

1 The musical, the magical, and the mathematical soul¹

Rae Langton

The musical soul

At the beginning of his treatise on the soul, Aristotle considers the opinions of his predecessors, his avowed purpose being to ‘profit by whatever is sound in their suggestions, and avoid their errors’ (*De Anima*, 403b 23–4).² One such opinion is that ‘the soul is a kind of harmony’ (407b 30). This theory appears in Plato’s *Phaedo*, where the relation of soul to body is compared to the relation of a lyre’s harmony and its strings. What is said of soul can equally be said of the harmony, or attunement:

the attunement of a lyre and its strings is something unseen and incorporeal and very lovely and divine in the tuned lyre, while the lyre itself and its strings are corporeal bodies and composite and earthy ... [S]omething of this sort is what we actually take the soul to be: our body is kept in tension, as it were, and held together by hot and cold, dry and wet, and the like, and our soul is a blending and attunement of these same things, when they’re blended with each other in due proportion.³

The harmonists imagine a musical soul: as harmony to wood and strings, so soul to body. The harmony, or attunement, is a certain arrangement, but not just any arrangement – not, for example, the arrangement possessed by the parts of a smashed lyre. The harmony is a correct arrangement, one that is present when the elements are mixed rightly, ‘in due proportion’. How are we to spell out this notion of correctness? Perhaps in terms of what the lyre is able to *do*: correctness is ‘aptitude for performance’, as Jonathan Barnes suggests.⁴ Harmony is an arrangement that gives rise to a capacity to do something: the attuned lyre will produce music in certain circumstances. Harmony, viewed this way, is not music, and not just arrangement, but arrangement that yields a capacity for music. If soul is like harmony, then to

have a soul is likewise to be able to do something; to be in some psychological state is to be in a state that tends to do something.

Thus understood, the harmonists are *functionalist* philosophers, if we take functionalists to be those who define a mental state in terms of its causal role, saying that a mental state is defined by a set of conditions that specify its typical causes and typical effects under a range of different circumstances.⁵ The lyre's harmony will be defined by its capacity to produce certain musical effects (given certain striking of the lyre); pain will be defined in part by its capacity to produce beliefs that one is in pain (given certain perceptions of pain), desires to avoid the cause of pain, and behaviour directed towards pain-avoidance. Souls, psychological states, are what they are in virtue of what they do.

Perhaps there is 'something sound' in these suggestions, then – something sound by contemporary lights, and something sound even by Aristotle's lights. The musical soul is the soul according to functionalism and, perhaps, the soul according to Aristotle. Some reservations must be expressed, to avoid anachronism. The contemporary functionalist will speak of mind rather than soul, the scope of 'soul' for the ancients being more generous than the scope of 'mind' nowadays: soul animates every living thing, whether animal or vegetable, for Aristotle. But thought is a function of life for creatures like ourselves, so ancient theories of soul and contemporary theories of mind will overlap. Aristotle talks of soul in ways that make the musical analogy, appropriate to ancient harmony theory and to contemporary functionalism alike, seem appropriate to his account as well. Soul seems to be functional organisation. Soul is form, which is to be understood in terms of function: we have a soul when we have certain capacities, the capacities to nourish ourselves, move, perceive, and think. He says, memorably, that if the eye were an animal, sight would be its soul: soul is to the animal as sight is to the eye (412b 18–19). He suggests in the same passage that if an axe were an animal, its soul would be the capacity to cut. Might he not just as well have said that if the lyre were an animal, harmony would be its soul? He seems willing to draw the harmonist's analogy between artefacts and living creatures. An artefact is defined by what it does: a house can give shelter against destruction by wind, rain and heat (403b 5). That is what it is to be a house. Similarly, anger is defined by what it does: it is a desire for revenge, an appetite for returning pain for pain, a motive for retaliation (403a 30–1). That is what it is to be anger – or at least, that is what it is to be anger according to the definition of the 'dialectician'.

Many commentators, drawing upon such texts, have said Aristotle is a functionalist philosopher of soul. Aristotle and the functionalists are thought to chart a common course, avoiding the twin perils of dualism and reductive materialism. 'The right view' steers clear of both, holding that the soul 'cannot

be without a body, while it cannot *be* a body: it is not a body, but something relative to a body' (414a 19–21).⁶ Hilary Putnam claims inspiration from Aristotle in an early paper championing the functionalist programme: 'what we are really interested in, as Aristotle saw, is form and not matter.' Martha Nussbaum and Richard Sorabji have offered a detailed functionalist interpretation of Aristotle, and others have joined them.⁷ In the remainder of this section I sketch this sort of interpretation, drawing attention to some apparent common ground between Aristotle and functionalists, ancient and modern. Later I shall consider two arguments against it, and endorse one of them – so this essay defends the functionalist interpretation from one argument, but leaves it vulnerable to another.

Functionalism avoids the perils of dualism and materialism through silence, not through enmity. When it defines mental states in terms of functional roles, functionalism at its most basic says nothing about what realises those roles. Basic functionalism is not materialism, it is not dualism, but it is compatible with either. The functional roles could be realised by anything from Swiss cheese to Cartesian mind-stuff, just so long as the stuff can do the work. Basic functionalism is compatible with almost any metaphysics, whether idealist, dualist or materialist.⁸ Its hands-off attitude is expressed by David Lewis, who says (confining his attention to experience) that the functionalist account 'is neutral between theories – or lack of any theory – about what sort of real and efficacious things experiences are: neural states or the like, pulsations of ectoplasm or the like, or just experiences and nothing else'.⁹ From the perspective of functionalism, says Putnam, 'the question of matter or soul stuff is really irrelevant to any question of philosophical ... significance'.¹⁰ Mental states are defined by their causal roles, and basic functionalism says no more than this.

But the harmony theorists do say more than this. They say that the lyre itself and its strings are 'corporeal bodies'; and they say that our own bodies are put together from material elements, 'the hot and cold, the dry and wet'. In addition to giving an account of the soul in functional terms, the harmonists offer an account of what in fact fulfils those functions. The soul is a harmony of a *body*. The harmony theory wedds basic functionalism to physicalism.

