; rather [perception] *always tells the truth* about it [*aei alêtheuei peri autou*], and anything that is ever going to be sweet is necessarily like that.[70]

A particular wine may taste differently at different times. It might have undergone a change or the perceiver might have. But the *flavour* we taste does not – it has a fixed character. Indeed, Aristotle elsewhere suggests that perceptible qualities like white are the same for both humans and fish, and so are invariant across species.[71] More importantly, when we are genuinely perceiving, we do not make a mistake about the *presence* of these basic qualities in our vicinity either: perception accurately reports that there is such a quality "when it is present" (*hoion estin hotan êi*) in our environment.

Aristotle makes the same point in *De anima* 2.6, though more briefly, when spelling out his claim that the senses "cannot be mistaken" about the qualities that are intrinsically perceptible to them alone (*peri ho mê endechetai apatêthênai*, 418a12). To elaborate this, he states the same distinction as before, but with greater emphasis:

> Each [sense] discriminates among these [qualities] and is not deceived that there is a colour or that there is a sound, but rather *what* the coloured thing is or *where*, or *what* the resounding thing is or *where*.[72]

The distinction between perceptible qualities and what they belong to is pivotal. It allows Aristotle to accept perceptual variation, now understood as confined to certain kinds of mistakes, without tainting all perception. Perception is a fallible source of information in a great many respects. But it still gets something right, indeed invariably: the basic qualities we perceive are *actually present in our environment* and *acting on our senses*. This limited infallibility, he believes, is sufficient to give perception some purchase, however minimal, on the world.

It is important to see that Aristotle's limited infallibility thesis is *not* the higher-order, phenomenological claim that we cannot be mistaken about what appears to us, as some later sceptics entertained, perhaps as early as Timon (D. L. 9.105, 107). If we were infallible about that, it would apply to the full range of appearances and not just basic perceptible qualities.[73] But Aristotle does not make such a sweeping claim: it is only for certain appearances and not others. In his view, we make many mistakes about the shape, size, number, distance, and motion of objects, as well as about their identity, what he calls "common" (*koina*) and "extrinsic" perceptibles (*kata sumbebêkos*), respectively.[74] It is only with regard to the most basic qualities – those intrinsically perceptible to a single sense exclusively (*idia*) – that he claims infallibility, and even then we can still err about which objects possess those qualities or where they are exemplified. But when such a quality is present in our vicinity and acting on our senses, we cannot be mistaken about that. How these qualities appear is *exactly how they are*.[75]

This limited infallibility thesis is justified given Aristotle's views on causation. He frequently characterises perceptible qualities in causal terms, as powers to produce perception, where the resulting perception is about its cause.[76] The most basic perceptible qualities are those which are intrinsically such as to produce perception in a single sense exclusively, and it is to them that the essence of each sense is related by nature (*DA* 2.6, 418a23–25). Such qualities are what in the *Metaphysics* Aristotle calls "nonrational powers" (*hai dunameis alogoi*) because they cannot be directed to contrary outcomes by thought or choice; they *each can produce only a single type of effect* (*mia henos poiêtikê*), which results necessarily whenever the relevant types of agent and patient encounter each other in the way required for exercising their capacities.[77] The same cause cannot, therefore, produce different effects: whenever a certain type of perceptible quality acts on the appropriate sense, it must be altered in the same way. The converse holds as well. The same effect cannot be produced by different types of cause: in alteration, an agent makes the patient similar to itself by causing the patient to receive that agent's active quality.[78] So if a basic perceptible quality acts on the appropriate sense at all, there can be *no ambiguity* in the resulting perception of it, since it can only be altered in that way by that quality and it is of the quality that produced it. In such cases, we invariably perceive correctly: the quality present in our environment and directly acting on our senses appears to us *as the very quality it is*. We only make mistakes about its location or which object it belongs to, and so about whether a *particular object* has the perceptible qualities it seems to. But our fallibility in these regards does not impugn our infallibility with respect to which basic perceptible qualities are in fact present to us.[79]

3.5 Apparent Counterexamples

For some readers, even this limited infallibility thesis will seem too strong. Aren't there obvious cases where we seem to see a particular colour or taste a flavour but *nothing* in the vicinity instantiates it? If so, they would constitute counterexamples to the limited infallibility thesis. Yet when Aristotle discusses such cases, I shall argue, he characterises them in terms that are in fact consistent with the thesis: either he denies that the experience in question is a perception or he believes that the perceptible quality *is* actually present in the perceiver's vicinity and acting on their senses. If so, then in Aristotle's view these would be merely apparent counterexamples.

While the cases are quite varied, Aristotle's treatment of them depends on a few basic aetiologies. Grouping them in this way will help keep our key concerns in focus.

3.5.1 Afterimages, Hallucinations, and Dreams

Afterimages and hallucinations, both of which Aristotle discusses, might seem to be the most obvious counterexamples to the limited infallibility thesis. In *De insomniis* 2, he describes how, after staring at a colour like bright green for

an extended period, we initially seem to see the same colour in our line of sight, wherever we turn our gaze, even when our eyes are shut; afterwards the colour alters, first to a complementary hue of red, and then darkens to purple and black, before finally fading away (459b11–18).[80] Although he does not say so explicitly, the point of the example seems to be that neither the original stimulus nor the objects we subsequently look at actually possess the later colours we seem to see. In the same chapter, Aristotle also describes (i) partial hallucinations during a fever, such as seeming to see animals in the wall, which, if we are sufficiently sick, we might take to be real and react to, along with (ii) dreams, which we might likewise take to be waking experience, even though in this case we aren't perceiving anything at all, much as with total hallucinations.[81] Both phenomena, he argues, are due to the same faculty (*Insomn.* 1, 458b25–29). Although he does not expressly mention colours or other perceptible qualities in these descriptions, it is reasonable to think that if we can be so deluded, it is in part because such qualities appear to us in these experiences just as they would in ordinary perceptual experience, even if nothing in the environment corresponds to what we are experiencing.[82]

Aristotle cites these cases, though, precisely in order to *distinguish* such experiences from genuine perceptions. He takes them all to constitute evidence of the aftereffects of perception, which can last in our system well after the perception from which they originate has ceased, analogous to what happens in some inanimate alterations like heating (459a24–b7). In *De anima* 3.3, he calls this aftereffect *phantasia*, which he argues is generated from perceptions in such a way as to have similar causal powers, so that when it affects the primary sense organ in the same way a perceptual stimulation would, things will appear in just the same way, despite this experience not being a perception (*Insomn.* 2, 460b22–25). Consequently, it will have a similar content – it is "of what perception is of" (*kai hôn aisthêsis estin, DA* 3.3, 428b12–13).[83] Aristotle contrasts how things appear due to *phantasia* with perception several times in *De anima* 3.3, particularly as regards truth and error (427a29–b6, 428b25–30); and he notes how in ordinary speech we tend to reserve the verb "it appears that" (*phainetai*) for cases where we are *not* perceiving accurately (428a12–15).

Aristotle appeals to these quasi-perceptual representations and the fact that they can be false as well as true to explain the "many things animals do and undergo"[84]; and it is a required component in most other mental states: not only memory and dreams, but also desire and even thought.[85] In the case of afterimages and partial hallucinations, we do perceive *other* objects in our environment; but we only *seem* to perceive the afterimages and hallucinated objects themselves. In the case of dreams, he says we don't perceive at all, since on Aristotle's theory we dream only when our peripheral senses have shut down and become inactive during sleep.[86] In fact, he argues that if we do see a lamp or hear a cock crowing while half-asleep, it is not part of our dream *precisely because* we are perceiving them "in a way" (*pêi, Insomn.* 3, 462a15–28 at a20; cf. *Somn.* 2, 455a9–12).

For just this reason, none of these phenomena constitutes a genuine counterexample to the limited infallibility thesis. We may mistake such experiences for perceptions of qualities which are not presently in our environment, but they are not in fact perceptions. Aristotle's distinction is crucial and principled. Perception is not defined for him in terms of a certain phenomenology, but rather a specific aetiology: perceptible qualities in our environment bring about a perception of them as those very qualities. The associated phenomenology, importantly, is not restricted to genuine perceptions; it can be brought about in other ways, standardly involving the operation of *phantasia*, which mimics the causal effect of perceptible stimulations on our primary sense organ, because of the way it was initially generated from perceptions, as echoes or traces. So in their case the phenomenal character of such experiences is also to be understood in terms of how perceptible qualities appear to us in genuine perceptions. The perceptible qualities we seem to be experiencing will appear just as they *would* appear *if we were* actually perceiving them (*Insomn.* 2, 460b22–25). But by hypothesis we are not, and such experiences are not themselves perceptions.

3.5.2 Aftertastes and Conditions in the Medium

There are other cases, though, where by Aristotle's own lights we *are* genuinely perceiving, and yet still seem to be getting something wrong about perceptible qualities in our environment. In *De anima* 2.10, he describes the experience of aftertastes: after having eaten something with a strong flavour, we still taste it even when we go on to eat something with a different flavour (422b7–8), like rice after spicy food. But unlike afterimages, in this case Aristotle doesn't appeal to *phantasia* or deny that we are tasting something. We are tasting a flavour that seems to no longer be there. If that's right, then we would have a counterexample to the limited infallibility thesis.

There are other cases where we also seem to experience a perceptible quality incorrectly, but Aristotle does not question whether we are perceiving or qualify it in some way. Conditions in the medium between a perceptible object and a perceiver, for example, can affect how the object's qualities appear to that perceiver. Aristotle notes in *De sensu* 3 that while the sun on its own appears white, through mist or smoke it appears red (440a10–12). This observation recurs in the *Meteorology* (3.4, 374a7–8), where he makes the even more general claim that whenever something bright is enveloped in darkness or shines through it, it appears red (374a3–8, 374b10–11). In *Metaphysics* 4.5, he lists perceptual variations mentioned by other philosophers, including the different colours that objects appear to have when they are distant or close at hand (1010b5–6), an effect he might think is likewise due to the medium, in so far as there will be differences in the total amount of intervening air or water and what they contain.[87] In *De sensu* 6, he also mentions cases involving hearing, where disturbances in the air affect what we hear (446b6–10). If in any of these cases we are perceiving qualities that

aren't in our environment, then they are counterexamples to the limited infallibility thesis.

Aristotle's explanations show, however, that he thinks we *are* perceiving something real in our environment in these cases, just not something that belongs to the distal object. With aftertastes, for example, we continue to taste the earlier flavour because it is *still present* in the fluid surrounding our tongue (cf. *tou prôtou hugrou, DA* 2.10, 422b7), in the same way that everything tastes bitter to sick people because of the bitter fluid that suffuses their tongue (b8–10). In both cases, the flavours we taste are genuinely present in our environment, in the fluid immediately in contact with the sense organ, and because it intervenes between the tongue and the new food, it prevents us from tasting a different flavour.[88] In fact, if there is excessive fluid coating the tongue, Aristotle thinks we won't taste anything at all (b3–6).

