

Wax, minds, and Aristotelian bodies

Abstract: In a series of articles, Myles Burnyeat has suggested that Aristotle's psychology is no longer credible because it presupposes a post-Cartesian conception of matter that none of us, functionalists or not, can share. By focusing on the employment of Aristotle's and Descartes' uses of a common example – the relation of a piece of wax to its shape – I pinpoint where exactly this disagreement lies. While there are major differences between an Aristotelian and a Cartesian conception of matter, the Aristotelian account is by no means as incredible as Burnyeat takes it to be. Moreover, Aristotle himself addresses a conception in many respects like that given by Descartes, and explicitly rejects it.

Keywords: Aristotle; Descartes; Wax experiment; hylomorphism; mind-body problem; functionalism; perception, ancient theories of; matter, ancient theories of.

1 Introduction

This article juxtaposes two claims of contemporary Aristotle scholarship, one larger, one smaller. Addressing the smaller claim will shed considerably more light on the issues involved in the larger one than has been done up to present.

The larger claim, originating with Myles Burnyeat, is that functionalist appropriations of hylomorphism fail to realize just how different Aristotle's conception of matter is from our own. A corollary of this is that it is a mistake to view Aristotle as the father of modern functionalism, since this understanding simply grafts a notion of function onto a distinctly *modern* conception of matter: one that Aristotle could not possibly have accepted, *nor could we accept his*. "Aristotle's psychology is designed to be the crowning achievement of his physics, and his physics is irretrievably dead and gone."¹

The smaller claim is that against this backdrop, the examples Aristotle draws on to illuminate the soul-body relation, and particularly the various wax examples Aristotle uses, turn out to be unilluminating.² "The usual way into the form-matter analysis of the soul-body relation is through a series of analogical extensions [...] Now the trouble with proceeding by analogical extension is that it can be unclear which features of the original case you are to hold on to and which you are to discard as you journey to the case you are really interested in."³

This focus on wax analogies serves two purposes. First, it pinpoints exactly how Burnyeat's critique depends on a broadly 'Cartesian' conception of matter, since Descartes employs a similar example in *Meditations* II and III. Second, it shows how Aristotle's accounts of perception and memory are tied to the broader themes of his physical treatises.

This article divides into two parts. The first begins with a brief description of Burnyeat's primary arguments against Aristotle's hylomorphic account of perception. From here, I move to Descartes' appropriation of the wax example in the latter half of the second Meditation, focusing on what it is that the appropriation is supposed to convince us of. This allows us to clarify Burnyeat's debt to a Cartesian conception of matter.

The second part turns to Aristotle's uses of wax examples directly: first, as they function in Aristotle's accounts of perception and memory; second, as they function in Aristotelian physics more broadly. Focusing on the common use of this example thus allows us to see which features of the example should carry over to these more substantive domains.

2 Contemporary spiritualism and the Cartesian conception of matter

2.1 Burnyeat's critique

Burnyeat's critique of Aristotle aims: first, to show that Aristotle could not be a functionalist in the modern sense; second, to show that Aristotle's actual theory of perception is untenable. The second aim, thinks Burnyeat, is achieved by showing that the precise points on which Aristotle departs from contemporary functionalism are points on which we cannot follow him.

Burnyeat brings forth two arguments in support of the first of these aims. The first can be summarized as follows:

- (1) For contemporary functionalism, the obtaining of certain physiological processes are sufficient for the enactment of a given function.
- (2) For Aristotle, the obtaining of certain physiological processes are *not* sufficient for the enactment of a given function.
- (3) Therefore, Aristotle is not a functionalist.

For example, Burnyeat writes "when one is angry, the blood boils, but that is merely a necessary, not a sufficient condition for anger; hence one's body, as [Aristotle] puts it, can be aroused and in the state it is in when one is angry without one's actually being angry."⁴

In the case of perception, the thesis stretches further. For Aristotle, every perception is a manner of receiving a form without receiving its matter.⁵ From this it follows, says Burnyeat, that

- (2') For Aristotle, not only are material conditions for perception not sufficient: they are not even necessary.⁶

The rejection of (2'), thinks Burnyeat, derives its support from Richard Sorabji's *literalist* interpretation of Aristotle's theory of perception. For Sorabji, "the physiological process of taking on the color (in the eye-jelly) *constitutes* seeing red, as a piece of bronze constitutes a statue or as a particular series of steps constitutes a journey from Athens to Thebes"⁷. Burnyeat's *spiritualist* interpretation denies this. For Burnyeat, "the eye's taking on a colour is just one's becoming aware of some colour."⁸

Burnyeat's second argument states that

- (1) A contemporary functionalist must hold that the relation of a matter to its function/form is contingent.⁹
- (2) Aristotle holds that the relation of a matter to its function/form is *not* contingent, but necessary.¹⁰
- (3) Therefore, Aristotle is not a functionalist.