Physicalistic functionalism goes beyond basic functionalism to a second stage: it offers an account of what, in fact, fulfils the functional roles definitive of mental states. Matter, and not Cartesian mind-stuff, does the work. The causal roles which belong by definition to certain mental states belong in fact to certain physical states.¹¹ It might be matter of quite different sorts in different sorts of beings, and here the lyre analogy is helpful once again. The same harmony might be achieved in different physical ways: in wood and string, or clay and wire. And if soul is like harmony, the same state of soul might be achieved in different physical ways: the harmony theory allows

for multiple realisability of psychological states in different physical states. In addition, harmony supervenes on the wood and the strings: there could be no difference in the harmony without a difference in the tension or arrangement of the components. And if soul is like harmony, soul supervenes on body: there could be no difference in psychological states without a difference in physical states.¹² But notwithstanding the supervenient dependence of harmony on matter, our grasp of harmony may have a kind of explanatory autonomy: the one who best understands music may not be the one who best understands wood and string. And if soul is like harmony, our grasp of mind may likewise have a kind of explanatory autonomy: the best psychologist may not be the one who best understands the nature of flesh and bone.

Here again, perhaps there is ‘something sound’ in these suggestions – something sound by contemporary lights, and something sound by Aristotle’s lights too. Those commentators who find Aristotle to be a functionalist typically find him to be more than a basic functionalist. For Aristotle says that the soul is the form *of the body*. He adds to the functional definition of states of soul an account of what realises those states. Soul is related to body as form to matter. We can dismiss as unnecessary the question whether the soul and the body are one: ‘it is as though we were to ask whether the wax and its shape are one, or generally the matter of a thing and that of which it is the matter’ (412b 6–9). A house is not simply a shelter against destruction by wind, rain and heat; it is also what the physicist describes, namely ‘stones, bricks and timbers’ (403b 6). Anger is not simply the desire for revenge, the motive for retaliation: it is also what the physicist describes, namely the ‘boiling of the blood or warm substance surrounding the heart’ (403a 31–403b 1). The dialectician’s definition is to be supplemented by what the physicist says. It is tempting to see Aristotle as pursuing the two-stage strategy of the physicalistic functionalist, first identifying states of soul with certain functional roles, in the manner of the basic functionalist, and then introducing matter as the realiser of those roles. The causal roles which belong by definition to certain mental states belong in fact to certain physical states: the causal role which belongs by definition to anger belongs in fact to the boiling of blood around the heart.

There is reason for supposing that Aristotle accepted multiple realisability: that he thought the capacities of the soul could be realised in different ways, just as the lyre analogy suggests. As the same harmony may exist in different sorts of musical instruments, so the same states of soul may exist in quite different sorts of matter. The analogies drawn by Aristotle himself – the shape of the wax, the sheltering ability of a house – suggest forms which can be instantiated in a variety of different things. And his explicit remarks on the capacities of the soul are in keeping with this. The capacity of absorbing food – one of the functions of living, animate things – is realised by

roots in plants, and by mouths in animals (412b 2–3). The perceptual capacity of smell is realised in fish quite differently to the way it is realised in ourselves, since in us it involves breathing, but not in fish (421b 9–422a 6).

There is reason for supposing that Aristotle thought the capacities of the soul supervene on states of the body. Whether a house is a good shelter will depend on its bricks and stone; and there could be no difference in the sheltering ability without a difference in the bricks and stones. With the soul it seems to be likewise, at least for many of its states. ‘It seems that all the affections of soul involve a body – passion, gentleness, fear, pity, courage, joy, loving, and hating; in all these there is a concurrent affection of the body’ (403a 16). For anger, this ‘concurrent affection of the body’ is the blood boiling around the heart, and the suggestion seems to be that there would be no difference in the facts about anger without a difference in the facts about boiling blood. In support of his conclusion about the ‘involvement’ of body Aristotle cites cases of fear and anger occurring in atypical circumstances.

[W]hile sometimes on the occasion of violent and striking occurrences there is no excitement or fear felt, on others faint and feeble stimulations produce these emotions, viz. when the body is already in a state of tension resembling its condition when we are angry. Here is a still clearer case: in the absence of any external cause of terror we find ourselves experiencing the feelings of a man in terror.

(403a 19–24)

The examples show what he takes this ‘involvement’ of body to be. In the first case, despite a typical cause for fear, no fear is felt, because of the absence of the relevant bodily state: a relevant bodily state is a necessary condition for fear. In the second case, an emotion is felt despite the absence of a fully appropriate cause, because of the presence of a relevant bodily state. In the third case (a ‘clearer case’) terror is felt despite the absence of any typical cause for it, because of the presence of a relevant bodily state. A necessary condition for fear is that there be some appropriate bodily state or other; and the presence of such a bodily state will be sufficient for the fear. Case one suggests the necessity condition; cases two and (more clearly) three, suggest a sufficiency condition. All this suggests that fear supervenes on its material basis, and anger supervenes on the blood boiling around the heart.¹³ Aristotle concludes the passage with an important summary of his view: ‘From all this it is obvious that the affections of soul are enmattered accounts’ (403b 24–5). The notion of an ‘enmattered account’ (*logos enhulos*) can be understood as the notion of a functionally defined mental state realised in, and supervening upon, states of matter.

Notwithstanding the supervenient dependence of soul on body, our explanation of the soul's capacities may have a kind of autonomy, just as an explanation of a lyre's distinctive musical capacity may be quite separate from an explanation of what happens to the lyre's wood and string. This explanatory autonomy is part of what Putnam had in mind when he hailed Aristotle as his philosophical forebear.

Whatever our mental functioning may be, there seems to be no serious reason to believe that it *is explainable by* our physics and chemistry.

No physical explanation will succeed in having the simplicity and generality that we need for psychology, but a functional explanation will. Putnam says this points to the autonomy of the mental.

My conclusion is that we have what we always wanted – an autonomous mental life. And we need no mysteries, no ghostly agents, no *élan vital* to have it.¹⁴

Nussbaum and Putnam find just this explanatory autonomy in Aristotle, who thinks explanations in terms of soul are superior to explanations in terms of matter.

[I]nasmuch as it is the presence of the soul that enables matter to constitute the animal nature, much more than it is the presence of matter which so enables the soul, the inquirer into nature is bound to treat of the soul rather than of the matter.

(Parts of Animals, 641a 28–32)

On this vision of Aristotle there is considerable common ground between Aristotle's views on the soul, and the views of his harmonist predecessors and functionalist successors.¹⁵ All are musicians of the soul: all give a theory of the soul which is perfectly capturable by the harmonist's musical analogy, according to which the soul and its states are like the harmony of a lyre – functionally defined, multiply realisable, supervenient on body, yet autonomous when it comes to the business of explanation. Given Aristotle's avowed purpose of profiting by what is sound in the suggestions of his predecessors, together with the apparent soundness of the harmonist's account of soul by his own lights, one might expect Aristotle to give the harmony theory a charitable reception. But no. The view is 'absurd' (408a 1, a 14), 'easily refutable' (408a 12). Aristotle's dismissiveness is puzzling; and if the harmonists are rightly interpreted as functionalists, that dismissiveness should also be puzzling to Aristotle's functionalist interpreters. Aristotle's evaluation of

the harmony theory will be an evaluation of functionalism, and one that should provoke unease. If Aristotle views the harmonists as 'absurd', is there not some danger that he would view his functionalist interpreters likewise?