Aristotle treats objects perceived through an impure medium in much the same way, as reporting accurately on objective, external conditions. It is a mistake to think that the sun is itself red, of course. But limited infallibility permits errors about which object exhibits the perceptible quality in question; it only insists that *something* in the environment has the quality perceived. And in context that seems to be what Aristotle is arguing for. He first introduces the case of seeing the sun through mist or smoke as evidence offered for a rival theory of colour, according to which most colours are produced from layers of black and white, much as when painters layer darker pigments over a brighter one (*Sens*. 3, 440a6–15; cf. 439b5–6). Although Aristotle rejects this as a general account – he thinks intermediate colours result instead from mixtures of black and white in certain proportions, when the underlying materials are combined[89] – he accepts that in cases like the sun seen through haze, the colour that appears is in fact the *layered* or *combined effect* of the distal object and the material through which it appears.[90] The colour's power to affect the medium (*DA* 2.7, 418a31–b2) can be modified by the condition of the medium, prior to its acting on our sense organs.[91] Given that the conditions in daylight are typically clear, Aristotle thinks that the appearance of the colour in solid objects is generally fixed or determinate, "except", he adds, "when the environment produces a change" (*ean mê to periechon poiêi to metaballein, Sens*. 3, 439b5). In this respect, the effect of the medium on colour *is* similar to the way sound and odour can be altered by disturbances in the medium, even though sight differs from hearing and smell in other respects.[92]

Aristotle is even more explicit about such combined effects in the *Meteorology*, where he again treats them as objective properties, present in the environment in certain regular conditions – indeed, they can be an object of study precisely because they can be observed by many perceivers and so are independent of any one perceiver's experiences.[93] Certain phenomena occur when part of the air condenses and catches fire, with the result that the air "*becomes coloured* with all sorts of colours" (*chrômatizetai ... pantodapas*

chroas, 1.5, 342a34–b5).[94] If the light shines through the thicker portion of the air more weakly, it "will *produce* all sorts of colours" (*pantodapa chrômata poiêsei*, b7), especially red and purple, when a fiery colour and white "have been *combined by layering*" (*meignumenôn kata tas epiprosthêseis*, b9; cf. *memeichthai*, 3.4, 374a5–7). This also occurs with rising and setting stars seen through smoke (b10–11). In general, when something bright is surrounded by darkness, it "*produces* a great variety of colours" (*poiei poikilias*, 342b18–19; cf. *poiei phoinikoun*, 3.4, 374b10–11). This effect is outshone in the brighter light of day (342b19–20), but at night, when the darkness is more uniform, we only see red in it (b20–21). Aristotle's language is remarkably objective: to reconstrue all of these phrases subjectively would be to impose a meaning onto the texts not obviously expressed in them. *We* might be inclined to understand such phenomena subjectively, purely in terms of their effects on us. But without clear textual evidence that Aristotle understands them all in this way, or that he is committed to such a view, it seems anachronistic to impute it to him.

The colour that appears to us, then, due to varying conditions in the medium is not a *mere* appearance in Aristotle's view. It is an actual feature of part of the external environment, even though it does not belong to the distal object itself. Like aftertastes, what matters for perception is the *proximal stimulus* that is actually acting on our sense organ, and we perceive its qualities correctly.

3.5.3 Rainbows and Reflections

Aristotle applies similar principles in the third book of the *Meteorology* to other cases which might not seem at all similar – rainbows and atmospheric phenomena like halos, mock suns, and rods – where again one might be tempted to think they were merely illusions.[95] Rainbows are a particularly vivid case: there does not seem to be a solid arc before us, not even a thin and ephemeral one, and its brilliant colours are not the colours of the mist or sky. If these colours are perceived, but not present in our environment, they would be a counterexample to the limited infallibility thesis.

Aristotle says that all such phenomena are due to the same cause, namely, reflection (*anaklasis*); they differ only with regard to the manner in which they arise, what serves as a reflector or reflecting surface (*enoptron*), and what the source of illumination is.[96] His explanations turn on details from a theory of vision different from the one offered in his psychological works. Unlike the *De anima* and *Parva naturalia*, which explicitly reject extromissionist theories of vision and reflection,[97] the *Meteorology* takes for granted that vision (*opsis*) leaves the eye – often referred to by interpreters as a visual "ray" or "beam" – and is deflected off the reflecting surface and towards a distal object.[98] Most of what Aristotle has to say about reflection concerns the geometrical relations between the distal object, the source of illumination, and the eye of the observer, where in fact it does not matter which

direction is involved physically; it is sufficient to think merely of the line of sight. But it does make a difference with regard to his explanation of certain features of these phenomena like colour.

One crucial feature of Aristotle's account that presupposes extromission is that vision weakens and diminishes as it extends through space (*ekteinomenê asthenestera gignetai kai elattôn*, 3.4, 374b11–12). This is more than just the commonplace observation that no one can see things that are too far away or that some people see less far than others, because vision peters out before reaching the object.[99] He makes more specific theoretical claims about the nature of this weakening and its effects in strongly physical terms. Reflection occurs when vision is so weak that it "cannot push past" (*ouk edunato apôthein*) the reflecting material and so is deflected instead (3.4 373b7–13).[100] Weaker vision is more easily deflected in general (374a22–23, 28–29): it happens not only when the air is dense or vision has to travel far, but even with ordinary, uncondensed air nearby, if a person's vision is excessively weak (373b2–7).[101] Reflection itself, moreover, additionally weakens vision (374b21–22, 29).

Aristotle appeals to the weakening of vision repeatedly in his explanations of the appearance of atmospheric phenomena. In *De caelo* 2.8, for example, he uses it to explain why the fixed stars twinkle, but the planets, which are nearer, don't (290a16–24).[102] What is important for us is that he uses it extensively in *Meteorology* 3 to explain the colours of atmospheric phenomena.[103] He takes weak vision to *alter* the colour that is ultimately seen,[104] much as happens when the intervening medium is combined with more opaque material – in fact, given that similar colours can be produced by both conditions, Aristotle thinks it "makes no difference" which is responsible in a given case.[105] It is the combination of illumination with varying degrees of darkness, regardless of its source, that is responsible for the different colours seen. As vision progressively loses strength, it makes dimmer colours appear,[106] since the diminution and cessation of sight results in darkness, which is a privation (3.4, 374b11–14); and it "makes no difference", Aristotle adds once again, whether it is the object seen that undergoes change or vision (b22–24).[107]

Aristotle appeals to the weakening of vision over distance to account for the three main colours of the rainbow, in both the primary and secondary arcs. Since the innermost bands – the highest in the primary arc, the lowest in the upper, secondary one – are closest to the observer, vision is strongest there and changes the colour on the reflecting surfaces to red (*eis phoinikoun chrôma metebalen*, 3.4, 374b31); while the outermost bands, being furthest away, will be dimmest and blue, with green in between.[108] The weakening of vision over distance also explains why there is no third rainbow (375b12–15).

What is crucial for our discussion is that these colours *manifest* themselves (*emphainesthai*) *on the reflecting surface*;[109] in fact, Aristotle points out that if the spatial relation of what sees, what is seen, and the reflecting surface is fixed, the same part of the reflected image (*emphasis*) will always appear at the same spot on the reflecting surface (*en tôi autôi sêmeiôi tou enoptrou to*

auto phainoit' an meros tês emphaseôs, 1.8, 345b12–19 at b14–15). In the case of the rainbow, each droplet of mist serves as a reflector, which is why the rainbow appears in the location it does, where there is mist or clouds.[110] But because the droplets are so small, he says they can only display colours and not shapes; in order for shapes to show up on a reflecting surface, it must be large enough for the spatial divisions that a shape contains to be perceptible.[111]

The colour seen on reflecting surfaces appears on the side closest to the observer, as it does in the cases we considered earlier, where different layers of material are combined in the medium. But there is a key difference. Where layering alone is involved, the distal object lies directly behind these layers, on their far side, so we are more easily led to mistakenly attribute the colour seen to the distal object in our line of sight. This is not the case with reflections, though, since the distal object lies off in an oblique direction. Consequently, we take the colour seen to be where the reflecting surface is – in Aristotle's view, correctly – and so do not mistake the colours of the rainbow, for example, as belonging to the sun or some other source of illumination. When it comes to the colour itself, though, the underlying physical explanation is the same. In both cases, which colour is manifest depends on how conditions darken it. But Aristotle regards this darkening as an objective phenomenon in the environment outside of us, whether it is due to the medium or how vision travels.[112] Phenomena like rainbows, halos, and the like reliably occur under specific conditions, obey geometrical regularities,[113] and can be seen simultaneously by multiple observers.[114] Like solid objects, they appear to perceivers through the remaining medium. But unlike solid objects, air and water are more mutable; what appears in them is therefore evanescent and dependent on the interaction of multiple conditions.[115]

3.5.4 The Colour of the Sea

In *De sensu* 3, Aristotle observes that the colour of the sea differs depending on one's distance (439b3–5). This might also seem to be a counterexample to the limited infallibility thesis. Unlike most solid bodies, water and air are fully transparent and so lack a colour of their own (*chrôma idion*, 439b13),[116] and this won't change based merely on the observer's location. Hence, when Aristotle says that the air or the sea "do not have the same colour for those coming up close to it as it does for those at a distance" (*ou tên autên enguthen kai prosiousi kai porrôthen echei chroan*, b3–4), we might infer that the sea *only appears* to take on different colours and that the effect is just in the perceiver and so inherently subjective.[117]

Aristotle doesn't himself make any such suggestion, though. So the possibility remains that here too he regards the phenomenon as an objective, external fact, resulting from the interaction between an object and an observer, as in the case of reflection. All he says is that it is "because [the transparent material] is present in something with indefinite boundaries"

(*dia to en ahoristôi*, 439b3; cf. a27) that the colour of the sea is different from different vantage points, unlike solid objects with stable boundaries, which have a fixed and definite colour (*hôristai kai hê phantasia tês chroas*).[118] But no further explanation is given. So it is open to him to invoke the same sorts of principles deployed in connection with reflections (Section 3.5.3).[119] Richard Sorabji has plausibly suggested that the unstable surface of air or water would produce changes in reflecting angles that might result in changes in colour ("Aristotle on Colour, Light, and Imperceptibles", 130–131), since Aristotle thinks an uneven reflecting surface displays various colours (*Meteor.* 3.6, 377b8–11), while an even surface produces a uniform one (b17–18). But as Sorabji also notes, this would not explain the effect due simply to the observer being at different distances, at least not if the same viewing angle is maintained. On the other hand, since Aristotle also thinks that vision weakens with distance and the greater amount or varying qualities of the medium itself can affect which colour is manifest to an observer, it is still possible that he regards the colour of the sea as dependent on these objective factors in the external environment, rather than something merely in the mind, even though it depends in part on the spatial location of the observer. In fact, the *Problemata* does explain the difference in colour of the sea as due to reflection in just this way, where the uneven surface of the water and the condition in the surrounding air also contribute to its colour at a distance (23.6, 932a21–27, 32–38). So when Aristotle says in *De sensu* 3 that the sea "does not *have* the same colour" (*ou tên autên ... echei chroan*, 439b3–4) for perceivers at different distances, he may literally mean it *possesses* different colours for each.[120]

How can the sea have any colour, though, much less different colours, if it doesn't have a "colour of its *own*" (*chrôma idion*, 439b13)? In the *De anima*, Aristotle claims that water and air, in so far as they are transparent, are "not intrinsically visible without qualification" (*ou kath' hauto de horaton hôs haplôs eipein*, 2.7, 418b5). But this only means that they do not have what Aristotle calls a "proper colour" (*oikeion chrôma*) of their own, that is, the natural colour of an object when visible in the light. The colours that phosphorescent objects exhibit in the dark are not their proper colour either, since these colours are not apparent in the light (419a1–6; cf. *Sens.* 2, 437a31–32). But even though transparent media are "not intrinsically visible without qualification", they are still visible *extrinsically*, in virtue of an exogenous or borrowed colour (*di' allotrion chrôma*, 418b5–6); and for Aristotle this *is* a genuine way of being coloured, even if only in a qualified sense. In a similar way, Aristotle can speak of light as "a sort of colour of the transparent" (*hoion chrôma esti tou diaphanous*, 418b11–13): light is *extrinsically* the colour of the transparent (*chrôma tou diaphanous kata sumbebêkos, Sens.* 3, 439a18–19). Bodies of air and water, such as the sea, in turn, appear coloured (*phainetai ... chrômatizomena*) because of the radiance or illumination (*augê*) of the medium from the presence of light (439b1–2). It is plausible to think Aristotle takes reflections to be extrinsic features of the reflecting surface as well, though he does not expressly claim this in the extant works. None of

the colours of the rainbow, for example, are the proper colour of mist and there is no reason to think the mist undergoes a transient change in its intrinsic colour when a rainbow arises. But they could still be extrinsic colours, which mist exhibits by virtue of reflection. Reflections in mirrors could be understood in a similar way.

The distinction between proper or intrinsic colours and those which are exogenous and extrinsic has a further consequence. The proper colour of an object is a nonrelational quality: an object still has its proper colours in the dark, even though they "escape notice" (*en tôi skotei lanthanei ta chrômata, Meteor*. 3.2, 372a24–25). The actual colours remain, since they are first actualities, despite not being seen in the absence of illumination, and likewise if there are no perceivers nearby. Aristotle explains the proper colours of an object, moreover, in terms of the object's intrinsic properties, which he specifies in both formal and material terms – he does not treat colour as a mere disposition to produce an effect in something else.[121] These intrinsic properties enable colours to affect perceivers, though, and so an object's proper colours will reveal themselves to perceivers in specific conditions, such as daylight in a clear medium and certain other conditions. Aristotle notes, for example, that the colour of the fixed stars is just as it appears in their night-time halos, as is the colour of the sun in certain kinds of reflection.[122] But in all such cases, this is merely a question of their intrinsic colour being *viewed*, their second actuality, not whether the objects have these colours in the first place.