In sum, Burnyeat thinks what modern functionalism needs most from Aristotle's analogies between the soul and artifacts is the contingency of the enactment relation, something Aristotle does not grant. In more basic cases, it turns out that higher order operations – life, sensation, etc. – are constitutive of the matter they are enacted in. While In the more complicated case of perception, Burnyeat holds that

for Aristotle, no physiological change is *needed*.¹¹ Aristotle's physics inverts the orders of fundamentality and explanation when compared to modern physics: hence life, for Aristotle, explains the nature of the body that enacts it, not conversely. "Aristotle [...] is entirely confident [...] that deduction 'from the bottom up' is impossible."¹²

2.2 The wax experiment in *Meditations* II and III

We can infer that Descartes' wax experiment harkens back to Aristotle for two reasons. First, we know Descartes' was familiar with the *De Anima*, since he quotes the Greek text in the reply to the fourth set of objections.¹³ Second, Descartes' appropriation of the wax example bears on the same problems as Aristotle's use in *De Anima* II.1 and 12 – the explanation of perception and the identity of material objects – in the broader context of a discussion of the same subject matter – the nature of the soul or mind. Descartes' readers would have recognized the appropriation as a way of strongly undercutting Aristotelianism: even Aristotle's own example fails to support his philosophical conclusions.

Descartes makes use of the wax example in two places in the *Meditations*: first, in the latter half of Meditation II; second, in paragraph 19 of Meditation III. Further, there are several places in the objections and replies illuminating Descartes' purposes in these passages.

Those aims of the wax experiment in the second meditation are summarized in that meditation's final paragraph:

For because it now be known to me that [1] bodies themselves are properly perceived [1a] not by the senses or [1b] by the faculty of imagining, but rather [2] by the intellect alone; and that [1'] bodies are perceived not from thence that they would be touched or seen, but rather [2'] from thence only that they were to be understood: I cognize overtly that [3] nothing can be perceived by me more easily or more evidently than my mind.¹⁴

Claims [1a], [1b], and [2] are linked as part of a disjunctive syllogism: since bodies are perceived neither by sense nor imagination,¹⁵ and perception must take place either by imagination or some particular sense or intellect, it follows that perception takes place only by intellect. Though claims [1] and [2] are distinct from [1'] and [2'], Descartes groups them together. [1] says that bodies are perceived not by the *faculty* of sense, but by the intellect; while [1'] says that bodies are perceived not by *acts* of sensing, but by those of understanding. For instance, sight is not, strictly speaking, performed by the eye, but by the mind; and it is not enacted by a seeing identifiable with some underlying physiological process, but by the seeing that is a mode of thinking. As he explains the example in the 2nd replies, "sensing one thing without some other thing is merely a matter of having an idea of one thing and understanding that this idea is not the same as the idea of the other thing."¹⁶ The third claim gives the titular aim of this part of the second meditation, i.e. to show that the mind is better known than body.

In the third Meditation, Descartes uses the wax example to distinguish primary and secondary qualities:

But as for the ideas of corporeal things, there occurs in them nothing that would be so great that it would not seem that it can have come from me myself. For if I were to inspect more penetratingly and were to examine these ideas individually in that manner in which I have yesterday examined the idea of the wax, I notice that there are only very few things in them that I clearly and distinctly perceive: namely, magnitude, or extension in length breadth and depth; figure, which arises from the determination of this extension; position, which different

shaped things obtain among themselves; and movement, or the change of this position [...] But the other things, such as light, and colors, sounds, odors, tastes, heat and cold, and other tactile qualities, are not cogitated by me except very confusedly and obscurely.¹⁷

The lists given in the above passage are summarized in the following table:

Primary qualities of body	Secondary qualities of body
1. Magnitude	5. Light/color
2. Figure	6. Sound
3. Position	7. Odor
4. Movement	8. Taste
	9. Temperature/other tactile qualities

The list is not wholly new: the list of secondary qualities corresponds in part to Aristotle’s own list of proper sensibles,¹⁸ while the list of primary qualities overlaps with Aristotle’s common sensibles.¹⁹ The significant shift in the Cartesian conception of matter here is not the idea that sensibles are relative, for this is already in Aristotle;²⁰ nor is it the attribution of extended magnitude to body as such, for this too is in Aristotle.²¹ Rather, it is that the relationality that *makes* the secondary qualities secondary in Descartes is now contrasted with measurability as the mark of the primary. Thereby, relationality is identified with perspective. “The root idea can be summed up thus: no frame of reference is privileged. A representation of things as they (really) are is not perspectival or *from a viewpoint*.”²² While things appear different colors in different light, or emit different pitches when heard from different locations, entities have masses, locations, velocities, etc. that can be measured absolutely and mathematically. Hence, the primary qualities, the objects of ‘pure understanding’, are also characterized as the “objects of pure mathematics.”²³

Descartes also takes this use to demarcate simple understanding from imagination:

I have explained here the difference between imagination and a concept of the pure mind when in the example of the piece of wax I enumerated those things in the wax that we entertain in our imagination and those that we conceive with the mind alone. (*Res. Ad III*, 178).

As this application shows, Descartes does not restrict the claims he draws from the wax example to those concerning the activities of the subject, but also draws claims *about* subjective faculties from ontological claims.