His stated reasons for finding the view absurd are not entirely satisfying. One reason is that if the soul is a harmony, there will be many souls distributed throughout the body, since there are many different harmonious arrangements (408a 16–19). This is hardly an objection: the claim was not that every harmony is a soul, but that the soul is a *kind* of harmony.¹⁶ Another reason is more important, and has to do with a question about the metaphysics of causation: a harmony lacks 'the power of originating movement', a power which everyone agrees belongs to the soul (407b 34–5). The harmony of the lyre fails to be a cause in the way that the soul is a cause. Some commentators have pointed to the special role assigned to the soul in actively holding the body together, in Aristotle's philosophy, a role which has no parallel in the lyre.¹⁷ Others have argued that Aristotle is an emergentist about the powers of the soul: that Aristotle believes states of soul have efficacy in virtue of being states of soul. I will not be addressing here these issues in the metaphysics of causation, despite their possible significance.¹⁸ But there may be other reasons for thinking Aristotle would find uncongenial the functionalist's account, whether ancient or modern, and hence other reasons for thinking that the soul he imagines is not, or not quite, the musical soul.

Two such reasons are considered in the remainder of the paper: one deals in magic, and I shall argue (in the next section) that it is unpersuasive; the other deals in mathematics, and I shall argue (in the final section) that it is persuasive. A powerful objection has been raised by Myles Burnyeat, who says that functionalism is reductive and materialistic, too materialistic for Aristotle; he attributes to Aristotle a magical soul quite different to the soul attributed by the functionalist. There are grounds for thinking Burnyeat is wrong in his interpretation, but even if he is right, his argument is unpersuasive because it does not fully meet its functionalist target. Contrary to Burnyeat, a magical soul could be the soul of the functionalist. The final section raises an argument about mathematics, or rather about the methodology of mathematics, as Aristotle sees it, which brings a problem for functionalism that looks the opposite of Burnyeat's: the trouble is not that functionalism takes matter too seriously, from Aristotle's point of view, but that it doesn't take matter seriously enough. The functionalist attributes to Aristotle an abstract conception of the soul. The musical soul is also a mathematical soul – a soul treated as if it were an object of mathematics, definable independently of matter. Although this abstract conception can seem congenial to Aristotle, there is a persuasive case for thinking Aristotle would reject it, given the difference he sees between the study of soul and the study of mathematics. Contrary to the functionalist, the mathematical soul could not be the soul of Aristotle.

The magical soul

According to Burnyeat, Aristotle's view is mysterious and alien, he says – 'magical' seems just the word for it, and it has been aptly used by others.¹⁹ That magic is evident in Aristotle's account of vision: according to Aristotle, when I see, nothing happens in the matter of my eye, says Burnyeat. If he were right, what would become of the musical soul? Imagine a lyre that produces beautiful music, though nothing happens to the wood and strings. That magical lyre would be no familiar physical lyre. Perhaps it could still be defined functionally, defined in terms of what it does; but the physical story would be gone. If Burnyeat were right, the musical analogy would need to be abandoned, or at least revised. The magical soul would at least partly displace the musical.

In what follows I want to consider Burnyeat's argument, but some disclaimers are in order. Confronted with a clash of scholarly giants, the hopes of a bystander will be modest. Ambitions will tend to the philosophical, rather than the textual. One can hope, perhaps, for the role of a spectator at Wimbledon, innocent of ability to play – but able none the less to form her own opinion about whether a player has, at any rate, returned his opponent's serve. I will be suggesting that Burnyeat's argument is weaker than he thinks: if his argument is quite sound, Aristotle may still be a functionalist; and if, as it seems, it is partly mistaken, Aristotle may even be a physicalistic functionalist.

Burnyeat says that Aristotle's philosophy of mind is no longer credible, contrary to his functionalist interpreters, because Aristotle's philosophy of matter is no longer credible. Among the features of the functionalist view that Burnyeat opposes are the twin claims of multiple realisability and supervenience. This is enough to show that Burnyeat is not addressing basic functionalism – which says nothing about what mental states are realised in or supervene on – but physicalistic functionalism. He addresses multiple realisability, the thesis that psychological states, construed as functional states, 'must be realised in some material or physical set-up, but it is not essential that the set-up should be the flesh and bones and nervous system of *Homo sapiens* rather than the electronic gadgetry of a computer'. And he addresses the supervenience of the mental on the physical, the thesis that 'in any two worlds where the physical facts are the same, the mental facts are the same'.²⁰ Burnyeat's magical Aristotle denies both theses.

Aristotle denies multiple realisability, according to Burnyeat, because he denies that the relation between animal bodies and their functions is a contingent one. According to what is sometimes called the *homonymy principle*, the eye which cannot see is an eye in name only, not really an eye at all. The principle applies as much to the matter of living things as to the

living things themselves. 'Life and perceptual awareness are not something contingently added to animal bodies in the way in which shape is contingently added to the bronze to make a statue'.²¹ On this understanding of Aristotle's conception of living bodies, it makes no sense to think of matter plus some functional ability – for example, eye-jelly plus sight. When it comes to living, animate things, Aristotle's 'matter' is, of necessity, functionally organised. The bodies that are in fact ensouled are also of necessity ensouled. On this understanding of Aristotle's homonymy principle, the functional roles provide the identity conditions for the physical states: without the sight, there is no eye, nor even an eye-jelly; without the soul, there is no body; without functioning life, there is no flesh.

[T]here is no such thing as face or flesh without soul in it; it is only homonymously that they will be called face or flesh if the life has gone out of them, just as if they had been made of stone or wood.

(Generation of Animals, 734b 24–6)

If Aristotle had believed that the firing of C-fibres realised the functionally defined mental state of pain, then on the homonymy principle he would think that C-fibres could not exist except in the brain of a living creature capable of pain. Should the creature die, the C-fibres would cease to exist (except homonymously). Burnyeat takes this to be a mysterious and alien conception of matter, a conception of matter as essentially capable of awareness. But whether or not the conception is really so mysterious, his basic argument is that Aristotle's matter theory requires a necessary relation between matter and form; multiple realisability requires a contingent relation. Burnyeat concludes that functionalism is incompatible with Aristotle's philosophy of matter.