In contrast, exogenous or extrinsic colours, like the colour of the sea or the illumination of the medium, *are* essentially relational properties of an object. Which extrinsic colours an object has is, in part, a function of its relation to other objects, including the location of observers relative to the object, the kind of light, and atmospheric conditions. As such, they are highly contingent and so may be evanescent, as one or more of those conditions alter. But possessing such colours is again distinct from their appearing a certain way. These colours belong to the object, as extrinsic properties do in general (*ta sumbebêkota*) for Aristotle – they are not in the least a subjective matter, "in the eye of the beholder". According to Aristotle's categorial scheme, extrinsic colours will be qualities, just as intrinsic colours are. It is a characteristic of the sky whether it is blue or grey – we characterise what sort (*poios*) of sky it is by its colour, among other things (*Categ*. 8, 8b25). Its essence does not consist in that relation, as it does for relatives such as being a parent or a child (*haper estin*, 7, 6a36, b6–8).[123] Nevertheless, whether an extrinsic quality belongs to an object depends in part on its relation to other things.

It may be that Aristotle also understands the colours that appear on a reflecting surface in the same way, not as intrinsic changes in the composition of its surface, but as extrinsic qualities that belong to it in virtue of its relation to observers, sources of illumination, and conditions in the medium; and for that very reason they are highly mutable. But which qualities appear will still be an objective and external matter, available to multiple observers, and governed by lawful regularities.

3.5.5 Colour Contrasts

A final class of phenomena involves what Josef Albers referred to as the "interaction" of colours: how a colour appears when placed next to different colours.[124] To us, it seems natural to regard these as illusions: without undergoing any intrinsic change, colours appear differently when situated next to different colours and so *otherwise than they are*.[125] If so, then this too might seem to be a counterexample to limited infallibility.

Aristotle's own assessment is somewhat harder to make out in these cases. His description of the phenomenon is clearest in the case of dyed fabrics:

> This effect is evident in the case of dyed material as well.[126] For woven fabrics and embroidery are inexpressibly different in appearance [*amuthêton diapherei têi phantasiai*] when certain colours are placed next to various others, for example when purple [fabrics] are placed on white or black wool, or yet again in this or that kind of illumination. It is for this reason too embroiderers say they frequently make mistakes [*dihamartanein*] with dyed material when working by lamplight, grabbing one instead of another.[127]

Another case of colour contrast is the golden yellow (*xanthon*) band that appears in the rainbow. For though Aristotle recognizes only three bands in the rainbow – red, green, and blue – and explains all three as due to reflection (*Meteor*. 3.4, 374b30–375a7), he thinks that yellow appears "due their appearing alongside one another" (*dia to par' allêla phainesthai*); more specifically, the part of the red band next to the green "appears white" or "bright" (*leukon phainetai*, a7–8). So too if a rainbow appears before a dark cloud, it is purest or "unmixed" (*akratos*) and the red "seems to be more yellow" (*xanthoteron einai dokein to phoinikoun*, a9–11). He thinks the clearest example is the moon rainbow: it appears white because it is in a dusky cloud and at night (a17–20), as a dark colour next to a dark colour makes something that is only dimly bright, like red, seem fully bright (*pantelôs phainesthai leukon*, a20–22).[128]

But does Aristotle think that these cases are *illusions*, that is, where we falsely perceive a colour like yellow to be present in the environment when it does not occur anywhere in the vicinity? We typically think of these cases as involving a simultaneous colour contrast between neighbouring colours, and so at odds with colour constancy (which would be related to what Aristotle calls the "proper" colour of an object). But no term for "contrast" occurs in the Greek,[129] and Aristotle does not offer any further explanation of how this effect comes about. He only says that the colour in question appears when certain colours are "alongside other colours" (*par' allêla*, 375a7, a24) or in the case of the bands of the rainbow, between them (*metaxu*, 375a12–13; 3.2, 372a9). We can plausibly rule out reflection as the cause, moreover, since he claims that reflection accounts for the three colours of the rainbow, and he insists that there are necessarily only these three (*anankê trichrôn te einai*

autên kai toutois tois chrômasi kechrôsthai monois, 375a5–7). It is unclear, though, whether it might be an objective effect that occurs in some other way, such as "mixture" or combination, something that is not implausible given the continuous gradation of colours in the rainbow. In fact, when Aristotle first introduces the appearance of the yellow band, he contrasts it with the three main colours precisely with respect to the mixture:

> These colours are practically the only ones that painters are unable to produce. For they mix some colours, but red, green, and blue do not arise by mixture, though the rainbow has these colours. Yellow often appears between red and green.[130]

As H. D. P. Lee notes, there is something peculiar about Aristotle's specific claims here: it is not green, but yellow which is a primary colour together with red and blue; and it is not yellow, but green that can be produced by mixture, specifically from blue and yellow.[131] Whatever sense can be made of the specific colours he mentions, the upshot remains the same: this passage assumes that the principal colours of the rainbow are the same as the unmixed, primary colours, from which other colours are produced by combination. If so, then the appearance of yellow in the rainbow could belong to the class we considered earlier, which is explained by the combined conditions in the medium (Section 3.5.2).

While these last cases pose more of a challenge than the earlier ones, it is mostly because of the absence of any further explanation on Aristotle's part. His other remarks suggest, though, that he has the resources to offer an explanation that relies exclusively on objective, external factors in these cases too. If so, then the yellow of the rainbow is not a mere appearance and so not a genuine counterexample to limited infallibility. Similarly with regard to the mistakes of embroiderers: the poorly illuminated medium may act together with the coloured threads to produce a combined effect, like the sun seen through haze. If so, then the mistake embroiderers make is to think that those colours belong *to specific threads*, rather than a proximate effect in the medium, and so they chose those threads in error. But then this case does not violate limited infallibility either.

The bottom line. There are quite a few phenomena we would be inclined to describe as illusions, where perceptible qualities like colours appear to us, but do not seem to belong to anything in our perceived vicinity. In most cases, Aristotle offers a physical explanation that takes these qualities to actually be exemplified in our surroundings, contrary to our own expectations, but not by the objects they seem at first to belong to, at least not as their proper colour. In a few cases, such as the colour of the sea and colour contrasts, he does not offer any real explanation at all. One could take this silence as suggesting that he regarded them as colour illusions, and so as violations of the limited infallibility thesis. But it would run contrary to the way he approaches all the other cases and his many assertions of limited

infallibility (n. 66). Rather than overturn all that and conjecture a wholly different position not otherwise attested, much less explained, it is clearly preferable to take his silence on these cases merely as that, silence. There is nothing in the description of these cases that rules out a physical explanation such as he offers in the other cases: the case of the sea could be due to reflection and colour contrasts due to combination or mixture. The texts as they stand are therefore compatible with limited infallibility. What is missing is a specification of the physical mechanism that he takes to explain them.

3.6 Conclusion

Aristotle thus regards colours and other perceptible qualities as real features of the environment, which can exist independently of being perceived and indeed of perceivers in general. They are not subjective features of our experiences, but objective features of objects. In the most basic cases, moreover, they appear to us *exactly as they are*. Perception reveals what colours are like just on their own, and similarly for odours, flavours, tones, and the rest. This correlation does not hold for our perception of other qualities and still less for quasi-perceptual experiences we might mistakenly take to be perceptions. But when one of these basic qualities affects our senses, we cannot go wrong. This is what Aristotle's direct realism and in particular his realism about perceptible qualities allows him. It is the manifest image sustained.

At the same time, Aristotle also maintains that we have awareness of our own perceptual awareness, which is perceptible in a way that is directly related to the perceptible quality that produced it. In seeing a colour, our perceptual awareness itself has a distinctive quality determined by that colour, because of the way the latter affects our visual organs, and this is something of which we can in some sense be aware. So we do have some awareness of the qualitative character of our perceptual experience in Aristotle's view. But it is parasitic on our first-order experiences. In describing the quality of our perceptual experience, we are forced to use terms drawn from the objects themselves and their characteristic qualities: the distinctive quality of our awareness is conceptually posterior to the external quality that appears to us in perception and determines its character. We are aware of our perceptual awareness, moreover, only peripherally and "on the side" of our first-order experiences. What we are aware of directly are the perceptible qualities themselves in our environment, just as they are in reality, and it is this that forms the basis of the rest of our perceptual experience.[132]

Notes

1 For an illuminating history of qualia and their relation to sense data, see Crane, "The Origins of Qualia".

2 For some representative texts on perceptual variation, see Protagoras, *ap*. Plat. *Tht*. 151E8–152C6 (= 80 B 1 DK); *ap*. Didym. *In Psalm*. 220.19–24 (ed. Gronewald, 380); Gorgias, *ap*. ps.-Arist. *MXG* 980b8–17; Melissus, *ap*. Simpl.

In De cael. 558.21–559.12 (= 30 B 8 DK); and Democritus, *ap*. Theophr. *De sens*. 63–64, 69 (= 68 A 135 DK); *ap*. Sext. Emp. *PH* 1.213–214, 2.63 (= 68 A 134 DK). For discussion, an important starting point is surely Burnyeat "Conflicting Appearances", but see also Lee "The Distinction between Primary and Secondary Qualities in Ancient Greek Philosophy" and her in-depth examination in *Epistemology after Protagoras*. On perception in early Greek philosophy, see my article "Perception in Ancient Philosophy", §§1–2.

3 Scholars are divided about the nature of appearances in Sextus Empiricus: although there are phenomenological readings in various flavors – e.g. Stough, *Greek Skepticism*, 119–125 and Burnyeat "Can the Sceptic Live his Scepticism?", esp. 217–218, 225–229 – there are epistemic or judgemental readings as well: e.g. Frede, "The Skeptic's Beliefs", famously, but also Barney, "Appearances and Impressions", who examines Sextus' usage against the backdrop of earlier philosophers' views about *phantasia*. She argues that for most of the philosophers in the tradition, appearances are judgements of one kind or another, although she acknowledges that Aristotle is an important exception (§2).

4 Matson, "Why Isn't the Mind-Body Problem Ancient?".

5 E.g. Johnston "How to Speak of the Colours", esp. 138–142. For discussion of his Revelation thesis and Campbell's "simple view of colours" (in "A Simple View of Colour") in relation to Aristotle, see my "Aristotle and the Problem of Intentionality", 64, n. 67; also Ganson, "What's Wrong with the Aristotelian Theory of Sensible Qualities?", 278–282; Decaen, "The Viability of Aristotelian-Thomistic Colour Realism", 204–208.

6 I have argued elsewhere that being perceived *as* something is essential to all forms of perception for Aristotle ("Aristotle on Perceptual Content", *in progress*).

7 *Categ*. 7, 6b2–4, b34–36; *Metaph*. 5.15, 1020b30–32. Due to considerations of space, I cannot provide full Greek texts for the passages I discuss, but I have noted the critical editions used. For the Greek of the *Categories*, I am relying on Minio-Paluello's OCT text and for the *Metaphysics* Ross's text (1924). All translations are my own.

8 *Categ*. 7, 6a36–37, b3–8, b28, 7a22–25.

9 For the Greek of the *De anima*, I am relying on Förster's edition (1912).

10 *DA* 3.2, 426a15–26.

11 *Categ*. 13, 14b27–29, 15a8–10; cf. 7, 7b15–16. Priority here is priority in existence, where the elimination of one relative entails the elimination of the other, but not *vice versa: Categ*. 12, 14a29–34; *Metaph*. 5.11, 1019a1–4.

12 *Categ*. 7, 7b35–8a12. For discussion of the texts and one-way existential independence, see my "Aristotle on the Reality of Colours and Other Perceptibles", §3.

13 *Metaph*. 9.3, 1047a4–10: "This will likewise hold for inanimate objects as well, since there will not be anything cold or hot or sweet or in general perceptible when no one is perceiving. Consequently, they will be committed to maintaining Protagoras' thesis."