Descartes states some further ontological implications of the example in the exchange with Hobbes. Commenting on the passage in Meditation II where the wax is moved toward the fire, Descartes tells us he “proved by means of the example of the piece of wax [...] that color, hardness, and shape do not belong to the essence [*rationem formalem*] of the wax.”²⁴ The mention of shape, a primary quality, shows the example is not merely meant to distinguish the wax from its secondary qualities. Rather, Descartes is concerned with the identity of a material thing with *any* of its determinate qualities.

Based on these passages, we can divide the claims deduced from the wax example into 1) negative and positive, and 2) epistemic and ontological. This will shed some light on how Descartes views the relations between these claims. Doing so gives us the following table:

	Negative	Positive

Epistemic	<ol style="list-style-type: none"> 1. Bodies are not known by sense faculties or sensing 2. Bodies are not known by imagination or imagining. 3. Primary qualities are not perceived by imagination. 4. Secondary qualities are not perceived by pure intellect. 	<ol style="list-style-type: none"> 5. Bodies are known by intellect and understanding. 6. Primary qualities, while sometimes discernible by imagination,²⁵ are properly conceived by pure intellect. 7. Secondary qualities are perceived by imagination. 8. Mind is better known than body.
Ontological	<ol style="list-style-type: none"> 9. Color, taste, etc. are not primary qualities. 10. Figure, motion, etc. are not secondary qualities 11. For each time t and body B, B is identical to neither the primary nor secondary qualities it has at t. 	<ol style="list-style-type: none"> 12. Color, taste, etc. are secondary qualities. 13. Figure, motion, etc. are primary qualities.

Given the apparent epistemological character of the Cartesian program as a whole, it is easy to miss the centrality of the ontological claims for the determination of the rest of this chart.²⁶ First as the quote from the 3rd replies shows, Descartes takes the distinction in thought between pure understanding and imagination, which gives rise to a distinction between the *act* of pure understanding (clear and distinct perception) and that of imagination (confused/obscure perception), to derive from that between primary and secondary qualities.²⁷ Second, the non-identity of the wax with its shape, etc., or more broadly, a thing with any of its qualities, is what allows Descartes to posit that it is the mind alone that determines the identity of the material object.²⁸ For the Cartesian conception of body, then, the net result of these claims are the following two theses:

(D1) Bodies do not *really* have their secondary qualities²⁹

And

(D2) Bodies are not identical to any of their *determinate* primary qualities.

In the first of these, ‘real’ has the sense of ‘absolute’, i.e. that which serves as the fundamental metaphysical and/or explanatory underpinning of the world and/or our understanding of it.

The second of these shows that for Descartes, the notion of identity is, to use a term from later medieval logic, *ampliated* to include not only present, but also past and future states. This means that matter, though extended, cannot be said to have any particular extension; even less can it be said to have qualities like redness. In order to serve as the object of pure mathematics Descartes takes it to be, matter must be completely indeterminate.

2.3 Burnyeat’s debt to Descartes

(D1) provides support to Burnyeat’s first argument, and (D2) to his second.³⁰ For Burnyeat, like Descartes, secondary qualities are not ‘out there in the world’, but interpretations of the world contingent on the activity of a mind. By contrast, Aristotle’s world is “a world in which colours, sounds, and smells are as real as the primary qualities, and they are the chief factors in the causal explanation of perception.

[...] [W]hat produces the perception of red or of middle C is not light striking the retina or the movement of air striking the ear; it is red and middle C.”³¹ This is what Burnyeat finds so incredible in the idea that for Aristotle, “the only values a scientist should admit for the predicate variables in a Ramsey sentence are the *psychological* predicates which the Ramsey sentence so cleverly allows us to eliminate from the scientific story of animal life.”³²

In the previous quote, we see how Burnyeat’s acceptance of (D1) provides support for his stronger claim that physical change is not even necessary for the enactment of perception. Here, the claim that bodies do not really have their secondary qualities interacts with broader tendencies to think of the material and mental as distinct realms: since secondary qualities are not within the realm of the material, they must be in some distinct realm of the mental. Hence, Burnyeat thinks of ‘redness’ and ‘middle C’ as names of some kind of mental content. This is why he describes ‘being-red’ and the like as psychological predicates.³³

But for this reason, claims like “[For Aristotle] what produces the perception of red [...] is not light striking the retina...; it is red” are more ambiguous than Burnyeat takes them to be. On the one hand, this could imply that red is some *entity* distinct from the light striking the retina, and this is how Burnyeat seems to understand it. Red causes perception *rather than* the light. The redness, then, would be *materially* distinct from the light. This way of understanding the claim is what grants Burnyeat the room to suggest that for Aristotle, material changes are not even necessary for perception, since they are at best only contingently connected to the changes themselves.