Aristotle denies supervenience, according to Burnyeat, because he thinks that differences in states of soul can occur without differences in states of body: in particular, visual awareness occurs without any difference in the matter of the eye-jelly. This violates supervenience, according to which there can be no difference in the facts about mental states without a difference in the facts about physical states. Since functionalism is committed to the supervenience of the mental on the physical, functionalist interpretations of Aristotle are, he says, mistaken. Burnyeat addresses the Aristotelian doctrine that in perception the eye takes on form without matter, arguing that Aristotle means that the eye takes on the form of a colour without any difference in its own matter. Sorabji had argued that for the eye to take on form without matter is for the eye jelly to become coloured, but without receiving matter from the object of vision.²² On Sorabji's view, the eye literally becomes red when we see something red. On Burnyeat's it does not become red, and

indeed does not *become* anything at all – except aware. On Burnyeat's interpretation, there is no physical story to the process of vision, the process in which the capacity of sight is exercised. Again, the mystery, according to Burnyeat, is in Aristotle's deeply alien conception of matter as 'pregnant with consciousness', the eye pregnant with visual awareness, needing no physiological change, nothing more than confrontation with the visible, in order to see.

The first thing to say about these two arguments is that they seem to be independent of each other, though Burnyeat does not present them that way. On the contrary, he suggests that 'the details of the theory of perception', given in the account of what goes on in the eye, are part of that same 'alien conception of the physical' which is a consequence of homonymy.²³ The suggestion is that the two are interconnected, and in particular that homonymy undermines supervenience as well as multiple realisability. But the issues of homonymy and supervenience seem independent. One could consistently hold (a) the matter of the eye is essentially capable of sight, and there is a difference in the matter of the eye when visual awareness occurs. Conversely, one could consistently hold (b) the matter of the eye is contingently capable of sight, and there is no difference in the matter of the eye when visual awareness occurs. Applying this to anger, one could consistently hold (a') the blood around the heart is essentially capable of playing the causal role of anger, and there is a difference in the blood when anger occurs (it boils). Conversely, one could consistently hold (b') the blood around the heart only contingently plays the role of anger, and there is no difference in the blood when anger occurs (it doesn't boil). A functionalist could accept Burnyeat's homonymy principle and still affirm supervenience on Aristotle's behalf, as in (a) and (a'). So we should treat the two arguments independently.

The second thing to say about these two arguments is that even if they were granted, there is a sense in which Burnyeat's functionalist target would remain beyond them. The musical soul is not completely displaced by the magical. Burnyeat's arguments, if sound, are compatible with basic functionalism. If a magical lyre might be definable in functional terms, a magical soul might be likewise. The lyre analogy need not be wholly abandoned: while no longer needed to illustrate physicalistic functionalism, it may still capture the idea of functional definition. If Aristotle were willing to define mental states in purely functional terms, that would be sufficient for his being a functionalist. He would be a functionalist who pursued the first stage of the functionalist programme – the account of functional definition – and failed to pursue the second stage – the account of physical realisation. Or, better, he would be a functionalist who pursued the first stage of the functionalist programme, and then pursued a quite different, non-physicalistic, second stage. If Aristotle were to deny the multiple realisability

of functional states, and deny the supervenience of functional states on physical states, he would be an odd sort of functionalist, but recall the hands-off attitude of basic functionalism. It is, in Lewis' words, 'neutral between theories – or lack of any theory – about what sort of things' the realisers of functional states are, or whether there is anything at all besides the functional states themselves.²⁴ Basic functionalism is designed to be compatible, not just with (almost) any physical story, but (almost) any metaphysical story, whether dualistic, idealistic, or outright magical. So Aristotle's matter cannot matter, however magical it may be – provided there is a functional account of states of soul. His matter theory may prevent him from being a physicalist, but that should not prevent him from being a functionalist.

Bearing in mind Burnyeat's more restricted target, let us consider his arguments, taking first of all the argument against multiple realisability. The homonymy principle generates a necessary relation between matter and form, according to Burnyeat, contrary to the contingent relation required by the functionalist thesis of multiple realisability. It is worth remarking that the homonymy principle is sometimes thought to create problems for Aristotle himself, collapsing an important distinction between what is potentially alive and what is actually alive, what is potentially enformed and what is actually enformed; so there may be good independent reasons, from an Aristotelian point of view, to seek an interpretation which allows for a looser relation between Aristotelian matter – somehow construed – and functional organisation.²⁵ The question for us here, though, is not whether the homonymy principle creates problems for Aristotle's metaphysics, but whether it creates problems for multiple realisability. Aristotle's functionalist defenders seem to assume that it does, and devote their attention to attacking Burnyeat's premise, which they argue to be an over-restrictive interpretation of homonymy. But our conclusion should be that functionalism is not vulnerable to the argument in the first place. Grant Burnyeat his premise of homonymy: it is compatible with multiple realisability.

To be sure, physicalistic functionalism requires a contingent relation between matter and function, while the homonymy principle requires a necessary relation, just as Burnyeat says. But if we are careful to say just what the relations in question are, we will see that the contingent relation which functionalism requires is compatible with the necessary relation which the homonymy principle requires. The contingency required by functionalism is: this function could be fulfilled without this matter. The necessity required by homonymy is: this matter couldn't fail to fulfil this function. The two thoughts are compatible. Recall that Burnyeat contrasts the cases of the bronze statue and the living creature, the matter/form relation being contingent in the case of the statue, but not in the case of the living thing. As Burnyeat notes, in the case of the statue the relation is contingent in two ways: the bronze might

not have been a statue; the statue might not have been bronze. The latter illustrates the multiple realisability of statues; the former illustrates, if you like, the multiple functionality of bronze. It is the former which Burnyeat describes when he says that shape is contingently added to the bronze, contrasting it to the case of organisms, whose life functions cannot be contingently added to matter. This leaves untouched the issue of multiple realisability, whether of statues or of life functions.

Homonymy does not seem to deny the multiple realisability of functions; it denies the multiple functionality of realisers. It denies that the eye-jelly could fail to have the function of sight; it does not deny that something other than eye-jelly could have the function of sight. It denies that the roots of a dead plant are roots, except in name only; it does not deny that the function of roots – namely the capacity to absorb food – can also be realised in animals. It will say that necessarily, if something is a root, it is capable of absorbing food; it will not thereby say that necessarily, if something is capable of absorbing food, it is a root. In short, the contingent relation required by functionalism is compatible with the necessary relation required by homonymy. I conclude that Burnyeat's argument against the attribution of multiple realisability to Aristotle fails, and with it fails an important part of his argument against the functionalist interpretation.

