Descartes on Mindless Animals

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What is it like to be a dog, or a bat, or an earthworm? When a dog sees someone she recognises, do we have any understanding of the cognitive state she is in, and perhaps of her affective or emotional state? The obvious way to proceed is to extrapolate from our own cognitive and affective states. But if we do that, we tend to end up thinking of the cognitive state of the dog as being like a diminished version of our own: the dog's cognitive state is relatively unfocused, or confused, or whatever, as if dogs are like a retarded or especially confused version of human beings. The unsatisfactory nature of this proposal has led many philosophers to dispute whether or not dogs, for example, can be described as being in cognitive states at all. To say they are in cognitive states, but not like ours, is to say they are not in cognitive states at all, because the 'like ours' is crucial to our identifying a cognitive state in the first place. If it were not, then we could just as easily say that chairs and tables, or hydrogen atoms, are in cognitive states, but not like ours.

But there are competing considerations that force us to take the idea of animal cognitive states seriously. Compare an earthworm, a shark, a dog, a chimpanzee, and a human being. It is impossible, on behavioural grounds, to resist the conclusion that we have here a series of things with different cognitive skills, and that there is an increase in cognitive skill as we proceed up the list. And this irresistible conclusion is confirmed when we compare the size and anatomical complexity of brain and central nervous systems. The reply that we can only call our

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own cognitive skills cognitive begins to looks like a merely semantic point.

I think there is a genuine dilemma here, and am not sure what the right answer is to what we do about it: indeed, I suspect that there is no one right answer, but several highly context-dependent good answers, depending on what exactly one is asking for. The problem is certainly not a new one, although in the early modern era parallels between animals and human beings were predominantly parallels between their affective states rather than between their cognitive states. The idea that different species of animals manifested particular passions and/or virtues goes back at least to the Patristic writers, and supplied a staple diet of iconography for medieval and Renaissance writers and painters. Early modern writers go along with this story: 'animals are always uniform in all their actions', one anonymous seventeenth-century writer tells us; 'the Lyon is always generous, the Hare ever cowardly; the Tyger, cruel; the Fox, craft'.[1] These features had an explanatory role. So, for example, Thomas Wright, in his *Passions of the Minde* (1601) introduces eleven basic passions, and illustrates them by making reference to the behaviour of the sheep and the wolf.[2] Cureau de la Chambre, one of the most influential writers on the passions in the seventeenth century, sets out his account of courage in terms of a close investigation of the behaviour of lions.[3] And so on.

Note that having a low view of a particular species means attributing a disreputable distinctive affective state to it, not refusing to attribute an affective state to it at all. No one, as far as I have been able to discover, denies affective states to animals, Descartes included. Descartes notes that the signs of passions in animals are natural and invariant, whereas those in humans can be modified by the soul: 'the soul is able to change facial expressions', he tells us, 'as well as expressions of the eyes .... Thus we may use such expressions to hide our passions as well as reveal them'. Animals may not be able to disguise their affective states, but they do have them.

And not only do they have affective states, they have

cognitive states as well, for Descartes. This is my theme: Descartes' account of cognition in animals, which he referred to at various times as 'bêtes machines' or 'automata'. Descartes has had a bad press on animals. It has been maintained recently that Descartes alienated his family by dissecting the family dog on the kitchen table,[4] confirming a widespread view (or at least it would have confirmed a widespread view if it had been true) that since Descartes considered animals to be mere machines, states such as fear, pain, or anguish could not be attributed to them, and so one could treat them as one liked.

Descartes has been seen primarily as the instigator of mind/body dualism, which treats the mind and the body as two completely separate substances, which do not admit of degrees. Earlier thinkers, and many of Descartes' contemporaries, believed that they were able to capture the differences between, say, inanimate things, plants, animals, and human beings, by postulating various degrees of 'soul'—vegetative, sensible, and rational—which often blended into one another, so that there was a clear hierarchy in the order of being, as it were. Descartes, by contrast, because he only admitted matter and the human rational soul, or mind, was left with a sharp divide between those entities which have minds—namely human beings—and those which have not: inanimate things, plants, animals. Does this prevent him from ascribing cognitive states to animals? I argue that it does not.