On the other hand, the redness could be merely distinct in aspect or intension from the light; in which case the claim that red, *rather than* the light striking the retina, produces the perception of red, need not entail that red and the light striking the retina are materially distinct from each other. Caston illustrates this way of understanding the distinction nicely with the examples of a signing and sealing a document:

There is genuinely such a thing as sealing a document, and it is *not simply* impressing shapes into wax, any more than signing a document is *simply* making a scrawl. There are not two separate acts here: there is not a distinct and separable act of signing in addition to making a scrawl, or a sealing in addition to the impressing. Rather, one does one *by* doing the other [...]. The two are distinct types of act, even if a single event instantiates them both.³⁴

So, for instance, even if the redness of an object is token-identical to the set of material qualities constituting its redness, it does not follow that those material qualities are what is ‘really’ doing the causing the impression of red. And though this assumption is deeply ingrained in most thinking about causation from Descartes onward, it is not so obviously correct that the only thing to be done with its negation is to “junk it.”³⁵ What it instead shows is that for Aristotle, intentional being, and accordingly, the thorny problem of the non-substitutivity of identicals in intensional contexts, extends to more than just some realm of the mental.³⁶

Burnyeat’s second argument depends on (D2) by requiring Aristotle to adhere to a univocal concept of matter as *indeterminate substratum for the determinate qualities of an object through time*. Aristotle may have had such a notion available to him in the concept of prime matter;³⁷ but even so, Aristotle need not have taken this concept to be the ‘really real’ concept of matter, rather than an abstraction drawn from the more robust configurations of matter in the material beings we come into

genuine contact with. Even less could this notion preclude his having more proximate notions of matter correlated to the forms of different kinds of things– for instance, different kinds of living matter for different kinds of living bodies.³⁸

3 Aristotelian bodies

3.1 Summary of Aristotle’s uses of wax examples

Aristotle employs wax examples in three domains, which we list in order from the most to least universal:³⁹ first, he employs wax analogies in books V and VII the *Metaphysics*; second, he employs them in the study of Physics more generally in the *Physics*, *On the Heavens*, *On Generation and Corruption*, and the *Meteorology*; third, he uses them in two treatises more specifically dealing with living beings, the *De Anima* and *De memoria*.

Of these, the majority, like Descartes’ example, do not involve any particular form of wax, (e.g. a candle), but are generic illustrations concerning the relation between the wax and its shape. Other more particular uses involve letters on a wax tablet,⁴⁰ candles,⁴¹ a buoyant wax vessel,⁴² and the analogy of a signet impressed into wax.⁴³

There are four basic topics to which Aristotle applies these examples: i) mereology and composition, ii) generation and alteration, iii) the passive potencies of bodies, and iv) perception and memory. A cross-reference of passages, domains, and their applications is given in the following table:

Area\Use	Mereology	Generation	Passive Potencies	Perception
Metaphysics	<i>Metaph.</i> V.26, 1023 ^b 4-6 <i>Metaph.</i> VII.10, 1035 ^a 14-17			
Physics	<i>Meteora</i> II.3, 358 ^b 34- 359 ^a 7	<i>Physics</i> VII.3, 245 ^b 9-16 <i>De Caelo</i> III.7, 305 ^b 28-31 <i>De Gen.</i> I.10, 327 ^b 14-16 <i>De Gen.</i> II.7, 334 ^a 32-36	<i>Meteora</i> IV.9-10, 386 ^a 18-388 ^b 35	
Psychology	<i>DA</i> II.1, 412 ^b 5-8			<i>DA</i> II.12, 424 ^a 18- 24 <i>DA</i> III.12, 435 ^a 3- 10 <i>De Mem.</i> 1, 450 ^a 28-33

3.2 Exposition of Aristotle’s uses of wax examples

From here, we can show what Aristotle actually takes his employments of wax examples to demonstrate. Though we will not treat the question of the sufficiency of matter alone for material change in detail, a cursory look at the passages from the *Meteorology* in the above chart shows Aristotle’s rejection of this sufficiency by no means meant he was uninterested in questions of material composition.

We move from those treatises most specific in their subject matter to those that are most universal. In doing so, each section will correlate nicely with one of Burnyeat's interpretive theses: the first with the thesis that for Aristotle, material change is not necessary for perception; the second, with his claim about the necessity of the matter-form relation in Aristotle.

3.2.1 As related to perception and memory

The uses listed in the above chart are not mutually exclusive. Rather, there is reason to think those uses in more restricted domains are *specifications* of broader uses.⁴⁴ Here, for instance, is how the wax seal example is employed in the discussion of memory:

It is clear that we must conceive that which is generated through sense perception in the soul, and in the part of the body which is its seat,—viz. that affection the state whereof we call memory—to be some such thing as a picture. The process of movement stamps in, as it were, a sort of impression of the percept, just as persons do who make an impression with a seal.⁴⁵

Here, i) memory is consequent upon sense perception, ii) sense perception is a kind of being affected in a particular organ (“the part of the body which is [the] seat [of what is generated]”), iii) the percept is described as something *generated*, and iv) as such, is the generation of some totality in the soul. In this instance, the having of a memory is likened to the wax's having of the impression, whereas the acting of the percept on the sense is likened to the seal's impressing itself upon the wax.