Now we turn to the argument against supervenience, based on the magical interpretation of Aristotle's account of vision. Burnyeat is surely right to assume that supervenience is part of the physicalistic functionalism he opposes, even if it is not part of functionalism at its most basic. This is worth emphasizing, because his chief opponents seem cagey. Nussbaum and Putnam defend functionalism as plausible philosophy of mind and as plausible interpretation of Aristotle, yet in their reply to Burnyeat they at first deny supervenience, surprisingly enough. Then they change their minds and affirm it, explicitly, when they say it is 'right', and implicitly, when they do battle with Burnyeat's claim that there is a difference in awareness without a difference in the eye-jelly, according to Aristotle. In rejecting Burnyeat's claim, Nussbaum and Putnam defend supervenience, whatever they say to the contrary.²⁶

The core of Burnyeat's argument against supervenience is, I said, that Aristotle thinks there is a difference in awareness without any difference in the matter of the eye-jelly. It is tempting to say: without the matter undergoing any change or alteration (I use those terms synonymously), and that is indeed how Burnyeat himself puts the point. But here we run into difficulties with a special Aristotelian understanding of change, one that Burnyeat takes to play a significant role in his argument against supervenience. The difference between having a capacity without exercising it at some particular time, and exercising that capacity at another particular time, is not strictly a change,

for Aristotle. The difference between knowing how to build a house and using that knowledge to build a house is not strictly an alteration in the builder (417b 7–9). Perception too is a capacity whose exercise is not strictly an alteration in the perceiver. The idea is that the builder and the perceiver do not ‘become other’ than they were before: the exercise of the capacities of building, and of perception, are a fulfilment of their natures, not a ‘becoming other’.²⁷ If this is so, then becoming aware of red is not strictly a change in the subject that becomes aware. Burnyeat uses this special view of change – or rather *absence* of change – to argue that since, according to Aristotle, there is visual awareness without change, there is visual awareness without change in matter, and hence supervenience is violated.

This special view about change does not seem to have quite the significance for the argument that Burnyeat attributes to it, I suggest. At worst, it hinders Burnyeat’s argument. In order to show a violation of supervenience, one might suppose that what is needed is a violation of the rule, ‘no mental change without a physical change’, that being a popular slogan for supervenience. If becoming aware *were* a change, but (as Burnyeat argues) there were no change in the eye jelly, then that supervenience rule would be violated and the argument would succeed. There would be a mental change without a physical change. But if becoming aware is not *even* a change, that supervenience rule is not violated. So Burnyeat’s appeal to the ‘no change’ understanding of the exercise of a perceptual capacity seems, on the face of it, to hinder his argument. It would be more helpful to Burnyeat’s case if talk of change were avoided, and the supervenience rule interpreted more broadly, as it has been above: ‘no mental difference without a physical difference’. Aristotle surely allows that there is a difference between a capacity’s not being exercised and its being exercised, so there is some kind of mental difference (whether or not it is to be called a change or alteration). The question then would be whether there is also a difference in the eye jelly (whether or not that is to be called a change or alteration).

Burnyeat’s case receives little help from this special Aristotelian view about change, I’ve suggested, and my reasons were based on thoughts about supervenience. Sorabji gives a different argument for this same conclusion, and his reasons are based on thoughts about what Aristotle says.²⁸ Perceiving is like building, says Aristotle: both are exercises of capacities that are not strictly changes in the perceiver or builder. If we consider the implications of that comparison, a magical interpretation seems implausible. When the capacity to build is exercised, the builder uses his hands, places one brick upon another, and eventually creates a house. There is an exercise of a capacity, a fulfilment of nature, that is not strictly a change in the builder; and there is also a physical alteration in the builder’s body. There is a difference that is an exercise of a capacity, and also a difference that is a change in

matter. If perceiving is like building, then one can expect there to be a difference that is an exercise of a capacity, and a difference that is a change in matter. That perceiving is an exercise of a capacity does not seem reason for thinking there may be no physical difference in the eye – or it would be reason for thinking the builder could build without some physical difference in himself. Sorabji extends his point to a still clearer case. A rock falling from a ledge would be fulfilling its natural capacity, and moving earthwards: the first would not be a change, in Aristotle's special sense, while the second would, even though the first could not happen (presumably) without the second.

Where does this leave Burnyeat's case against supervenience, and against the functionalist interpretation as a whole? Burnyeat took his case against supervenience to be supported by Aristotle's special view of change; and he took it to be supported by the homonymy principle, in so far as homonymy was thought to help establish the alien nature of Aristotle's matter theory. But his case seems to lack these two supports – the first for the reasons just given, and the second for the reasons given at the beginning of this section. The homonymy principle is independent, not just of multiple realisability, but of supervenience too. Perhaps homonymy is to be understood in a mysterious and magical way – matter as pregnant with consciousness, essentially capable of awareness. Even if it is, the magic of homonymy is independent of the magic of supervenience-denial. The soul could be magical in one way without being magical in the other. The matter of the eye might be essentially capable of sight, yet alter when visual awareness occurs (homonymy with supervenience). The matter of the eye might be contingently capable of sight, yet not alter when visual awareness occurs (no homonymy, with no supervenience). Of course, there may still be good textual reasons for thinking that Aristotle believes in a magical soul, whose states of visual awareness vary without difference in the eye-jelly. My conclusion is only that his views about homonymy, and about the exercise of capacities, do not show he believes in that sort of magical soul. If these arguments are right, then Aristotle may be a physicalistic functionalist, as Nussbaum and Putnam and Sorabji say, though his understanding of the physical may be different from any we know. But if they are wrong, and if Burnyeat is right about the magical soul, Aristotle may still be a functionalist. He would not be physicalistic functionalist, to be sure; but if idealists and dualists may be functionalists, so too may a magical Aristotle.

The mathematical soul

On Burnyeat's argument, functionalism takes matter too seriously, for Aristotle. It was suggested in the preceding section that Burnyeat is mistaken,

that functionalism does not take matter too seriously, and that even Burnyeat's magical Aristotle could be a functionalist. This section takes that argument further, to a point where it ceases to be a defence of functionalism (against Burnyeat), and becomes an attack. Functionalism does not take matter too seriously: indeed, functionalism does not take matter seriously enough, for Aristotle. Functionalism's abstraction offers a persuasive reason for thinking that Aristotle would reject it.