14 For the first reaction, see §164 in Irwin, *Aristotle's First Principles*, titled "The Rejection of Realism" (313–314); also §165, which argues that this antirealism is of a piece with his commitment to the infallibility of the senses, as part of his response to scepticism. Others who understand this passage along similar lines include G. R. T. Ross, *Aristotle*, De sensu *and* De memoria, 149–150; W. D. Ross, *Aristotle's* Metaphysics, 1.278; Chisholm, *Perceiving: A Philosophical Study*, 129; and Taylor, "Aristotle's Epistemology", 140–141. For the second reaction, see Marmodoro's "Aristotle's Subtle Perceptual Realism," ch. 3 of *Aristotle on Perceiving Objects*, esp. §3.2, 134–141; Shields similarly takes it to be merely a denial of "*naïve* realism" (*Aristotle* De Anima, 268–269, my emphasis). He does not say anything more about what naïve realism consists in, but I suspect it would include the position I defend here and in my "Aristotle on the Reality of Colours

and Other Perceptibles." For exceptions to this general line of interpretation, see n. 28 below.

15 *Tht.* 156D2–E7 (cf. 182A4–B7).

16 For this reading, see Gottlieb, "Aristotle versus Protagoras", 112–113. W. D. Ross seems to assume something similar as well, even though he does not mention the *Theaetetus*, when commenting on *Metaphysics* 4.5: he takes it to imply that the perceptible quality has "a merely potential existence" and to support the view that "if the senses disappeared the sensible qualities would disappear" (in *Aristotle's* Metaphysics, 1.278 ad 1010b32). But his reading is difficult to extract from the text of 1010b31–35: "While perhaps it might be true that there would not be either *aisthêta* or perceptual stimulations, since this is a modification of the perceiver, it is impossible that the underlying things that produce perception would not exist in the absence of perception." Ross takes αἰσθητά here to mean "perceptible," as it often does in Aristotle; but in that case, the passage would actually *conflict* with our passage from *De anima* 3.2, which holds that as a power a perceptible *can* exist independently from perception. Moreover, it would be for the "odd reason," as Irwin notes (1988, 592, n. 31), that perceptibles are a *modification* of the perceiver (τοῦ γὰρ αἰσθανομένου πάθος, b33), a view hard to ascribe to Aristotle. It is far more plausible to take αἰσθητά here to mean, as the -τος ending sometimes does in Aristotle, things that are *actually perceived*, in which case 1010b31–35 is similar to *De anima* 3.2 after all, though in different language, and not in the way either Ross or Irwin take it. For full discussion, see my "Aristotle on the Reality of Colours", §4.

17 It may seem strange to hear a power described as an "actuality", but Aristotle is careful to distinguish possessing the power to *perform* a certain activity from the power to *acquire* that power, which Alexander of Aphrodisias would later call a "first potentiality" (*Quaest.* 3.2, 81.9 and 3.3, 84.34 Bruns) and Vetter has recently referred to as an "iterated potentiality" (*Potentiality: From Dispositions to Modality*, §4.6). Although these two powers are essentially connected, they do not collapse, but remain distinct, because Aristotle rejects transitivity in this case: if *F* is potentially *G* and *G* is potentially *H*, it does not follow that *F* is potentially *H* (*Metaph.* Θ.7, 1049a2–5, a19–24). It is therefore a significant development when an object has actually acquired a power for some activity, which it can then exercise without undergoing any further change, and so merits the term "first actuality".

18 Ierodiakonou in "Aristotle and Alexander of Aphrodisias on Colour" draws a similar distinction (at 83). Cf. Alexander of Aphrodisias' remark (*In Sens.* 42.7–10, 15–18 Wendland): "For colour in activity is not the same as sight in activity ... since they [*sc.* colours] can be in activity *even when they are not seen*, but apart from perception it would no longer be possible for them to be *perceptible* in activity ... What each of them is – colour, sound, and each of the [qualities] corresponding to the other senses – is potentially perceptible, since by saying 'it will produce perception and activity' he was characterising what is potentially perceptible." For a parallel distinction in Thomas Aquinas, see Decaen "The Viability of Aristotelian-Thomistic Colour Realism", 181–182.

In Aristotle's view, there is an asymmetry regarding the existence of the power of perception, however: if there were no perceptible qualities, there would be no senses or perceivers either. This is not because of its nature as a relative, but rather a peculiarity about perceivers: perceivers are animals and hence embodied, and bodies necessarily have perceptible qualities; so if the latter didn't exist, *a fortiori* perceivers and their senses wouldn't either (*Categ.* 7, 7b36–8a3, 8a9–10; *DA* 2.11, 423b26–29). For discussion, see my "Aristotle on the Reality of Colours", 40–41.

19 *Metaph*. 4.5, 1010b26–1011a2. On perceptibles as causal agents, *Meteor*. 4.8, 384b34–385a4; *DA* 2.5, 417b19–21; *Sens*. 2, 438b22–23 (cf. b5); 6, 445b4–8; *Insomn*. 2, 459a24–25; cf. also *Sens*. 3, 439a16–17; 4, 442b22–23; *DA* 2.7, 419a3; 2.10, 422a17; *Categ*. 8, 9b5–7; *GA* 5.1, 780b33. For discussion, see my "Aristotle on the Reality of Colours", §5, esp. 46. On the general point about causal relatives and priority, see *Categ*. 13, 14b27–29, 15a8–10; cf. 12, 14b11–13.

20 *Phys*. 3.1, 201b3–4 (cf. 201a29–b5) and its doublet in *Metaph*. 11.9, 1065b32: "... since they [*sc*. being bronze and being a change] are not the same, just as colour and visible are not [the same] ..." (... οὐ ταὐτόν, ὥσπερ οὐδὲ χρῶμα ταὐτὸν καὶ ὁρατόν ...) Cf. Alex. Aphr. *In Sens*. 1.16–17, 41.15–18 Wendland. For discussion, see Ganson, "What's Wrong with the Aristotelian Theory of Sensible Qualities?", 267.

21 In Aristotle's view, phosphorescent qualities are visible, but not colours (*DA* 2.7, 418a26–28; 419a1–7).

22 *DA* 2.7, 418a26–b2. This definition is recapitulated more briefly later in the chapter, at 419a9–11, again without mentioning vision: "For this for it is *what it is to be a colour* [τὸ χρώματι εἶναι], namely, to be capable of effecting change in what is actually transparent."

23 A point well made by Everson (*Aristotle on Perception*, 21–30) and noted by Lee ("The Distinction between Primary and Secondary Qualities", 32, n. 21), although it had already been noticed earlier by Sorabji that Aristotle's definitions of various perceptible qualities rarely mention the senses ("Aristotle on Demarcating the Five Senses", 55, n. 2). For further discussion, see Broackes, "Aristotle, Objectivity and Perception", 60–61.

24 Aristotle's distinction thus contradicts Broadie's claim that he is committed to what she calls "the Restricted Efficacy of Sensibilia" ("Aristotle's Perceptual Realism", §3, but esp. 145–147, 153). Aristotle's point is precisely that colour's causal power can be described, and indeed is defined, without reference to perception, in terms of its effects on the inanimate medium.

25 *Sens*. 3, 440b13–15: "It is clear that when [these bodies] are mixed, necessarily the colours are mixed too and this is what chiefly responsible for there being many colours." For discussion of the evidence and its implications, see my "Aristotle on the Reality of Colour and Other Perceptibles", §7, esp. 7.3.

26 See Campbell "A Simple View of Colour"; Johnston "How to Speak of the Colours."

27 See §§7.2 and 7.3 of my "Aristotle and the Problem of Intentionality."

28 A few other scholars adopt a realist interpretation broadly similar to the one I defend here and in my "Aristotle on the Reality of Colour and Other Perceptibles", at least in their general orientation. Ganson (in "What's Wrong with the Aristotelian Theory of Sensible Qualities?") offers a detailed and nuanced reading of the texts, which uses Greek commentators like Alexander and Simplicius to advantage, as well as Theophrastus, to show how Aristotelians can answer Galileo's and Descartes' objections. Decaen (in "The Viability of Aristotelian-Thomistic Colour Realism") vigorously defends a form of colour realism he attributes to Thomas Aquinas and Aristotle against current theories of colour (and so confirms my suspicion that the position I have adopted is in many ways a traditional one among Thomists). Merker contrasts Aristotle's realism about colours with Plato's view in the *Timaeus*, which on her reading holds that colour is only a property of the visual "stream" and so does not really belong to the body we attribute it to ("Aristote et l'arc-en-ciel", 197; *La vision chez Platon et Aristote*, 207–209, 219–220, 246). Ierodiakonou also seems to assume this general outlook ("Aristotle and Alexander of Aphrodisias on Colour", 83, 87).

29 *Metaph*. 4.5, 1010b35–1011a2.

30 See n. 19 above.
31 *Sens*. 6, 446a20–25: "One might worry whether perceptibles or the changes from perceptibles (in whichever way perception in fact arises), arrive first at the midpoint when they are active, as for example odor and sound clearly do. For the person who is close smells the odor earlier, and the sound arrives later than the striking [of an object]." For the Greek of the *De sensu*, I am relying on Förster, *Aristotelis* De sensu *et* De memoria *libri*, 1942.
32 *Sens*. 6, 446b17–21. Förster inserts ἓν after χωρὶς ὄντας at b20 on the basis of Alexander's paraphrase (*In Sens*. 130.8 Wendland), but this seems like a weak basis for emendation. Better to take τὸ αὐτὸ in the previous line as tacitly understood.
33 *Tht*. 153E7–154A4: "What we say each colour is, then, will not be either what strikes [against something] or is struck, but rather something that results in between which is *unique to each perceiver* [ἑκάστῳ ἴδιον]".
34 *MXG* 5, 980b9–14 Diels: ἀλλὰ πῶς ὁ ἀκούων τὸ αὐτὸ ἐννοήσει; οὐ γὰρ οἷόν τε τὸ αὐτὸ ἅμα ἐν πλείοσι καὶ χωρὶς οὖσιν εἶναι· δύο γὰρ ἂν εἴη τὸ ἕν. εἰ δὲ καὶ εἴη, φησίν, ἐν πλείοσι καὶ ταὐτόν, οὐδὲν κωλύει μὴ ὅμοιον φαίνεσθαι αὐτοῖς, μὴ πάντῃ ὁμοίοις ἐκείνοις οὖσι καὶ ἐν τῷ αὐτῷ· εἴ <γὰρ> ἐν τῷ αὐτῷ εἴησαν, <εἷς ἂν> ἀλλ' οὐ δύο εἶεν. I reproduce Ioli's text here, which accepts Cook Wilson's insertion (conjecturing haplography), but retains the optative from the MSS (Ioli (ed.), *Gorgia di Leontini*, Su ciò che non è, 106, with her discussion on 142–143; cf. Cook Wilson, "Apelt's Pseudo-Aristotelian Treatises", at 7 (1893), 38).
35 *Sens*. 6, 446b21–26.
36 Alexander of Aphrodisias wrongly takes this distinction to show that we do not perceive the bodies themselves, but only modifications and changes, which are not independent of body (*In Sens*. 131.1–3 Wendland), where the modification Alexander has in mind is in the part of the medium proximate to each perceiver (130.16–19, 131.5). But this interpretation ignores Aristotle's claim that we *do* all perceive the very same thing.
37 Corcilius ("Common Sense and Extra Powers", 316; "The Gate to Reality", 131) takes τοῦ ἰδίου at 446b23 to refer to a "special" or exclusive perceptible (ἴδιον αἰσθητόν), as ἴδιον often can signify; G. R. T. Ross explains it the same way (in his translation of *De sensu and De memoria*, 210 ad loc.), and it is translated this way by both Beare in *The Parva Naturalia* and Miller in *On the Soul*. But construing it that way would imply that colours, odours, and smells are different for each perceiver, which would effectively *concede* the objection posed by the *aporia*: different perceivers would *not* hear the same sound or smell the same odour, but *numerically different* ones (a consequence G. R. T. Ross seems to accept, as does W. D. Ross in *Parva Naturalia*, 219). But we don't have to take the mention of what is "exclusive" (ἴδιον) here to refer to exclusive perceptibles, since αἰσθητόν has not been used anywhere in the immediate context. Since the *aporia* only questions in a more general way whether perceivers see, hear, or smell "the same thing" (τὸ αὐτό), what is at stake is what is *unique* (ἴδιον) to each perceiver, in contrast with what is perceived *in common*.
38 Against Kalderon *Form without Matter*, ch. 9, esp. 173–184. For discussion, see my "Review of Mark Eli Kalderon", esp. 387–389.
39 The only qualification is that the power of perception is preserved, rather than destroyed, when activated, and so "comes into its own" and realises its nature, rather than being altered into something else: "Being modified is not simple either, but one type is a sort of destruction by the opposite, the other is rather a preservation of what is in its power by what is in actuality and similar, in the way that a power is related to its activity. For what has knowledge comes to contemplate, and just on its own this is either not altering (since it arrives at itself and its actuality), or it is a different kind of alteration. ... either one ought to say that it is not a case of being modified or that there are two forms of alteration, one a transition

to privative conditions, the other to its dispositions and nature" (*DA* 2.5, 417b2–7, b13–15).