Here is what Aristotle states on the matter of perception:

Universally, about all perception, we can say that a sense is a power of receiving sensible forms without the matter, as wax takes on the impress of a signet-ring without the iron or gold; what produces the impression is a signet of bronze or gold, but not *qua* bronze or gold: similarly, the sense is affected by what has color or flavor or sound; but not insofar as each is called a particular thing, but as such and such a sort and according to its *logos*.⁴⁶

In his interpretation of this passage, Burnyeat is antecedently committed to the claim that spiritual or intentional being is, as Brentano put it, the ‘mark of the mental’,⁴⁷ and aligns himself with Brentano on this point.⁴⁸ But as Caston has recognized,⁴⁹ the passage does not require such a strong interpretation. Though Aristotle states that all sense is receptive of form without matter, he does not say that all *and only* sense is this way. In fact, there are aspects of the passage that mitigate against this. Aristotle begins the passage by stating that what follows holds “universally concerning all perceptions” (Καθόλου δὲ περὶ πάσης αἰσθήσεως). In the *Posterior Analytics*, Aristotle tells us that what it means for something to hold universally is for it to belong “to every instance of its subject, both essentially and as such”⁵⁰ That is a) all members of the subject class are members of the predicate class (but not necessarily conversely), and b) that this is so on account of the nature or essence of the subject. So, for instance, being animal holds universally of all humans, but not of only humans.

The manner in which Aristotle first introduces the example of the wax impression here further supports this interpretation, since it implies not exemplification and analogy, but commonality of type.⁵¹ Hence, the wax impression and the perception are kinds belonging to the same genus: *both* are cases of something receiving the form of something without its matter. Aquinas suggests the following interpretation.

[Aristotle] first says that one ought to accept universally and commonly that it belongs to every sense to be receptive of species without matter, just as wax receives the sign of the ring without iron or gold. But this seems to be common to every case of being-affected. For every patient receives something from an agent inasmuch as it is acting. But what is acting acts by its form, and not by its matter. Thus, every being-affected receives form without matter. And this is obvious to sense: for the air does not receive matter from the fire acting on it, but form. Therefore, it seems that being receptive of form apart from matter is not proper to sense.⁵²

On this reading, all Aristotle is doing in the first part of the above passage is locating perception in its highest genus: perception belongs to the category of passion, or being-acted-upon. Similarly, in the passage from the *De Memoria*, the wax seal example shows not that memory is a having of a special kind of content in the mind, but merely that it is the result of the manner of being acted upon occurring in sensation.⁵³

To return to an example given by Burnyeat, then, to receive “the warmth of a warm thing without its matter” does not mean “becoming warm without really becoming warm”:⁵⁴ It means, *pace* Democritus, that being warmed by the sun is not a matter of receiving sun-particles.⁵⁵ Nothing in the passage suggests that *no* change is required for sensation: this isn’t even at issue. To the degree that this is addressed, it is done in the passage immediately following the above quoted one,⁵⁶ by simply assigning sensation a corporeal organ. For to say, for instance, that the *nose* is what smells is to say that (since sensation is a kind of passion) it is the nose that undergoes something, and in each case this undergoing will be a change in the organ itself.⁵⁷

The real difficulty with these passages is not, then, whether sensation requires material alteration of some sort. This sort of problem only arises because Burnyeat follows Descartes in erecting a wall of partition between a realm of the real and psychological. If the distinction between *esse spirituale* and *esse reale* is not a distinction of domains, then the problem disappears.

There is, however, a genuine problem on Aristotle’s own account: it is that of how sensation can be *both* a kind of passion – thus an alteration of some previously existing substratum leaving that substratum intact – and a kind of generation – thus *not* an alteration of this sort.⁵⁸ It is in this context, I suspect, that the distinction between intentional and real being comes into play. In the successful perceiving of a tree, for instance, the form of the tree is in some sense generated in the perceiver, but not in such a way that the perceiver becomes a tree, as would be the case in ordinary generation. However, since my aim here is not to distinguish sensation and other kinds of change, but to explain the relevant similarities upon which such a later study would have to be predicated, this point is best left for another discussion.

3.2.2 As related to composition and alteration

We now move to an interpretation of Aristotle’s remarks on composition and alteration *contra* Burnyeat’s use of (D2).

What Burnyeat finds difficult to believe about Aristotle’s characterization of matter in the matter-form relation is that it presupposes a conception of body essentially and necessarily correlating to its form. It is surprising, then, that Burnyeat never addresses these points in a context broader than that of Aristotle’s psychology, since they surely have wider application than in this sphere alone. Aristotle views

on this correlation are worked out primarily in his remarks on composition and alteration in the *Physics* and *Parva Naturalia*.

First, it is important to note what Aristotle does *not* say on this subject. Aristotle does not hold that *all* forms are *only* instantiated in one kind of matter. As is clear from the *Meteorology*, there are forms that essentially belong to certain kinds of bodies that do not belong *only* to those kinds of bodies: being impassible belongs both to wax and copper;⁵⁹ being squeezable belongs essentially to sponges, wax, and flesh;⁶⁰ *any* composite partly composed of water is meltable.⁶¹

Thus, even before entering into the realm of living beings, it is not necessary for things to belong to the same *specific* kind in order to have the same function. *Being an animal*, for instance, is not a specific kind; and so it is clear that perceptions, which are the characteristic functions of animals, are realized in different species. And so in at least this respect, Aristotle genuinely accounts for some level of multiple realizability.