One of the principal tasks of the seventeenth-century mechanist natural philosophy—of which Descartes was one of the foremost representatives—was the elimination of teleology. In the case of mechanics, optics, and cosmology, there were, outside the question of the formation of the Earth, few reasons to question this approach once Aristotelianism had been abandoned. Physiology was a different matter, however, and among the phenomena that a mechanised physiology had to deal with were a number of processes that seemed clearly goal-directed. Here at least, it was not a question of Aristotle's misguided concern to provide teleological explanations where

they weren't needed, but rather a question of how one could possibly avoid reference to goals in explaining these processes.

I am particularly interested in the resources used by Descartes in his development of a mechanist physiology to account for two processes that had traditionally been conceived as goal-directed. The first is his account of the development of the foetus, where he pursues a programme designed to show that what had traditionally been seen as a goal-directed process need not be thought of as goal-directed at all, and could be construed in terms of straightforward mechanical causation. The second (my present concern) occurs in his treatment of perceptual cognition in animals—and in humans in cases where the intellect is not operative, that is where it is simply a case of psycho-physiology—where he does not attempt to show that perceptual cognition does not occur, but rather invokes a kind of receptive capacity which stretches what one might normally think of as the limits of explanations that have recourse only to mechanical causation.

The aims of a mechanistic physiology

Before we can appreciate the strengths and limitations of these resources, it is important that we ask about the aim of a mechanised physiology; that is, what Descartes hoped to achieve by such a programme. Descartes' commitment to mechanism extends far beyond physiology, and the most important statement of his mechanistic physiology, the *Traité de l'Homme*, is the continuation of a work providing a mechanist account of optics and cosmology, the *Traité de la Lumière*, also known by the generic title *Le Monde*.[5] *Le Monde* sets out to show how optical and cosmological phenomena can be explained in terms of a theory of matter and two basic physical principles, centrifugal force and the principle of rectilinear inertia. His theory of matter allows no qualitative distinction between types of matter, it allows no internal forces or activities, and it explains various differences between the properties of things in terms of three sizes of matter, the largest making up the planets, the second making up fluids

such as the air and the regions between the planets, and the smallest filling up the regions between the boundaries of the first and second kinds, which are generally speaking corpuscular, and also making up the sun. The most important feature of Cartesian matter from the point of view of mechanism is its inertness. This was a constraint the full implications of which Descartes had learnt from Mersenne, for it was the versions of mechanism that Mersenne was developing in various works in the mid-1620s that largely shaped Descartes' understanding of the natural-philosophical issues underlying mechanism. Mersenne had been particularly concerned to rebut various forms of Renaissance naturalism, which had obscured the distinction between the natural and the supernatural, and had conceived nature generally as animate in varying degrees, having numerous powers and forces by which natural processes were effected. One particular danger that he perceived in the construal of nature as an 'active realm' along naturalistic lines was that the need for divine activity would ultimately be rendered otiose. Unable to counter these forms of naturalism by relying on traditional scholasticism—for the Aristotelian doctrine of form was part of the naturalist armoury—he advocated a strict separation between an active supernatural realm and a completely inert natural realm, stripping the latter not just of the offending sympathies and powers of the naturalists, but also of Aristotelian forms and qualities.

Descartes employs this notion of matter not only in his physical theory, but also in his account of physiology. There are three kinds of approach to which his mechanist account can be seen as an alternative. These attempt to provide an account of physiology that aims to explain various functional differences between organs either, first, in terms of qualitatively different kinds of matter, or, second, in terms of some non-material principle guiding those functions, or, third, in goal-directed terms which cannot be captured mechanistically. In the first case, what was usually invoked was the traditional doctrine of the four elements—earth, air, fire, water—but Descartes had, in *Le Monde*, already questioned both the basis for this doctrine and

whether the accounts it produced could have any explanatory value, whether they could actually have informative content, and he had offered his own accounts of phenomena such as burning, and the different physical properties of solids and fluids, in terms of his much more economical single matter theory. At a general level, the argument is that invoking the traditional theory of the elements explains nothing, and the cases they are invoked to explain in physical theory can actually be accounted for fully in terms of a single type of matter, material extension. When we turn to physiology, the same considerations apply. Why try to account for differences in physiological function in terms of a theory of matter which would not explain anything anyway, and which can be replaced by something much more economical?