40 *Sens*. 6, 446b2–4: "And given that it is always the case one hears and has heard at the same time, and generally perceives and has perceived, and there is no coming-to-be of them, but instead they are, without coming into being …" On verbs in the present and perfect being true at once for activities, see *Metaph*. Θ.6, 1048b23-35. On being or not being, without coming or ceasing to be, see *Phys*. 8.6, 258b16–20; *Cael*. 1.11, 280b26–31.

41 *Sens*. 6, 446b4–9: "… just as when, though a blow has already occurred, the sound has not yet reached [anyone's] hearing; a transformation in the phonemes also shows this, namely, that a transmission through the medium occurs; for people seem not to hear what was said due to the transmitted air undergoing a transformation." Cf. n. 92.

42 This is true even if τις is understood in an *alienans* sense, i.e. that it is a modification and change only "in a sort of way," as some might insist, since in context Aristotle is clearly referring to the activity of perceiving. But there is no textual reason to think he is excluding reference to material changes either. So he may have in mind *both* the activity of perceiving as such and any underlying changes as well, taking τις just to indicate the specific type of change in a body that perception is, taken as a whole. This difference is idle, though, for present purposes.

43 *Sens*. 6, 446b10–13: "For it is not just by standing in some relation that one sees and another is seen, in the manner of things that are equal. For then nothing would need to be in any particular place, since it makes no difference to becoming equal whether things are near or far from each other."

44 Aristotle discusses the transmission of perceptual stimulations to the central sense organ in *De insomniis* 3, to explain the verisimilitude of dreams: 461a25–b5, b21–30. He identifies this organ with the heart: *Somn*. 2, 455a19, 455b34–456a6; *Juv*. 1, 467b18–27; 3, 469a5–20; 4, 469a23–34, b1–6; *PA* 2.1, 647a24–31; 2.10, 656a27–29; 3.3, 665a10–15; 3.4, 666a11–18, a34–35; 4.5, 678b2–4, 681b13–17; *MA* 11, 703b23–24; cf. *Mem*. 1, 450a10–14; *Insomn*. 3, 461a4–8.

45 The perceptual stimulation produced in the peripheral organs on his view always gives rise to echoes or traces as a by-product, which are able to affect the central perceptual organ in similar ways (*DA* 3.3, 428b10–17; *Insomn*. 1, 459a17–19; 2, 460b22–25), though they are weaker in strength (3, 460b28–461a8; *Rhet*. 1.11, 1370a28–29). In such cases, however, it would no longer be a genuine perception or involve a perceptual stimulation in the proper sense, but merely representations or *phantasmata* (*Insomn*. 3, 461a25–b5, b21–30). See below, Section 3.5.1.

46 For discussion of the content and character of these quasi-perceptual representations or *phantasmata*, see my "Aristotle and the Problem of Intentionality"; "Aristotle and the Cartesian Theatre"; and "Aristotle on Illusions, Hallucinations, and Dreams: Is he a Direct Realist?" (in progress).

47 As is attributed to Aristotle by Everson (*Aristotle on Perception*, 177, 197, 200) and followed by Moss (*Aristotle on the Apparent Good*, 51, n. 10). For discussion of their view, see my "Aristotle and the Cartesian Theatre", 194 and esp. 219, n. 97. It is possible that *Plato* may have held this view, on the other hand. In several late works, he speaks of our being immediately aware of the effect perceptible objects produce in our bodily organs (e.g. *Tht*. 186C, E; *Tim*. 42A, 64D; *Phileb*. 32A, 33D–34A), though it is unclear whether this bodily awareness merely accompanies our perception of the external object or whether we perceive the latter *by* perceiving the former. Ganson ("The Platonic Approach to Sense-Perception") sometimes treats it as just an accompaniment (1–4), resulting in what he calls "bifurcated" perception. But he later argues that in the *Timaeus* our perception of external objects is "mediated" by our awareness of their effect on our bodies (9–10).

48 The explanation Aristotle offers in *De anima* 2.12 for why plants don't perceive will hold *a fortiori* for the medium: even though plants have a soul and are affected by perceptible qualities, they "do not possess a mean or the sort of principle that can receive the forms of perceptibles, but instead are modified with the matter" (αἴτιον γὰρ τὸ μὴ ἔχειν μεσότητα, μηδὲ τοιαύτην ἀρχὴν οἵαν τὰ εἴδη δέχεσθαι τῶν αἰσθητῶν, ἀλλὰ πάσχειν μετὰ τῆς ὕλης, 424a32–b3). The same will be all the more true of the inanimate medium, since it does not even have a soul. For discussion of this passage, see my "Aristotle on the Transmission of Information", 18–22. Corcilius argues this is so because the verb "receives" (δέχεσθαι) is restricted to cognition and does not feature in Aristotle's general account of change ("The Gate to Reality", 149 n. 55). But he overlooks the *Categories*, where one of the most distinctive characteristics of substance is precisely its ability to "receive" opposites, by taking them on (5, 4a10–21, a28–34, b2–4, b13–18), and perfect forms of δέχεσθαι likewise indicate possession of an attribute (8, 9a28–b9). For other noncognitive cases of reception, see *DA* 1.3, 407b21; 2.7, 418b26–27; *Sens.* 3, 439b7; *Mem.* 1, 450b4–5; *Somn.* 1, 453b27–31; *Insomn.* 2, 460a13; cf. also Plato *Tim.* 51ʙ4–6.

49 *Phys.* 7.2, 244b12–245a2 (using Version α here from Ross 1936). Corcilius ("The Gate to Reality", 124, n. 5) mischaracterises my construal of this passage as involving a "that" clause, but the passage he cites (Caston "Aristotle on Consciousness", 757) is consistently framed in terms of being aware *of* one's perceiving, a distinction emphasised later in the article (770).

50 Although Aristotle introduces this claim conditionally (εἰ γάρ), as a premise in an argument against earlier theories, he never retracts it and seems to take the objection to be conclusive. The assumption is consistent, moreover, with stronger statements in *De anima* 3.2 and *Nicomachean Ethics* 9.9 (see below). Ross inserts a second μή in order to bring the text in line with Alexander of Aphrodisias' interpretation, that it is impossible to be unaware of seeing *nothing*. But the *De sensu* text makes sense as it stands in the manuscripts, indeed better sense.

51 Aristotle's arguments are often taken to show that this higher-order perception is due to the perceptual *power*. But the Greek αἴσθησις and ὄψις are ambiguous between power and activity, and I have argued elsewhere that the passage is better understood here as primarily referring to the activity (for extensive discussion, see my "Aristotle on Consciousness"). But this controversy does not affect the central claims here: the more common reading (which I call "the moderate capacity reading") will work just as well.

52 *Metaph.* 12.9, 1074b35–36. For discussion of the indirectness of this higher-order perception, see §9 of my "Aristotle on Consciousness", 785–787.

53 For the interpretation of the *Nicomachean Ethics* 9.9 passage, see my "Aristotle on Consciousness", 774–775. More recent commentators have argued that Aristotle is not committed to this view in *De anima* 3.2: on their view, higher-order awareness can, but need not, accompany first-order perception (Johansen, "In Defense of Inner Sense"; McCabe, "Perceiving that We See and Hear"; Gregoric, "Perceiving that We are Not Seeing and Hearing"; Perälä "Perceiving that We See and Hear in Aristotle's *de Anima*"; and most recently Ierodiakonou "Perceptual Attention", 175, n. 3). But Kosman's criticism of Johansen (Kosman, "Comment on Johansen", 280–282, cited only by McCabe) is decisive against this whole line of interpretation: if there needn't always be a higher-order awareness, an infinite regress is not generated in the first place, and so the problem Aristotle poses never even gets out of the starting blocks. It would also make the solution that Aristotle in fact offers in *De anima* 3.2 otiose, since he would no longer need to deny the assumption that the αἴσθησις must be distinct, as he explicitly does; if there needn't always be a higher-order awareness on his view,

then he can unproblematically accept a distinct internal monitoring sense. This line of interpretation, then, is doubly uncharitable to Aristotle, merely to accommodate a view that *we* typically hold about higher-order awareness. But other philosophers – notably, Descartes, Arnauld, Brentano, Husserl, Sartre, and possibly Burge – do not share this current view (see my "Aristotle on Consciousness", 791–792, n. 85–90). Aristotle, I believe, belongs with this last group of philosophers, as *NE* 9.9 clearly shows.

54 Aristotle does not use an epistemic verb like "know" here, but insists on its being achieved through a sensory activity (or on the traditional reading, a sensory capacity). While that doesn't rule out an interpretation in terms of access consciousness, the onus of proof would be on such an interpretation: we would need either positive textual evidence in favour of such a reading or an argument as to why this makes better sense of Aristotle's views overall.

55 *DA* 3.2, 17–19. Johansen ("In Defense of Inner Sense", 246–248) argues against construing τὸ ὁρῶν as referring to the activity of seeing (e.g. Caston, "Aristotle on Consciousness", 788–789), in favour of the person seeing, despite the substantive being neuter in gender. As he himself mentions and concedes, substantives formed from the neuter participle are used to designate a mental state or activity in Thucydides. But Johansen denies this is evidence that Aristotle might have used the construction that way, quoting a remark from Popp's 1827 commentary claiming that that this is uncommon outside of Thucydides, along with a brief remark from Denniston, "Two Notes", which Johansen takes to favour construing the neuter as referring to a person. But this is an overly selective reading of Denniston. The latter notes that Antiphon also uses the construction for mental activities and Denniston goes on to endorse a version of the activity construal for τὸ ποθοῦν at Sophocles *Trach*. 196, the subject of the article, which he renders as "their eager craving" (7–8). Given that several classical authors use this construction for mental activities, the only question is whether Aristotle does too, a question that cannot be settled by philological generalisations, but only by close attention to its use in context (as offered above).

Aristotle actually uses τὸ ὁρῶν elsewhere in the corpus, in several different ways. (1) At *De sensu* 2, 437b1–10, it seems to refer to the eye, which in certain conditions both sees and is seen (b4, b9); it may occur later in the chapter as well, depending on how we construe ἐν ἐκείνῳ ἀλλ' ἐν τῷ ὁρῶντι at 438a7–8. One might possibly take *Meteorology* 1.8, 345b12 and 16 to refer to the eye, though the eye is not mentioned explicitly in context. On the other hand, (2) in *Metaphysics* Θ.6, τὸ ὁρῶν occurs in a passage where Aristotle is seeking to draw a general distinction between activity and potentiality through induction, where all the examples use neuter substantives formed from participles (1048a35–b4). Those formed from present participles are most plausibly construed as referring not to agents, but their activities (building, waking, seeing); those formed from perfect participles likewise do not refer to the agent, but to a product that has come into being. This confirms that Aristotle can use the construction for the activity itself and this, together with the puzzle raised about seeing the activity of seeing from Plato's *Charmides*, which Aristotle clearly has in mind, make an activity reading entirely plausible.

56 This example occurs as part of a general argument against the possibility of knowledge that is knowledge of itself, in which Socrates cites a string of iterated psychological attitudes as obvious counterexamples to such reflexivity: a perception of perceptions, a desire of desires, a belief of beliefs, and several others (167B–168A). The specific case Aristotle is responding to, "a sight of sights" (ὄψεων ὄψις, 167c10), concerns an occurrent activity rather than a capacity, as the plural "sights" makes clear, and similarly as regards most of the examples. For further discussion of this argument, see McCabe "Perceiving that We See and Hear", §4–6;

Tuozzo, *Plato's* Charmides, 218–219, who both rightly point out that Socrates' main target in the passage is knowledge. But that does not erase the fact that the phrase "a sight of sights" and many of the others clearly refer to activities.