Like being able to perceive, all of the qualities mentioned above are dispositional qualities of things whose corresponding enactments – being impressed, melted, etc. – belong to the category of passion. In this context, the claim that certain kinds of matter have certain qualities and capacities – i.e. correspond to certain kinds of forms – that others don't should seem relatively innocuous. We still accept today that water is drinkable, liquid at room temperature, etc., while neither hydrogen nor oxygen is so.

The last mentioned of Aristotle's examples further shows that properties predicable of a whole by virtue of its having a proper part are not thereby predicable of the part: anything partly composed of water is meltable, but water itself is not meltable. Similarly, to counter a claim of Burnyeat's, any body with flesh, bones, organs, etc. is essentially alive. But from this, it does not follow that "the flesh, bones, organs, etc. of which we are *composed* are essentially alive."⁶²

The only place that Burnyeat's worry can genuinely arise, then, is with respect to characteristic functions of things consequent upon having certain *substantial* forms. For instance, Burnyeat cannot complain that there is a kind of matter that is essentially alive – for Aristotle, there are several such kinds: rather, he would have to find it problematic that there is a kind of matter that essentially correlates, for instance, with the function of *being a grizzly bear*; or, perhaps, properties like (as Aristotle would have it) *being risible*. This demand, in turn, ultimately goes back to the demand, common to Burnyeat and Descartes alike, that the *real* conception of matter also be a *univocal* one. All capacities of bodies should, for Burnyeat as for Descartes, be in principle analyzable back to some absolutely basic material base.

Aristotle rejects this concept of real matter not because it fails to occur to him, but on principle. There are two reasons for this: first, because there is not, for Aristotle, one basic kind of real matter out of which all other things are composed, but rather four. It is not enough for things to belong to a natural kind that we are able to consider them in a way that abstracts from their differences: if it were, then, for instance, the different categories of being would be members of a common genus, and Aristotle famously rejects this view.⁶³ Second, Aristotle thinks of the being of a being not in terms of what it is made of, but primarily in terms of what it does.⁶⁴ Even the elements, for instance, are distinguished by their different tendencies. Thus, where for Descartes and Burnyeat, the theory of matter is subordinated to mechanics, for Aristotle the mechanics of bodies are consequent upon these more primitive differences in matter theory.⁶⁵

Even apart from this, there is a more basic reason for Aristotle's rejection of such a view. Though Burnyeat assumes Aristotle's conception of matter leaves us unable to explain emergence, an alternative take might say Burnyeat's approach rather explains it *away*. For Burnyeat, higher-order qualities and activities must already be there to begin with in such a way that the appearance of these activities just *is* the rearrangement of fundamental particles: to use a popular example, a tree is just, at bottom, simples arranged tree-wise. But for Aristotle, this kind of explanation both i) leaves generation undifferentiated from simple alteration, and ii) explains alteration in terms of combination. Neither of these is quite right. On the first, Aristotle tells us that

When anything has been completely shaped or structured, we do not call it by the name of its material: e.g. we do not call the statue bronze or the candle wax or the bed wood, but we use a paronymous expression and call them brazen, waxen, and wooden respectively. But when a thing has been affected and altered in any way we still call it by the original name: thus we speak of the bronze or the wax being fluid or hard or hot (not only that—we also call the fluid and the hot stuff bronze, giving the matter the same name as the affection).⁶⁶

In other words, the difference between substantive and paronymous uses of a term reflects a more basic difference between something's being "completely shaped and structured," i.e. a whole, and something's belonging to something else.⁶⁷ On Burnyeat's view, the ontology would be better reflected in the language by dropping distinctions among substantives altogether, and instead referring to basic matter as being F-wise, G-wise, etc.⁶⁸ But to identify the substantial with the elemental, as Antiphon does, and to further insist on only one kind of elemental, as Democritus seems to, does violence to this datum of experience.

On the other point of disagreement, Aristotle insists that genuine change cannot be accounted for simply in terms of combinations. He writes:

Now we do not speak of the wood as combined with the fire, nor of its burning as a combining either of its particles with one another or of itself with the fire: what we say is that the fire is coming-to-be, but the wood is passing-away. Similarly, we speak neither of the food as combining with the body, nor of the shape as combining with the wax and thus fashioning a lump. Nor can body combine with white, nor (to generalize) properties and states of things; for we see them persisting unaltered.⁶⁹

Here, the wax example is coupled with a reference to the process of taking in nutrition, and thus these processes serve to mutually illuminate each other. In the nutritive process, the food, in order to be digested, must *cease to exist* as food, and become something else, viz., a part of the body taking it in. Similarly, the fire, while one of the elements constituting the wood according to Aristotle's theory of elements, did not itself exist when it was doing so. It was an integral part of the wood, but by being taken up into a more advanced structure, it ceased to have the activity constitutive of its original nature, and thus in this sense ceased to *be*. And when the wood was burning, the fire was, out of that very wood, in the process of becoming. The combinatorial problem arises in a deeper way for the wax and its shape, because the shape *cannot* have independent existence; thus by the combinatorial account, there cannot *be* shape. But this, thinks Aristotle, is absurd. Hence, the account must be rejected.