It was argued before that Burnyeat's Aristotle could be a functionalist – *provided* he were willing to define mental states in functional terms. That proviso is the nub. If Aristotle refuses to say that states of soul are states definable in functional terms, that would be a blow to the functionalist interpretation. It would not then be possible to say that Aristotle pursues the first, definitional, stage of the functionalist programme, subsequently pursuing his own idiosyncratic version of the second, realisation, stage – the stage that is in any case optional as far as basic functionalism is concerned.

There are reasons for thinking Aristotle does refuse this first stage. Recall again his description of 'the right view' of soul (given a little more fully this time): 'the soul cannot be without a body, while it cannot be a body; it is not a body but something relative to a body. That is why it is *in* a body, and a body of a definite kind' (414a 19–21) The soul *cannot be without a body*. How are we to understand the modality of this claim? It seems to deny the contingency of the soul/body relation – though not in the way that Burnyeat identified, when describing the implications of the homonymy principle. What Burnyeat described was the idea that *body is necessarily ensouled*. (Dead flesh is not flesh, except in name only; a corpse is not a body, except in name only.) But when Aristotle says that the soul cannot be without body, things are the other way around. *Soul is necessarily embodied*. I have argued that the former, homonymy-based, necessity is compatible with functionalism – compatible with functionalism construed at its most basic, and compatible with functionalism construed as physicalistic. But what of this latter necessity?

It seems more damning to the project of functionalist interpretation, because it stops it at the very starting point. Basic functionalism is the starting point, compatible with almost any metaphysical view. Physicalistic functionalism is basic functionalism wedded to the contingent fact of physicalism: the causal roles which belong by definition to certain mental states (described at stage one) belong as a matter of contingent fact to certain physical states (described at stage two). If Aristotle thinks that soul is necessarily embodied, then that first stage cannot get off the ground: soul cannot be understood in a way that allows compatibility with a variety of metaphysical views, physicalistic, dualistic, idealist, or whatever. And if the reason soul is necessarily embodied is because its *definition mentions matter*, things are worse still.

Not only is there a failure of metaphysical neutrality: there is a failure of functional definition.

Let us look again, a little more closely this time, at the business of definition, as Aristotle sees it. Having concluded that the affections of soul are ‘enmattered accounts’ (*logoi enhuloi*), Aristotle goes on to give his famous two-fold description of anger: the description given by ‘the dialectician’, according to which anger is the appetite for returning pain for pain; and the description given by ‘the physicist’, according to which anger is the boiling of the blood or warm substance surrounding the heart. It is tempting, as we saw, to interpret this in terms of functionalism’s two stages. Functional definition is given by the dialectician, and then supplemented by an account of contingent physical realisation, given by the physicist. The causal role which belongs as a matter of definitional necessity to certain mental states – as told by the dialectician – belongs as a matter of contingent fact to certain physical states – as told by the physicist. But Aristotle seems to be saying something stronger: it seems he is not talking about definition plus realisation, but about definition as such. There is a case for thinking that the very notion of an ‘enmattered account’ is not that of a functionally defined state realised in matter, but of a functional definition that mentions matter – as an alternative translation, ‘formula including matter’, perhaps makes clearer.²⁹

Aristotle says that when defining affections of the soul, the fact that they are ‘enmattered accounts’, or ‘formulae including matter’, has implications for their definition:

their definitions ought to correspond, e.g. anger should be defined as a certain mode of movement of such and such a body (or part or faculty of a body) by this or that cause and for this or that end. That is precisely why the study of the soul – either every soul or souls of this sort – must fall within the science of nature.

(403a 26–9)

Anger’s definition is not given purely by its causal role – a something that is ‘by this or that cause and for this or that end’. It is also, as a matter of definition, ‘a movement of such and such a body (or part or faculty of a body)’. It is part of anger’s very definition that it is a movement of the blood around the heart. To say that someone is angry is to say that the blood around their heart is boiling, because that is part of what it *means* to be angry.³⁰ That is why philosophy of soul will of necessity be part of the science of nature. The talk of body is part of the definition. This seems to be supported by what Aristotle says immediately thereafter. He raises the question of who gets the definition right, whether it is the dialectician, who restricts himself to the formal definition, or the physicist, who restricts himself to

the material definition; and he answers, 'Is it not rather the one who combines both?' The right sort of definition will say that a thing is 'that form in that material with that purpose or end' (403b 7–8).

Aristotle then draws a contrast between the theorist of soul and the mathematician. The mathematician deals with features of bodies that are 'inseparable in fact, but are separable from any particular kind of body by an effort of abstraction' (403b 14–15). Sphericity is separable from matter, whether bronze or wood, by an effort of abstraction; and the mathematician need not study bronze or wood in order to study sphericity. With the soul it is different. The theorist of soul cannot study its affections as if they could be abstracted from any sort of bodily thing. To remain with the dialectician's definition of anger would be to study the soul as if it were an object of mathematics.

Functionalism studies the soul as if it were an object of mathematics. Functionalism takes mental states to be 'separable from any particular kind of body by an effort of abstraction'. The harmonists do likewise, if they take harmony to be 'separable from any particular kind of body by an effort of abstraction' – separable by an effort of abstraction from wood and strings, clay and wire, or whatever. Functionalism goes if anything further than the mathematician envisaged by Aristotle, taking mental states to be separable, not just from 'any particular kind of body', but from any body at all, mental states being in principle realisable by non-physical stuff. Functionalism's virtue is its abstraction. Just as the mathematician gives an account of sphericity that abstracts from matter, abstracts from bronze or wood, so the functionalist gives an account of mental states that abstracts from body, abstracts from neurons or Martian hydraulics. 'We could be made of Swiss cheese and it wouldn't matter', says Putnam.³¹ The soul of the functionalists is a mathematical soul, and when they hail Aristotle as their philosophical forebear, they give Aristotle a mathematical soul too.

Functionalism's virtue – its abstraction – seems likely to be its vice, for Aristotle. When Putnam says that 'what we are interested in, as Aristotle saw, is form and not matter', his characterisation of functionalism seems more apt than his characterisation of Aristotle. Functionalism does not take matter as seriously as Aristotle would like to take matter. The functionalist plays the role of the dialectician, whose definitions of states of soul fail to mention matter at all, let alone matter of a particular kind. And the harmony theorist likewise plays the role of the dialectician, if harmony can be defined without reference to wood and strings. To be sure, functionalism in its physicalistic guise will graft its functional definitions to a physicalistic theory of what contingently realises the states so defined: but that would be like grafting geometry to a separate theory of bronze, or grafting musical theory to a theory of instrument-making. Functionalism will not say that anger

must be embodied, any more than the mathematician will say that spheres must be bronze, or the musician that harmonies must be in instruments of wood and string. Aristotle says that anger is necessarily in a body, and in a body of a particular sort. States of soul are not like spheres, not like harmonies, but functionalism treats them as if they were.