57 *DA* 3.2, 425b20–22: "Yet clearly perceiving by sight does not consist in just one thing, since we can also discern by sight when we are not seeing, as well as light and darkness, though not in the same way".

58 McCabe 2015 argues Aristotle's initial response does address this concern, by introducing an essentially judgemental and reflective account of higher-order perception. But since there are no other indications of such an account in the opening arguments of *De anima* 3.2, and it would pose serious difficulties for the content of e.g. animals' perceptions (which McCabe mentions but does not resolve, 299 n. 73), I find it hard to take Aristotle's initial response as offering an Archimedean point, as McCabe does, even though we are both in agreement that Aristotle is a close reader of Plato.

59 *DA* 3.2, 425b22–25.

60 This criticism applies equally to Johansen's solution ("In Defense of Inner Sense", 251–252; cf. 260–261, 267): it is not clear in what way the colouring is observable, if it is like the "appearance" of the colour in the medium, as he claims. For the medium does not become observably coloured at all.

61 *DA* 2.11, 424a15–2.12, 424a24.

62 For this interpretation, including a close examination of *De anima* 2.12, see my "Aristotle on the Transmission of Information".

63 Shoemaker, "Qualities and Qualia", 98–99, 116; Shoemaker, "Qualia and Consciousness", 121, 132; Peacocke, *Sense and Content*, ch. 1. There are differences here as well, to be sure. I am not in any way claiming that Aristotle has the same view.

64 Aristotle notes that in the case of describing odours, we often have no recourse other than to refer to the types of object that produce it (*DA* 2.9, 421a31–b3). But this also occurs when we make finer distinctions between perceptible qualities, as, for example, with shades of a given colour, such as saffron yellow.

65 Contrast this position with the subjectivist interpretation above (Section 3.1), where the quality is fully real only in our experience; as such, it would be quite different from the way the corresponding first actuality exists in world, not unlike Descartes' treatment of colours and other such qualities in the Sixth Meditation.

66 Aristotle states this generalisation *six times* without qualification:

(1) *DA* 2.6, 418a12: "it is not possible to be in error about" exclusive perceptibles (περὶ ὃ μὴ ἐνδέχεται ἀπατηθῆναι).
(2) *DA* 3.3, 427b11–12 "the perception of exclusive [perceptibles] is true in every case" (ἡ γὰρ αἴσθησις τῶν ἰδίων ἀεὶ ἀληθής).
(3) *DA* 3.3, 428a11: "next, while perceptions are always true ..." (εἶτα αἱ μὲν ἀληθεῖς ἀεί ...).
(4) *DA* 3.6, 430b29: "but just as seeing an exclusive [perceptible] is true ..." (ἀλλ' ὥσπερ τὸ ὁρᾶν τοῦ ἰδίου ἀληθές ...).
(5) *Sens*. 4, 442b8–10: "for this reason, though we err about these [*sc*. the common perceptibles], we do not err about the exclusive ones: for example sight [does not err] about a colour or hearing about sounds" (διὸ καὶ περὶ μὲν τούτων ἀπατῶνται, περὶ δὲ τῶν ἰδίων οὐκ ἀπατῶνται, οἷον ἡ ὄψις περὶ χρώματος καὶ ἡ ἀκοὴ περὶ ψόφων).
(6) *Metaph*. 4.5, 1010b1–3: "even though perception is not false, at any rate [perception] of the exclusive [perceptible is not], ..." (πρῶτον μὲν ὅτι οὐδ' <εἰ>

ἡ αἴσθησις <μὴ> ψευδὴς τοῦ γε ἰδίου ἐστίν ..., accepting Bonitz' conjectures based on Alexander, printed by both Ross and Jaeger).

On a seventh occasion, Aristotle appears to qualify this generalization, saying "the perception of exclusive [perceptibles] is true *or has falsehood to the least possible extent*" (ἡ αἴσθησις τῶν μὲν ἰδίων ἀληθής ἢ ὅτι ὀλίγιστον ἔχουσα τὸ ψεῦδος, *DA* 3.3, 428b18–19). But in the very next sentence he continues as though error only enters at a *subsequent* stage, when extrinsic or incidental perceptibles are involved: "it is *here at just this point* that it is possible to be mistaken" (καὶ ἐνταῦθα ἤδη ἐνδέχεται διαψεύδεσθαι, 428b20). Very few interpreters have mentioned this subsequent remark, much less tried to account for it. But Barnes ("An Aristotelian Way with Scepticism", 55, n. 14) and Shields (*Aristotle* De Anima, 291) both acknowledge that it cannot be reconciled with the apparent qualification that precedes it, while Hicks interpolates something not present in the Greek at 428b20, saying the second sentence only concerns "serious" error (Hicks, *Aristotle*, De anima, 471 ad loc.). In context, then, *Aristotle does not himself embrace the qualification* he mentions, which so many commentators have made pivotal to their interpretations. For discussion, see my "Aristotle on the Transmission of Information", 49–50.

67 In addition to the two main texts quoted just below from *Metaphysics* 4.5 and *De anima* 2.6, Aristotle makes the same observations about mistakes elsewhere as well: for example, about (i) the particular object a quality belongs to ("whether this, or something else, is white," *DA* 3.3, 428b21–22: εἰ δὲ τοῦτο λευκὸν ἢ ἄλλο) and (ii) the type of object ("whether what is white is a human or not", *DA* 3.6, 430b29–30: εἰ δ' ἄνθρωπος τὸ λευκὸν ἢ μή).

68 For an examination of some of these cases, see the next section. For discussion of Aristotle's treatment of this tradition in Greek philosophy, see Long, "Aristotle and the History of Greek Scepticism", esp. §3; also DeLacy "οὐ μᾶλλον and the Antecedents of Ancient Scepticism", 61–64, 68, 70–71; Lee, *Epistemology after Protagoras*, ch. 7; for in-depth criticism of Long, see Anagnostopoulos, "Aristotle on Scepticism." On the earlier tradition itself, see Burnyeat's classic discussion in "Conflicting Appearances"; also Hankinson, *The Sceptics*, ch. 3; Lee, *Epistemology after Protagoras*, esp. chs. 3, 8–9; and Lee, "The Distinction between Primary and Secondary Qualities".

69 On this point, Kenny briefly agrees ("The Argument from Illusion", 191), but then retracts it, allowing that we can be mistaken on a given occasion, even if the faculty is incorrigible (193); see n. 73 below. Johnstone thinks ("Aristotle and Alexander on Perceptual Error", 317) we can be mistaken about colours or flavours because we can be mistaken about "the *true* size or colour *of a thing*" or "the *true* flavour *of a thing*" (my emphasis). But I think this runs together the two cases: Aristotle can consistently maintain that we are correctly perceiving the presence of a quality somewhere in our environment while being mistaken in taking it to belong to a particular object. For discussion, see my "Aristotle on the Transmission of Information", 48, n. 96.

70 *Metaph*. 4.5, 1010b19–26. For discussion, see Kenny, "The Argument from Illusion", 195–196; Kirwan, *Aristotle* Metaphysics, 112; Lee, *Epistemology after Protagoras*, 173–174. Cf. Theophrastus, *De sens*. 70, 519.26–520.1 Diels: "Yet even if the sweet and the bitter do not arise for everyone through the same things, the *nature* [φύσις] of the bitter and the sweet does indeed appear to be the same for everyone. Even [Democritus] himself seems to confirm this. For how could what is bitter to us be sweet or sour to others unless they had a definite nature [ὡρισμένη φύσις αὐτῶν]?".

71 *EN* 6.7, 1141a22–24: "So if healthy and good are different for humans and fishes, but white and straight are always the same ...".

72 *DA* 2.6, 418a14–16 (cf. a12). It is grammatically possible to translate the clause, ὅτι χρῶμα ... ὅτι ψόφος as claiming that the quality perceived *is a colour* or that it *is a sound*, rather than a quality from a different sense modality (Osborne, "Aristotle, *De anima* 3.2", §3 and "Perceiving White and Sweet (Again)", 439; cf. Kenny, "The Argument from Illusion", 191). But on that construal, the senses themselves would, as part of their intrinsic activity, be able to classify a quality under a more general kind, something Aristotle elsewhere attributes to accidental or extrinsic perception instead (*Metaph*. 13.10, 1087a19–20), not intrinsic perception; and it would be especially difficult to make sense of in the context of *De anima* 2.6, where he is trying to distinguish what can be intrinsically perceived by a single sense from what is perceived by several senses or the perceptual capacity as a whole. At *De anima* 3.2, 426b8–12 Aristotle makes clear that each sense discriminates the specific qualities within its range from each other, that is, sight discriminates white from black and taste discriminates sweet from bitter and so on. Notice finally the plural ψόφων at *Sens*. 4, 442b9–10: we are infallible about *which sounds* we hear, not whether it is *a* sound.

73 A point rightly made by Kenny ("The Argument from Illusion", 192).

74 *DA* 2.6, 418a16; 3.3, 428a12–16, b19–25; 3.6, 430b29–30; cf. 3.1, 425b6–9.

75 Against Kenny, who claims it merely involves incorrigibility, because we cannot "appeal to a court higher than" a particular sense ("The Argument from Illusion", 193), I am making the stronger claim that these perceptions are *true of* some part of our environment that is acting on our senses. Kenny ignores the causal role of the external quality that produces a perception of itself. For further discussion, see my "Aristotle on the Transmission of Information", 42–51.

76 See references in n. 19 above.

77 *Metaph*. 9.5, 1048a2–10: "Some things are capable in virtue of reason and their powers are accompanied by reason, while others are nonrational and their powers nonrational. The former are necessarily found in something animate, while the latter can occur in both [animate and inanimate things]. The latter powers are necessarily such that whenever what is capable of acting and what is capable of being modified come near each other in such a way as to be enabled, the one acts and the other is modified; but in the former cases, this is not necessary. For while all [nonrational powers] can each produce just a single effect [μία ἑνὸς ποιητική], [the rational powers] can produce contraries; so [if rational powers necessarily produced their effects], they would produce contraries at the same time; but this is impossible."

78 See esp. *GC* 1.7, which Aristotle invokes at *DA* 2.5, 417a1–2, applying it explicitly to perception; cf. also *DA* 2.11, 423b29–424a2. For the connections between the treatment of alteration in the *De anima* and the physical works, see Burnyeat, "Introduction: Aristotle on the Foundations of Sublunary Physics", §1.

79 By making this distinction, I can accept Anthony Price's claim that "Aristotle's thought cannot be that things always look the colour they are" ("Aristotelian Perception.", 300). For how "things look" is a matter of which qualities *objects* appear to have, and we can indeed be in error about which qualities they actually have. My point is orthogonal. For we still will not be mistaken that the quality an object appears to have exists in our environment and is acting on our senses, whether or not it belongs to that particular object. Price may leave room for this when he claims, just before the sentence quoted, "[s]o far, so infallible" with regard to the perceptible quality.

80 Aristotle offers a classic description here of what is sometimes called a "negative afterimage", following a brief initial "positive" afterimage of the same colour. For a closely parallel description of the phenomenon, see Gregory, "After-Image", 13. Just before this passage, Aristotle also describes light adaptation in terms that suggest positive afterimages (459b7–11): when we shift our gaze, "the

modification follows" it (μεταφερόντων αἴσθησιν ἀκολουθεῖ τὸ πάθος, b9), as we go from sunlight into darkness. On the priority of Aristotle's observation, see van Hoorn, *As Images Unwind*, ch. 3, note F, 104–105.

81 Delusions in fever: *Insomn.* 2, 461b11–16 (cf. also hypnagogic hallucinations: 3, 462a12–15). Dreams: *Insomn.* 3, *passim*, but esp. 461b21–30; cf. 462a1–8. In grouping these phenomena together, I do not mean to imply that afterimages are a type of hallucination rather than illusion, a question discussed by Phillips, "Afterimages and Sensation", who argues that they are just illusions. I take Aristotle's remarks here to be compatible with either position. He discusses these phenomena together only because he thinks they offer evidence of a common aetiology.