4 Conclusion

Let's recap what this essay has and hasn't achieved. I began by outlining two of Myles Burnyeat's critiques of Aristotle's conception of matter, both supporting the claim that Aristotle's conception of matter is untenable against the backdrop of post-Cartesian physics. From here, I moved to a consideration of Descartes' own remarks on matter, in order to pinpoint this Cartesian patrimony more precisely. I showed, drawing on Descartes uses of the wax experiment in *Meditations* II and III, that that patrimony consists principally in: 1) the rejection of the reality of secondary qualities, and a corresponding relegation of the same to a psychological or mental realm; and 2) an ampliation of the notion of matter to the point where it could no longer be identified even with any determinate primary qualities. *Pace* Burnyeat, neither of these aspects of this patrimony is unquestionable. On the first, I showed that for Aristotle, the distinction between intentional and real being is not a *distinctio generis*; rather, something's having real being does not preclude it's also having intentional being as well. On the second, I showed that the post-Cartesian conception of matter that Aristotle supposedly cannot accommodate is itself just a misappropriation of Aristotle's notion of *prime* matter. Against this backdrop Aristotle's correlation of different kinds of matter with different forms actually proves *more* fruitful than the Burnyeat/Descartes conception for explaining real change.

What I have not done is shown how operations like sensation *differ* from other kinds of alteration. But having shown that the distinction between spiritual and real being is not a distinction in kind, I've laid the ground for an explication of the genuine difference between sensation and other forms of alteration in Aristotle. Hopefully, work on this issue can now make more progress than it has.

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¹ Burnyeat (2002), 78. Cf. Burnyeat (1992), 16.

² See Shields (1993), 162-63; Corcilius (2014), 35, fn. 49.

³ Burnyeat (1992), 17.

⁴ Burnyeat (1992), 23.

⁵ *DA* II.12, 424^a18-24.

⁶ Burnyeat (1992), 22.

⁷ Burnyeat (1992), 18. Cf. Sorabji (1992), 214-220; 2001, *passim*; Everson (1997). For a more nuanced rebuttal of literalism, see Lorenz (2007).

⁸ *Ibid.*

⁹ Burnyeat seems to take this premise to give a necessary characteristic of modern functionalism.

If the artefact model prevails, [...] it will not [...] be essential to Aristotle's account of perception that it involves the particular physiological processes he invokes to explain it. [...] We must be able to [discard this account] if Aristotle is a functionalist and functionalism is Aristotelian, because *the whole point of functionalism is to free our mental life from dependence on any particular material set-up*. (Burnyeat (1992), 17, emphasis mine).

Though the italicized assumption is questionable, attempting to save Aristotle by broadening the definition of 'functionalism' would leave some larger issues unsolved, and so the assumption may be granted for now.

¹⁰ See Burnyeat (1992), 17.

¹¹ Burnyeat (1992), 22.

¹² Burnyeat (1992), 23.

¹³ *Resp. ad IV*, 251.

¹⁴ *Med.* II. 16.

¹⁵ Descartes identifies the latter with the scholastic *sensus communis*. Cf. *Med.* II. 14.

¹⁶ *Rep. ad II*, 132.

¹⁷ *Med.* III. 19 (alt.).

¹⁸ *DA* II.6, 418^a11-15.

¹⁹ *DA* II.6.418^a16-19; *De Sensu* 1.437^a6-11.

²⁰ For instance, Aristotle distinguishes color as the object of sight from that which constitutes it. Cf. *DA* II.7.418^a26-418^b2.

²¹ *De Sensu* 7.449^a20-30.

²² Glouberman (1997), 125.

²³ *Med.* V.16; cf. V.9, VI.1, 4, 10.

²⁴ *Rep. ad III*, 175.

²⁵ See Descartes' example of the Pentagon in *Med.* VI. 2; cf. *res. Ad. III*, 178. The sense of 'imagination' in this affirmation differs from that in the denials of the preceding column: negatively, Descartes denies that imagination is a faculty *distinct from* thought, and that imagining is an operation distinct from thinking; in his positive use of the term, Descartes always takes imagining to be a mode of thinking applied to a body.

²⁶ See Glouberman (1997), 118.

²⁷ On one level, this is unsurprising, given the assumption from Aristotle onward that faculties are individuated by their objects. See Johansen (2012), 93-115; Cf. Vasiliou (2012). However, it *is* surprising to find the assumption in *Descartes*, given the way he collapses the different perceptual faculties into the broader category of cogitation. See Burnyeat (2008), 9-15.

²⁸ See Hart (1975), 18-20.

²⁹ Cf. Burnyeat (1981), 74; Westphal (2005), 221-224.