In the second case, a parallel set of considerations holds. Instead of a theory of elements, what are invoked are various classes of 'soul': vegetative souls, sensitive souls, and rational souls. These are supposed to capture various qualitative differences that emerge as we ascend the chain of being from inanimate matter, to vegetable life, to animal life, to human beings; or alternatively, as we ascend from those functions we share with plants, to those we share with animals, to those that are distinctively human. Descartes certainly thinks that distinctively human capacities require the postulation of a separate soul, but the postulation of a hierarchy of souls—and more specifically, the postulation of a 'sensitive soul' to account for animal sentience—is a different matter. First, it is unnecessary, since one can, Descartes believes, explain vegetable and animal capacities simply in terms of matter. Second, the postulation of a hierarchy of souls does not actually explain anything: it does nothing more than label the stages at which various differences are considered to emerge, while giving the impression that the cause of the difference has been identified. Third, a hierarchy of souls obscures the all-important distinction between the soul and the body, suggesting that the differences may be ones of degree, something that Descartes singles out for criticism in his theory of the passions.

The third case, that of the apparent goal-directedness of certain physiological processes, is the most serious challenge to a mechanist physiology, and the cases of the development of the foetus and perceptual cognition are the most problematic kinds of case for a mechanist account. Descartes deals with both in some detail. His account of embryology is radically revisionary and effectively eliminates any element of goal-directedness in foetal development. His account of perceptual cognition, on the other hand, aims to 'save the appearances' to a large extent, and is reductionist, in that nothing other than mechanical processes are involved; but these mechanical processes have a level of structuring imposed upon them that allows for recognitional capacities, something which Descartes shows, at least at an elementary level, not to be beyond the capabilities of a mechanist theory. The aim is to show how function can be generated purely within the resources of mechanism.

It is important, in considering these matters, to understand in what the novelty of Descartes' attempt to mechanise physiology lay. It did not lie in construing psycho-physiological functions corporeally. Many psycho-physiological functions had been construed corporeally before Descartes by writers on physiology, and indeed there had been an extensive concern from Galen onwards with the localisation of particular faculties in the brain. There was even an orthodox tradition, dating back to the Church Fathers, of construing thought in corporeal terms, a tradition which the 'theologians and philosophers' who compiled the sixth set of objections to Descartes' *Meditationes* describe explicitly and approvingly as the 'soul thinking ... by means of corporeal motions'.[6] Descartes' aim was to show that a number of psycho-physiological functions that had traditionally been recognised as being corporeal could be accounted for in a way that did not render matter sentient. That is the novel part of the programme. What is original about Descartes' project is not that it construes the faculties in corporeal terms, but his attempt to show that construing them in corporeal terms did not contradict the central tenet of mechanism that matter was inert.

Finally, in this section, it is worth asking just what picture of biological entities emerges from the more revisionary aspects of Cartesian mechanist physiology. Descartes speaks of animals as 'automata', a term that also covers human bodies when not considered as animated by a soul. The terminology is misleading, however, for in the seventeenth century it meant little more than a 'self-moving thing'. Leibniz, defending his claim that we possess 'freedom of spontaneity', speaks of the human soul as a 'kind of spiritual automaton', meaning no more than that its action-generating impulses arise solely *ad interno*, and produce effects without the intervention of any external cause. Indeed, the terminology of machines, which carries with it the strongest connotations for our understanding of what a mechanistically-construed animal might be like, is also somewhat misleading here. We tend to think of seventeenth-century machines as rigid wooden and metal clockwork constructions, like the famous Strasbourg clock. On this conception, 'animal machines' come out looking like the metal robots of twentieth-century imagination. But the machines that Descartes takes as his model are hydraulically-powered statues and mechanically-driven fountains: the kinds of devices he describes in *L'Homme* resemble, and probably derive from, the hydraulically-powered devices in the underground grottoes at the Saint-Germain gardens, which Descartes was certainly familiar with from illustrations, and which he may well have known at first hand. He mentions the analogy with clocks in the *Discours de la méthode*,[7] but there is no evidence that clocks ever formed a model for a mechanistic physiology. Just as in *Le Monde*, where bodies are carried along in fluids, so in *L'Homme* the kind of image Descartes' model conveys is that of fluids being pushed through tubes, not wheels working cogs, and this has a much more intuitively 'organic' feel to it. The difference between an animal so traditionally conceived and a Cartesian automaton is not a difference between soft, fleshy organic entities and clockwork robots, but a conceptual difference between how physiological processes are to be modelled.