82 Aristotle uses "appear" (φαίνεσθαι) frequently in these contexts, which he distinguishes carefully from believing (δοκεῖν): see, e.g. *Insomn.* 3, 461b3–7; cf. 2, 460b16–22. For extensive discussion of illusions, hallucinations, and dreams, see my "Aristotle on Illusions, Hallucinations, and Dreams: Is he a Direct Realist?" (*in progress*).

83 For discussion, see my "Aristotle and the Problem of Intentionality", 272–279.

84 *DA* 3.3, 428b10–18, 428b30–429a8; cf. 427a29–b2.

85 Memory: *Mem.* 1, 450a27–32, b10–11, together with 450a10–13. Dreams: *Insomn.* 3, *passim*; note that at *Somn.* 2, he says that a dream is only "a perceptual stimulation *in a way*" (αἴσθημα τρόπον τινά, 456a26). Desire: *DA* 3.10, 433a11–12. Thought: *DA* 3.7, 431a16–17, b2; 3.8, 432a8–14; *Mem.* 1, 449b31–450a1.

86 A dream is a quasi-perceptual representation or *phantasma* that occurs during sleep (*Insomn.* 1, 459a19–20; 3, 462a16–18), although not every *phantasma* in sleep is a dream (1, 458b24–25; 3, 462a18–25). Sleep is the shutting down of the perceptual power's activity: *Somn.* 2, 455b2–13; also 1, 454b9–11, 25–26; 3, 458a28–29; cf. 456b9–10, 17–19.

87 Cf. *Sens.* 3, 439b6 and n. 118 below.

88 Aristotle may have a similar thought in mind when he says in *Nicomachean Ethics* 10.5 that the same things do not seem sweet to a feverish person and to a healthy one (1176a12–15; cf. 3.4, 1113a26–29); or in *Metaphysics* 4.5 that wine can taste different to a single person on different occasions, if their condition has changed (1010b21–23, quoted above, pp. 65–66). He does not elaborate, but both could in principle be explained in the same way. The only textual evidence that appeals to internal conditions in the organ is from Book Kappa of the *Metaphysics*, which denies that the same thing can appear sweet to one person and not to another *unless* someone's sense organ and "criterion" is "decrepit or damaged" (διεφθαρμένων καὶ λελωβημένων τῶν ἑτέρων τὸ αἰσθητήριον καὶ κριτήριον, 11.6, 1062b36–1063a3). But there is good reason to think that this text is not by Aristotle himself, even if it originated in his school. Though common in Hellenistic philosophy, the term κριτήριον is a *hapax legomenon* in Aristotle, and the view this text endorses is not found elsewhere in his extant works. For full discussion, see my "Aristotle on the Transmission of Information", 47 n. 95.

89 Intermediate colours as mixtures of white and black: *Sens.* 3, 440a15–26. Mixture of underlying transparent material and opaque matter like earth: e.g. *Sens.* 3, 439a21–b18 (esp. b8–10). See also Ierodiakonou, "Aristotle and Alexander of Aphrodisias on Colour", 84, who cites multiple passages which attribute dark colours to the presence of water as well as earth.

90 In discussing the sun seen through haze, Kalderon argues that Aristotle, like J. L. Austin in *Sense and Sensibilia*, does not think that there is a genuine problem of conflicting appearances, on the grounds that colour constancy – the constancy of an object's "presented colour", according to Kalderon, like what Aristotle calls its "proper colour" (see immediately below and Section 3.5.5) – is compatible with that colour's also appearing in visually different ways (*Form*

without Matter, 56–57, 117–118; "Aristotle on Transparency", 231–232). But Aristotle nowhere deploys this distinction in the way Austin does. In particular, he does not characterise the redness as a merely subjective appearance of the sun; it is rather a real feature of the environment, produced by the causal interaction of the sun's proper colour with material in the medium. If we attribute redness to the sun, then in Aristotle's view there *is* a conflict in how *the sun* appears and we are just wrong about that (*pace* Austin). But we are still correct about *the colour* that appears and its presence in our vicinity (Section 3.4).

91 A much more complex development of this idea can be found in the Ps.-Aristotelian *De coloribus* (3, 793b12–32).

92 Aristotle does emphasise one respect in which they differ: the change colour initiates does not travel through the medium over time as they do (as noted above in n. 41), but is an alteration that happens all at once (*Sens*. 6, 446b28–447a6). But this difference is independent of whether conditions in the medium affect the resulting appearance of colour.

93 We could add that the colours that appear in these phenomena are in fact independent of *any* perceiver, since they can be photographed without any perceiver in the vicinity.

94 Cf. 3.1, 371a17 (χρωματίζων), a22–24 (μελᾶναι, ἔχρωσε); 3.3, 372b24–25 (μέλαιναι γίγνονται τὴν χρόαν ... μάλιστα). The Greek for the *Meteorology* is taken from Fobes (ed.), *Aristotelis* Meteorologicorum *libri quattuor*, 1919.

95 As they are repeatedly characterised in the literature: e.g. Boyer, *The Rainbow*, 53; Merker, "Aristote et l'arc-en-ciel", 200–201 (cf. Merker *La vision chez Platon et Aristote*, 238–241); Mansfeld, "From Milky Way to Halo", 30–33; Johnson, "The Aristotelian Explanation of the Halo", 329, 330, 332.

96 *Meteor*. 3.2, 371b20–21, 372a17–21; 3.3, 372b33–373a2; 3.4, 373a35–b1, b6–7, 373b32–374a3. For reflectors, see esp. 3.4, 373b6–32, 374a23–29, b18–21; 3.6, 377b6–378a11; cf. 1.5, 342b12; 1.8, 345b13–15, 19, 26; 3.2, 372a33, b1; 3.3, 373a22.

97 Aristotle severely criticises extromissionist theories of vision at *De sensu* 2, 438a25–b2 (cf. *Mem*. 2, 452b10–11) and extromissionist theories of reflection at *De anima* 3.12, 435a5–10, which he explicitly rejects in favour of the theory he defended earlier in *De anima* 2.7, where the object of vision affects the medium, which then affects the eye. In *De generatione animalium* 5.1, he mentions extromissionist theories as something some unnamed people hold, but maintains that it "makes no difference" to his explanation of seeing at greater distances whether sight leaves the eye or a change comes from the object (781a3–8).

98 E.g. *Meteor*. 3.2, 372a29–32; 3.4, 373b22–24, 375a3; 3.6, 377a30–34, b6–7, b18–19; cf. 1.8, 345b10–11. In this respect, his view resembles that of the geometer Hippocrates of Chios, reported at 1.6, 343a2–4; cf. 1.8, 345b9–12. Lee (*Aristotle*, Meteorologica, 243, n. c), Simon (*Le regard, l'être, et l'apparence*, 48), and Berryman ("'It Makes No Difference'", esp. 210–212) all rightly emphasise that Aristotle's characterisation of reflection runs directly counter to our own intuitions, according to which *light* is reflected off an object and then deflected by a reflecting surface towards our eye. This difference from ancient optics is a central theme in Simon, *Le regard, l'être, et l'apparence*, ch. 1, esp. §4 (noted earlier by Picolet, *Les sources et le contexte historique de la théorie aristotelicienne de l'arc-en-ciel*, 174, 180–181; cf. 330–331, n. 98). Boyer is thus wrong to regard the view that sight is deflected as a "lapse into Platonic terminology" (*The Rainbow*, 325, n. 19, 41), an assumption that later misleads him about reflection in the *Problemata* (41) and the role of light in Aristotle's explanation of the rainbow (41–42, 47). The ancient evidence in any event is more complex: as Mansfeld notes, though the doxographical tradition at times seems to offer a version of Aristotle's theory, it also speaks of *light* being reflected ("From Milky Way to Halo", 30, 45, 48, 51).

99 These are truisms he takes his theory to also explain: *Meteor*. 3.6, 377b32–378a3; cf. 3.4, 375b13–15; *GA* 5.1, 781a3–8; cf. *Probl*. 3.9, 872a26.

100 For further evidence of the visual ray's physicality, see Merker, "Aristote et l'arc-en-ciel", 195 esp. n. 41–44; Merker, *La vision chez Platon et Aristote*, 228, esp. n. 11–20; Berryman, "'It Makes No Difference'", 203 n. 9. On the physical part of Aristotle's explanation of meteorological optics, see Merker, "Aristote et l'arc-en-ciel", 193–201.

101 Aristotle also thinks that if the object is not near enough, vision either will be "dispersed" (διασπᾶσθαι) in the empty intervening space and so not arrive at the object intact (ἀθρόαν ἐλθεῖν), or if it does reach it, it will be altogether too weak (πάμπαν ἀσθενής, *Meteor*. 3.6, 378a3–14).

102 Aristotle plainly assumes an extromissionist account of vision here, though he explicitly notes that it "makes no difference" whether it is vision that produces the effect or the object seen (οὐθὲν γὰρ διαφέρει κινεῖν τὴν ὄψιν ἢ τὸ ὁρώμενον, *Cael*. 2.8, 290a24). On the phrase "it makes no difference", see n. 105 below.

103 Centuries later Ptolemy will offer a similarly objective account of colour, to such an extent that Lejeune regards him as "inspired by Aristotle's teaching" (1948, 24–28 at 28).

104 *Meteor*. 3.4, 374b31 (μετέβαλεν), 375a17 (μεταβάλλει). Cf. also "produces the appearance of another colour" (ἄλλου χρώματος ἐμποιεῖ φαντασίαν, 3.2, 372b6-9), where φαντασία should be construed not as an internal psychological state – in line with its technical sense of the *De anima* 3.3 and elsewhere in the psychological works – but rather as a colour's external appearance or manifestation, simultaneously observable by many subjects. The same holds for occurrences of the term in *Meteor*. 1.3, 339a35; 1.5, 342b23; 1.6, 342b32; 2.9, 370a15; 3.4, 374b8, 375a5, a24. If one were, however, to take these uses as involving *phantasia* in the technical sense, then these cases would no longer count as basic perceptions and hence would not constitute a counterexample to the limited infallibility thesis after all, but would be explained away much like afterimages (see Section 3.5.1).

105 *Meteor*. 1.5, 342b5–13; 3.6, 377b11–13. The colour seen may be due either to the combination of materials in the reflecting surface or to the weakening of sight (ἢ τῷ μείγνυσθαι τῷ τοῦ ἐνόπτρου ἢ διὰ τὴν ἀσθένειαν τῆς ὄψεως, 3.2, 372b7–9), or possibly to both. On the role of the repeated phrase, "it makes no difference", in Aristotle and the subsequent tradition, see Berryman, "'It Makes No Difference'", 213–218.

106 *Meteor*. 3.4, 374b14–15, 18–20, 375b2–3.

107 Likewise for the twinkling of the fixed stars (*Cael*. 2.8, 290a24, see n. 102 above) or the weakening of vision when very drunk (*Probl*. 3.9, 872a22–23; 3.20, 874a10–12, 18–21; 3.30, 875b13–18).

108 *Meteor*. 3.4, 374b30–375a7, 375b3–5; cf. the iridescence in a cloud's reflection in water at 374b25–28. Merker rightly points out that the explanation of the order in the primary rainbow is based on size, while the order in the secondary one is based on distance, without any attempt to reconcile them ("Aristote et l'arc-en-ciel", 194). But they do not contradict each other, as she claims, if the optimal viewing distance is where the two red bands are (as I have assumed in the main body above), rather than what is closest to the ground. For then the two criteria would yield the same result, since the red bands also happen to be largest.

109 *Meteor*. 3.3, 373a22 (ἐν ἑκάστῳ φαινόμενος τῶν ἐνόπτρων); 3.4, 373b18–19 (ἐν τοῖς τοιούτοις ἐνόπτροις τὸ χρῶμα μόνον ἐμφαίνεται); 3.6, 377b8–11 (τὸ ἐν ἀνωμάλῳ φαίνεσθαι λαμπρὸν καὶ λευκὸν τὸν ἥλιον), cf. b17–22. For Aristotle's use of this term and its cognates, ἐμφαίνεσθαι: *Meteor*. 1.8, 345b27; 3.2, 372a33, b2, 4, 6; 3.4, 373b19; 3.6, 377b21; cf. *APost*. 2.15, 98a27; *Sens*. 2, 438a12. ἔμφασις: *Meteor*. 1.8, 345b15, 18, 24; 3.4, 373b24, 31, 374a16; 3.6, 377b18; cf.