³⁰ This is all the more surprising given Burnyeat's opposition from early in his career to what he calls 'the argument from appearances'. See *ibid.* In its most common form, the argument from appearances infers that some object doesn't really/inherently/in itself have some property from its not appearing as such to all observers or at all times. A contemporary relic of this is the view that identity and other essential properties must be rigid. Cf. Kripke (1971), esp. fn. 19. For an interesting discussion of rigidity in the semantics of Descartes' medieval predecessors, see Klima (1999).

³¹ Burnyeat (1992), 19-20.

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- ³² Burnyeat (1992), 22. Emphasis mine.
- ³³ For excellent discussions of Aristotle's realism about the objects of sense, cf. Broadie (1993); Johansen (1997), 128-135.
- ³⁴ Caston (2004), 304-305.
- ³⁵ Burnyeat (1992), 26.
- ³⁶ And so Burnyeat's position itself depends on the dualism he accuses Nussbaum and Putnam of. See Burnyeat (2002), 81.
- ³⁷ Cf. *Metaph.* IX.7, 1049a18-29.
- ³⁸ This point is made in Whiting (1992), 79-85. I take it up at greater length in section 3.2.2.
- ³⁹ On the thesis that the subject of Metaphysics is more universal than that of Physics, see *Metaph.* I.2, 982^a19-982^b11. On the ordering of the sciences within Physics, see *Meteora* I, 1; cf. Aquinas, *Sentencia Super Meteora*, Bk. I. lec. 1.
- ⁴⁰ *Metaph.* VII.10, 1035^a14-17
- ⁴¹ *Physics* VII.3, 245^b9-16.
- ⁴² *Meteora* II.3, 358^b34-359^a7.
- ⁴³ *DA* II.12, 424^a18-24; *De Mem.* 450^a28-33.
- ⁴⁴ Cf. Heinaman (2007).
- ⁴⁵ *De Mem.* 1, 450^a28-33.
- ⁴⁶ *DA* II.12, 424^a18-24 (alt.).
- ⁴⁷ See Brentano (1995), 89.
- ⁴⁸ Burnyeat (1992), 18. In the same passage, he (mistakenly) attributes this interpretation to Aquinas and John Philoponus. Cf. Caston, (1998), 256; Shields (1995), 318-322; Klima (2013), 360-63.
- ⁴⁹ Cf. Caston (2004), 307, fn. 121.
- ⁵⁰ *PA* I.4, 73^b27 (alt).
- ⁵¹ The most basic meaning of 'as' (οἷον) in the above passage is "of what sort."
- ⁵² In *DA* II.24, 551. Aquinas does not himself endorse the view, but gives it as an objection.
- ⁵³ Indeed, the way Aristotle blends the picture and seal analogies in *De Mem.* 450^a28-33 imply the "picture" that Aristotle has in mind is *itself* an impression or an etching, rather than a painting. If this is so, then the salient point of the passage across the board would not be that memories are representations, but rather that they are impressions consequent upon sense. Cf. *Theaetetus* 187c-200d; Rowett (2012); Schwitzgebel (2006).
- ⁵⁴ Burnyeat (1992), 24.
- ⁵⁵ Cf. Lear (1988), 116.
- ⁵⁶ i.e. at "αἰσθητήριον δὲ πρῶτον..."
- ⁵⁷ Aquinas anticipates Burnyeat's objection and responds to it in his comments on *DA* II.12.424^a26-30:
Since, then [Aristotle] had said that sense is receptive of forms without matter, which also belongs to the intellect, someone might believe that sense was not a power in a body, just as the intellect is not. And therefore, to exclude this, he assigns to an organ to it (*In DA* II. 24. 555).
- For to say that an organ undergoes no corporeal change in sensation amounts to saying that not it, but rather something else is receptive of sensation, i.e. that it is not the organ of sensation after all. Cf. Nevitt (2013), 200-203; Magee (2000), 320-327.
- ⁵⁸ For an application of this difficulty to the problem of learning, see Bowin (2012). Cf. Bowin (2011).
- ⁵⁹ *Meteora* IV.9, 386^a18-22.
- ⁶⁰ *Meteora* IV.9, 386^b6-7.
- ⁶¹ *Meteora* IV.10, 388^b33-35.
- ⁶² Burnyeat (1992), 26.
- ⁶³ Cf. *Metaph.* III.3, 998^b22.
- ⁶⁴ Cf. esp. the critique of Antiphon in *Physics* II.1, 193^a9-193^b21.
- ⁶⁵ Cf. Gaukroger (2000), 215-19.
- ⁶⁶ *Physics* VII.3, 245^b9-16.
- ⁶⁷ For more on how Aristotle's physics relates to his mereology, see Whiting (2002), esp. 146-154.
- ⁶⁸ This is, of course, very close to Quine's adaptation of Russell's theory of definite descriptions: 'Pegasus' becomes, 'Pegasizing,' etc. Thus, the difference in linguistic regimentation seems to be tracking a fairly longstanding shift in the ontology. Cf. Quine (1948).

⁶⁹ *De Gen.* I.10, 327^b12-16.