The mathematician is compared again to the philosopher of soul in *Metaphysics Z*. Aristotle raises the question whether the definition of man is unlike the definition of circle in requiring mention of matter, and mention of flesh and blood in particular: are flesh and blood ‘parts of the form and formula’ of man (1036b 5)? Whether Aristotle answers his question at this point is somewhat unclear, and the text is disputed.³² But there is reason for thinking his answer would not be negative. Earlier he had said that ‘man and animal’ are analogous ‘to bronze sphere in general’ (1033b 23–5), that is analogous to something whose definition mentions a particular sort of matter, just as the definition of anger does. And a little later he describes as mistaken a philosopher called Socrates the younger, who theorised about animals as if they were circles, as if ‘man can exist without the parts, in the way that circle can without the bronze’ (1036b 24). Aristotle contrasts the definition of a circle, which will not mention matter, with the definition of an animal, which will mention matter, and matter of a particular sort. Here, as in *De Anima*, he seems to reject the mathematician’s approach to the soul, which seems to be the approach of Socrates the younger, and, surely, the approach of the functionalist.

On this interpretation of Aristotle, matter is taken so seriously that functional definitions must mention it. This appears to be accepted by Nussbaum and Putnam. They cite some of the passages just quoted and others, to show that of necessity ensouled things are material things, according to Aristotle, and that mention of matter must be given in their very definitions. They explain how Aristotle’s views here depend in part on his view about change and materiality: for Aristotle, if something is essentially a changing thing it is necessarily a material thing. That is an important fact to bear in mind in considering Aristotle’s contrast between soul and circle, if circles can be defined without mention of change, but states of soul cannot. Since the functions of living beings involve change, they involve matter. Therefore, say the authors, ‘any account that properly gives the what-is-it of such a being must make mention of the presence of material composition’. They say Aristotle rejects the view of Socrates the younger because

the functional essence of a living being like an animal ... does require mention of material embodiment in that its essential activities are embodied activities. Just as ‘snub’ directly imports a reference to material composition, so too does ‘perceiving creature’ – in a way that ‘sphere’ does not.³³

How can functionalism's defenders attribute to Aristotle the view that functional definition must mention matter, if that is what functionalism denies? Their target is Burnyeat, and his magical interpretation of Aristotle. They say it is Burnyeat who makes the mistake of Socrates the Younger. That is to assimilate the mathematical to the magical, and the suggestion seems implausible. The mistake Aristotle describes seems to be that of abstraction, not that of magic, and it is the functionalist, not Burnyeat, who should plead guilty. But it is because of their focus on Burnyeat that Nussbaum and Putnam so emphasise the importance of matter to Aristotle. They think Burnyeat's Aristotle does not take matter seriously enough, if he thinks visual awareness occurs without any happenings in the eye jelly. They want to show that Aristotle takes matter very seriously indeed. But they have proved too much, it seems. If Aristotle takes matter as seriously as they say he does – so seriously that functional definitions must mention it – then he is surely no functionalist. States of soul cannot be defined in purely functional terms. The vaunted 'autonomy of the mental' which Putnam claimed for functionalism cannot be claimed for Aristotle: the abstraction sought by functionalism is an abstraction shunned by its adopted hero. The functionalist may want a mathematical soul, but Aristotle, it seems, does not.

Notes

- 1 An ancestor of this paper benefited from Michael Frede's generous written comments, and from discussion at a presentation at University College, London; more recent work on it was improved by helpful suggestions from Stephen Makin and Richard Holton.
- 2 Unless otherwise noted, all references to Aristotle's work henceforth are to *De Anima*. Quotations are from *The Complete Works of Aristotle: The Revised Oxford Translation*, ed. Jonathan Barnes (Princeton: Princeton University Press, 1984), Vols. I and II.
- 3 *Plato: Phaedo*, trans. David Gallop (Oxford: Clarendon Press, 1975), 85e, 86b–c.
- 4 Jonathan Barnes, *The Presocratic Philosophers* (London: Routledge and Kegan Paul, 1979), p. 189. For some other useful discussions of the harmony theory see William Charlton, 'Aristotle and the *Harmonia* Theory', *Aristotle on Nature and Living Things: Philosophical and Historical Studies presented to David M. Balme on his Seventieth Birthday*, ed. Alan Gotthelf (Pittsburgh: Mathesis, 1985), pp. 131–50; Victor Caston, 'Epiphenomenalisms, Ancient and Modern', *Philosophical Review* 106 (1997), pp. 309–93; Charlotte Witt, 'Dialectic, Motion, and Perception: *De Anima* Book I', in *Essays on Aristotle's De Anima*, eds Martha Nussbaum and Amélie Oksenberg Rorty (Oxford: Clarendon Press, 1992), pp. 169–83.
- 5 For a classic statement, see David Lewis, 'An argument for the identity theory' (1966), reprinted in *Philosophical Papers* Vol. I (Oxford: Oxford University Press, 1983), p. 102.
- 6 Cf. Jonathan Barnes, 'Philosophy of mind has for centuries been whirled between a Cartesian Charybdis and a scientific Scylla: Aristotle has the look of an Odysseus', 'Aristotle's Concept of Mind', *Proceedings of the Aristotelian Society* 72 (1971–2), pp. 101–14, 114.
- 7 For some of the original statements see Martha Nussbaum, 'Aristotle on teleological explanation', in *Aristotle's De Motu Animalium* (Princeton: Princeton University Press,