Sens. 2, 438a6; *Div. per somn*. 2, 464b11–12. For an excellent discussion of the meaning of *emphainesthai* in Aristotle, see Simon, *Le regard, l'être, et l'apparence*, 45–46. For the terminology in the Greek tradition more generally, Mugler, *Dictionnaire historique de la terminologie optique des Grecs*, 138–141; Merker, "Aristote et l'arc-en-ciel, 188.

110 *Meteor*. 3.4, 373a35–b2, b13–32; cf. 3.3, 373a19–23.

111 *Meteor*. 3.2, 372a32–b6; 3.3, 373a21–24; 3.4, 373b17–28; 3.6, 377b6–8, b14–15; cf. 1.5, 342b11–13. Too small for spatial divisions to be perceptible (μηδεμίαν ἔχων αἰσθητὴν διαίρεσιν): 3.2, 372b1; 3.3, 373a23. Cf. Aëtius 3.5.7 = *Dox. gr*. 372.34–373.3 Diels.

112 Unlike the ps.-Aristotelian *De mundo* (1st c. CE), which takes rainbows, halos, and the rest to be reflections *rather than* existing in reality (τὰ μέν ἐστι κατ' ἔμφασιν, τὰ δὲ καθ' ὑπόστασιν, 4, 395a28–32), something Olympiodorus likewise endorses (*In Meteor*. 209.19–25 at 23). We find similar distinctions, without the formulaic phrase, in Alexander of Aphrodisias, who thinks the halo's colour is not real (*In Meteor*. 35.11-15) and Philoponus, who thinks the opposite, namely, that the colours of the rainbow and halo are not mere phantoms, but have a basis in real conditions (*In Meteor*. 69.6-9, 75.11–17). The verbal formula contrasting real existence with being a mere reflection goes back at least to Aëtius 3.5.1 = *Dox. gr*. 371.28–372.5 Diels (cf. 3.6 = *Dox. gr*. 374.10–15 Diels); cf. Sen. *NQ* 1.15.6. For discussion, see Mansfeld, "From Milky Way to Halo", although he treats the distinction as essentially Aristotelian (27–37, 40–41, 44–46, 48–50, 54, 55); cf. Mansfeld and Runia, *Aëtiana V*, 1222. The Aristotelian evidence Mansfeld cites, however, is at best implicit and rests heavily on his assumption that reflection just *is* an illusion for Aristotle, something I am questioning here. See n. 95 above. Aristotle does report Cleidemus and others claiming that lightning "does not exist but rather appears" (οὐκ εἶναί φασιν ἀλλὰ φαίνεσθαι, *Meteor*. 2.9, 370a11–12), but Aristotle *contrasts* this with reflection, which he regards as the real and the true cause, of which they were unaware (370a16–19).

113 See esp. *Meteor*. 3.5; cf. 3.2, 372a29–32. On the status of optics as a science and its relation to geometry, see *APo* 1.13, 78b34–79a13 and *Phys*. 2.2, 194a7–12. For discussion of the *Posterior Analytics* passage, see Brunschwig, "Aristote et le statut épistémologique de la théorie de l'arc-en-ciel".

114 Berryman runs together distinct issues when she claims that for Aristotle, "there is no observer-independent image in the mirror"; she says that what we see by deflection is "the object, *not* an image" and that "images in mirrors are *merely* the observer looking at the object" ("'It Makes No Difference'", 212, my emphases); so too Ierodiakonou "Alexander of Aphrodisias on the Reality of Mirror Images", 19. Berryman is right that the effect causally depends upon observers' vision and their line of sight, as well as on the distal object. But it is nevertheless an external interaction, whose effect is located on the reflecting surface and is seen by multiple observers in the same vicinity. It is true that on Aristotle's theory weaker vision in some observers will produce different effects. But he still would not regard these as subjective effects, since other perceivers with similar debilities would produce and witness the same colours from the same locations. It is useful to contrast Aristotle's position here with his contemporary and former colleague, Philip of Opus, who places great emphasis on the dependence of reflected images on the observer's position and how they move relative to the observer's movement: when the observer moves, the rainbow "appears to move with it, as though it was following the vision of the person seeing" (τὴν ἶριν φαίνεσθαι συμμεθισταμένην, ὥσπερ ἑπομένην τῇ τοῦ ὁρῶντος ὄψει, Alex. Aphr. *In Meteor*. 151.32–152.4 Hayduck = 20 F33 Lasserre = T13 Tarán). For discussion, see Picolet, *Les sources et le contexte historique de la théorie aristotelicienne de l'arc-en-ciel*, 150–159; cf. Appendix II, 236–239; Burnyeat,"Archytas and

Optics", 36. I think the explanation (γάρ) that follows at 152.4–9 concerning mirrors is likely Alexander rather than Philip, since Alexander is in part engaging with later discussions of catoptrics by Geminus and Aelius (152.10–13), though the phenomena also bear some resemblance to those treated by Archimedes (*ap*. Apul., *Apol*. 16.3).

115 Because of this relationality, it may be that such colours should be regarded as *extrinsic* qualities of the reflecting surface, rather than a modification of its intrinsic character. For discussion, see the end of the next subsection.

116 In *De anima* 2.7, Aristotle acknowledges that there are also some solid bodies that are transparent in this way (418b6–7); even though he doesn't name which, it is natural to think of glass or certain gem stones (Hicks, in *Aristotle, De anima*, 368 ad loc.; cf. *Probl*. 11.58, 905b6; 25.9, 939a13–14). Aristotle does claim, however, that *all* solid bodies contain transparent material, and that this, when mixed with opaque bodies, is responsible for the colours manifest on their surface (*Sens*. 3, 43a21–b18, esp. b8–10), something Sorabji reasonably infers is due to earth ("Aristotle, Mathematics, and Colour", 293, esp. n. 1), though see now Ierodiakonou, "Aristotle and Alexander of Aphrodisias on Colour", 84. But that is just to say that even if they contain transparent material, Aristotle does not take the bodies themselves to be fully transparent like glass, but rather coloured and opaque. On the role of the transparent in the colour of solid bodies, see Ierodiakonou, "Aristotle and Alexander of Aphrodisias on Colour", 78–84. On the underlying material causes of colour, see my "Aristotle on the Reality of Colours and Other Perceptibles", 64–65, esp. n. 69.

117 In discussing a rival theory of colour, according to which colours result from the juxtaposition of white and black, Aristotle says that "nothing prevents" (οὐδὲν κωλύει) such a theorist from holding that a juxtaposition might "appear from a distance to have some colour in common" (φαίνεσθαί τινα χρόαν κοινὴν τοῖς πόρρωθεν, *Sens*. 3, 440a29–30), which might again seem to be subjective. But this is merely a dialectical gesture on behalf of a rival theory and so needn't imply anything about his own commitments.

118 "... except," he adds, "when the surrounding conditions alter it" (ἐὰν μὴ τὸ περιέχον ποιῇ μεταβάλλειν, 439b6), presumably in the ways considered in Section 3.5.2. This qualification might also explain the different appearance of solid objects' colour at a great distance (*Metaph*. 4.5, 1010b4–6), despite having relatively stable boundaries. Alexander uses this difference to explain why media like air and water lack a colour of their own: it is because they lack a proper boundary of their own (μὴ ἔχειν οἰκεῖον πέρας) and colour is the boundary of a body (*In Sens*. 48.20–49.4 Wendland at 49.2–4, referring to Aristotle's claim at *Sens*. 3, 439b11–12). For discussion, see Ierodiakonou "Aristotle and Alexander of Aphrodisias on Colour", 82–83, who rightly points out that Aristotle thinks bodies are coloured inside as well (439a31–b1).

119 Ierodiakonou, in "Aristotle and Alexander of Aphrodisias on Colour", offers a different explanation in terms of the colour of objects seen *through* such bodies (87). But I do not see how this would help with the different colour of the same sea when seen at different distances, as there will be no change in what is seen through the same body of sea water.

120 Elsewhere Aristotle offers a different sort of explanation, though equally objective: he attributes the different colours of the sea to the *depth* of transparent material in it, from light to dark blue (*GA* 5.1, 779b30–33). Kalderon develops a view of volume colour similar to this, based on conjectured notions of "visual penetrability" and "visual resistance" of more or less perfectly transparent bodies (*Form without Matter*, 53–58, cf. 107; "Aristotle on Transparency", 233, 235). But as Sorabji notes, while depth together with the instability of the surface of the water might explain some fluctuations in colour, it still wouldn't account

for differences dependent simply on the observer's distance ("Aristotle on Colour, Light, and Imperceptibles", 131).

121 See sections 7.2 and 7.3 of my "Aristotle on the Reality of Colours and Other Perceptibles".

122 The colour of the stars' halo "is *what appears*" (πλὴν ἡ μὲν γίγνεται δι' ἀνάκλασιν τοιαύτη τὴν χρόαν, ἐκεῖ δ' ἐπ' αὐτῶν τὸ χρῶμα φαινόμενόν ἐστιν.) The *real* colour of the sun shows itself in certain kinds of reflections (τὸ ὑπάρχον τῷ ἡλίῳ ἐμφαίνεσθαι χρῶμα ποιεῖ, 3.6, 377b18–22 at b20–21), although not in many others (ἄλλου χρώματος ἐμποιεῖ φαντασίαν, 3.2, 372b5–9).

123 If this is right, then Alexander's view of reflected colours as relational qualities may not be the "considerable deviation from the Aristotelian text" that Ierodiakonou claims ("Alexander of Aphrodisias on the Reality of Mirror Images", 23–24), but rather a natural way of spelling out Aristotle's view of extrinsic colours in reflection. She shows how Alexander treats not only light but also colours as real, though dependent on a relation (see esp. *Mant*. 143.4–18). But if Ierodiakonou is right, Alexander holds this for *all* colours (24–28), and not just extrinsic ones, as I am suggesting for Aristotle.

124 Albers, *Interaction of Colour*.

125 This is Albers' view: "In visual perception a colour is almost never seen as it really is – as it physically is. This fact makes colour the most relative medium in art" (*Interaction of Colour*, 1).

126 On getting dye from purpuras and sea-lungs, see *HA* 5.15, 547a7–18, 548a10–14; cf. 6.13, 568a4–10. Also ps.-Arist., *Color*. 4 *passim*.

127 *Meteor*. 3.4, 375a22–28. Kalderon argues (*Form without Matter*, 111) that the last case, of the embroiderers, is not a case of colour contrast, where a single colour has two different appearances, depending on the colours surrounding it, but metamerism, where two different colours have the same appearance. But Aristotle says in this passage that how things appear to embroiderers is to be explained *in the same way* (διό, 375a26) as the immediately preceding cases, involving colour contrasts. If I am right below, it is because a different colour is produced by the interaction of the colour with its present surroundings and illumination, and so the mistake the embroiderers make is misattributing this different colour to the threads they choose.

128 Aristotle also claims that when a rainbow is fading and the red band is dissolving, a white cloud next to the green will appear yellow (375a14–17). Since this expressly does not involve red, the result seems to be due to something brighter being next to green. The moon rainbow seems to illustrate the opposite, where something red appears bright.

129 Even though Lee supplies "contrast" three times in his Loeb translation (Aristotle, *Meteorologica*, 1962, 263) and Webster once in his Oxford translation (Aristotle, *Meteorologica*, 1931, ad 375a22), and following them Boyer 1987, 48–49, 53.

130 *Meteor*. 3.2, 372a5–10.

131 See Aristotle, *Meteorologica*, 242 note *a*. There is no variation in the manuscripts, moreover, that might explain this inversion, nor is it plausible to think Aristotle would have idiosyncratically inverted the use of these colour terms in these passages.

132 I am grateful to the two editors above all, Katerina Ierodiakonou and Véronique Decaix, as well as to the participants at the original conference in Paris on ancient and medieval views of colour, for their comments and questions, along with those from audiences at Stanford, Michigan State, and Rice universities, and the Chicago meetings of the Central Division of the American Philosophical Association. These discussions have led to many improvements, both large and small. The imperfections that remain are, needless to say, my own.

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