- 1978), pp. 59–106; Hilary Putnam, 'Philosophy and Our Mental Life' (1973), reprinted in *Mind, Language and Reality* (Cambridge: Cambridge University Press, 1975), pp. 291–303, quotation from p. 302; Richard Sorabji, 'Body and Soul in Aristotle' *Philosophy* 49 (1974), pp. 63–89. Among the opposing camp are Howard Robinson, 'Mind and Body in Aristotle', *Classical Quarterly* 28 (1978), pp. 105–24 and Miles Burnyeat, 'Is an Aristotelian Philosophy of Mind Still Credible? (A Draft)', in Nussbaum and Rorty (eds) *Essays*, pp. 16–26. Nussbaum and Putnam reply to Burnyeat in 'Changing Aristotle's Mind' (*ibid.*, pp. 27–56), Sorabji replies in 'Intentionality and Physical Processes' (*ibid.*, 195–225); Marc Cohen ably defends the functionalist interpretation in 'Hylomorphism and Functionalism' (*ibid.*, pp. 57–73).
- 8 Lewis, 'An Argument', p. 102, Putnam, 'Our Mental Life', pp. 291, 293 (and *passim*). *Almost any metaphysics: some restrictions are noted by Lewis.*
 - 9 Lewis, 'An Argument', p. 102. Lewis's argument proceeds in two distinct stages, the first defining mental states in terms of their causal roles (basic functionalism), the second identifying the contingent realisers of those roles with e.g. neural states (physicalistic functionalism).
 - 10 Putnam, 'Our Mental Life', p. 295.
 - 11 Cf. Lewis, 'An Argument', pp. 100, 106.
 - 12 The lyre analogy essentially expresses a supervenience thesis and a thesis about multiple realisability according to Caston, 'Epiphenomenalisms', p. 322.
 - 13 This supervenience interpretation is indebted to Caston, 'Epiphenomenalisms', pp. 332–4. (Stephen Everson interprets the aberrant cases similarly, 'Psychology', *Cambridge Companion to Aristotle*, ed. Jonathan Barnes (Cambridge: Cambridge University Press, 1995), pp. 168–94, 186). Caston supplies extensive textual evidence supporting the attribution of supervenience to Aristotle – *pace* Burnyeat, who takes case three *not* to be anger, concluding that the passage denies supervenience, 'Aristotelian Philosophy of Mind', p. 23.
 - 14 Putnam, 'Our Mental Life', pp. 297 (his emphasis), 303. See also Michael Frede, 'On Aristotle's Conception of the Soul', Nussbaum and Rorty, *Essays*, pp. 93–107, especially pp. 95–6; and Nussbaum and Putnam, 'Changing Aristotle's Mind'.
 - 15 This is partly a consequence of taking the harmony theory in an Aristotelian direction, following Barnes, who thinks that Aristotle's 'hasty dismissal of the [harmony] theory is a pity', *Presocratic Philosophers*, p. 190; cf. Frede, 'Aristotle's Conception', pp. 98–9 (Frede also emphasises some dissimilarities).
 - 16 Charlton, 'Aristotle and the *Harmonia* Theory', p. 133.
 - 17 Alan Code, 'Aristotle, Searle and the Mind–Body Problem', *John Searle and his Critics*, eds Ernest Lepore and Robert Van Gulick (Oxford: Blackwell, 1981), 105–13; Code and Julius Moravcsik, 'Explaining Various Forms of Living', in Nussbaum and Rorty, *Essays*, 129–145. Marc Cohen sees the causation question as crucial to settling the functionalist debate, in 'Aristotle's Hylomorphism', *ibid.*, pp. 57–73, 71.
 - 18 They may be beside the point if, for example, functionalism is compatible with emergentism, as Caston seems to suggest, in 'Epiphenomenalisms'. He argues that Aristotle is an emergentist, and takes emergentism to be compatible with a belief in supervenience and multiple realisability, so I anticipate he would take it to be compatible with the full functionalist interpretation (assuming no other hindrances).
 - 19 Nussbaum and Putnam describe Burnyeat's Aristotle this way, 'Changing Aristotle's Mind', pp. 46–7.
 - 20 Burnyeat, 'Aristotelian Philosophy of Mind', pp. 17, 23. Burnyeat has other objections I do not address, e.g. about a functionalist demand for materialistic explanation (this is countered by Nussbaum and Putnam in their response).

- 21 'Aristotelian Philosophy of Mind', p. 26.
- 22 Sorabji, 'Body and Soul'.
- 23 Burnyeat, 'Aristotelian Philosophy of Mind', p. 26
- 24 Cf. Lewis' above-quoted remark about 'just experiences'.
- 25 See e.g. J.L. Ackrill, 'Aristotle's Definitions of *psyche*', *Proceedings of the Aristotelian Society* 73 (1972–3), pp. 119–33; Bernard Williams, 'Hylomorphism' (1986), in Julia Annas (ed.), *Oxford Studies in Ancient Philosophy* 4, pp. 189–99; Marc Cohen, 'Hylomorphism and Functionalism'; Jennifer Whiting, 'Living Bodies', Nussbaum and Rorty, *Essays*, pp. 75–91.
- 26 They deny supervenience, arguing (mistakenly) that it is incompatible with multiple realisability, and with desire-based causal explanation, 'Changing Aristotle's Mind', pp. 33–4. They say supervenience is 'right' but 'trivial', while generally disparaging it, pp. 49, 51.
- 27 For a helpful explanation see Sorabji, 'Intentionality', p. 221.
- 28 Sorabji, 'Intentionality', p. 221.
- 29 The interpretation given here draws on Barnes, 'Aristotle's Concept of Mind', 106–7, where *logos enhulos* has the alternative translation; Deborah Modrak, *Aristotle: the Power of Perception* (Chicago: University of Chicago Press, 1987), pp. 28–9; Everson, 'Psychology', pp. 181–3; and Nussbaum and Putnam (see below). Modrak thinks such definitions do not fit modern (analytic) functionalism (though may fit biological functionalism). Points are also raised against the interpretation by Everson, and it is rejected by Cohen, 'Hylomorphism and Functionalism'.
- 30 Cf. Barnes, 'part of the meaning of "x is angry" [Aristotle] implies, is "the blood about x's heart is boiling"', 'Aristotle's Concept of Mind', p. 107.
- 31 Putnam, 'Our Mental Life', p. 291.
- 32 See Cohen's Appendix to 'Hylomorphism and Functionalism', to which I am indebted. He contrasts two translations, the first being at odds with the above interpretation, the second not. W.D. Ross gives Aristotle a negative reply: the question whether flesh and bones are part of the form of man is followed by 'No, they are matter; but because man is not found also in other matters we are unable to effect the severance'. According to Montgomery Furth there is no negative reply: what follows the question is not an answer but more question: 'Or not, but matter ...?' (Ross in *The Works of Aristotle Translated into English*, eds J.A. Smith and Ross (Oxford: Clarendon Press, 1912–54), likewise in the Barnes revision), Furth in *Aristotle's Metaphysics: Books Zeta, Eta, Theta, Iota, Translation and Commentary* (Indianapolis, IN: Hackett, 1985).) Cohen (defending functionalism) favours Ross.
- 33 Nussbaum and Putnam, 'Changing Aristotle's Mind', pp. 31, 32, 46. The comparison with 'snub' is discussed in more detail on p. 31, in connection with *Metaphysics* 1026a 2–3.