Perceptual Cognition

Let us turn then to perceptual cognition. Descartes has a specific quarrel with the attempt to treat perception as a goal-directed process. It is not just that thinking of goals gets us nowhere. Rather, trying to think through perception in terms of its goals points us in a direction that is demonstrably wrong. Aristotle had maintained that we have the sense organs we do have because they naturally display to us the nature of the world, and his account of the optics and physiology of perception turned around what he took its function to be. Among other things, the optics and physiology had to be construed in such a way as to yield perceptual images that resembled what was perceived. The optics and physiology that Aristotle's account yielded turned out to be completely wrong, however, as Descartes knew, and his own account of perception, in the *Regulae* for example,[8] starts from a new understanding of the optics and physiology of vision and uses this understanding to explore what form visual cognition might take.

Visual cognition involves cognitive response. This isn't a problem for an account that construes the sense organs primarily in terms of their function, that subordinates structure to function, as Aristotle's account did. Descartes wants to subordinate function to structure, he wants there to be nothing more to function than what an examination of structure reveals. The problem in perceptual cognition is to recognise the goal-directedness of perceptual cognition—the goal is cognition, the means perception—without rendering this a teleological process. It is basically the problem of capturing the idea of realising a function without the Aristotelian/scholastic notion of intrinsic final ends.

The faculties involved in perceptual cognition—the 'external' sense organs, the common sense, the memory, and the imagination—traditionally had been constructed in corporeal terms, with a good deal of attention having been given to localisation of faculties in the brain by physiologists. But the

construal of some level of cognitive functioning in corporeal terms had been associated with various attempts to render matter itself sentient, by invoking the idea of a 'sensitive soul' regulating the corporeal process from inside. To the extent that he is concerned to show that organic processes, including some cognitive operations, can be construed wholly mechanistically, Descartes has to make sure that his account is compatible with the inertness of matter. His aim is to show that the structure and behaviour of bodies are to be explained in the same way that we explain the structure and behaviour of machines, and in doing this he wants to show how a form of genuine cognition occurs in animals and that this can be captured in mechanistic terms. He does not want to show that cognition does not occur at all, that instead of a cognitive process we have a merely mechanical one. The aim is to explain animal cognition, not to explain it away.

Take the case of visual cognition. We can distinguish between mere response to a visual stimulus, in which the parts of the automaton simply react in a fixed way; visual awareness, in which the perceiver has a mental representation of the object or state of affairs that caused the visual stimulus in the first place; and perceptual judgement, the power to reflect on and make a judgement about (e.g. a judgement as to the veridicality of) this representation. Descartes clearly restricts the last to human beings—it requires the possession of a mind/rational soul. Which of the first two are we to attribute to animals on Descartes' account? The automaton could react directly to the corpuscular action that makes up light without actually seeing anything, as a genuine machine might, but this is not how Descartes describes the visual process in automata in *L'Homme*. He tells us, for example, that the 'figures traced in the spirits on the [pineal] gland, where the seat of imagination and common sense is, should be taken to be ideas, that is, to be the forms or images that the rational soul will consider directly when, being united to this machine, it will imagine or will sense any object'. This indicates that there are representations on the pineal gland of the automaton. It is in fact difficult to see how they could not have

'mental' representations if we are to talk about visual cognition. And it makes no sense to talk about their having representations but not being aware of the content of these representations. Moreover, Descartes certainly does not deny states such as memory to animals, and remembering something is just about the paradigm case of grasping the content of a representation.

The problem is, that while Descartes can allow that automata have representations, it is not immediately clear how he can allow that they grasp the content of these representations if they are not aware of them as representations: if, unlike human beings, they cannot make judgements about them as representations, e.g. about their veridicality.

In what sense can automata be aware of the content of representations without being able to respond to them as representations? Descartes' problem might be put in these terms. The behaviour of automata is such that they must be construed as responding to perceptual and other cognitive stimuli in a genuinely cognitive way, that is in a way that simply goes beyond a stimulus-response arc. In other words, their behaviour indicates that they are sentient. But they are not conscious: that is, they have no awareness of their own cognitive states as such and so cannot make judgements as to their content. Consequently, Descartes has to account for the behaviour of sentient but non-conscious automata. Because automata are literally 'mindless', this can only be done in terms of a mechanistic physiology.

What we need to do is to capture the difference between sentient and non-sentient behaviour, and to set out how this is reflected in differences at the level of a mechanistic physiology. My account of Descartes on this issue is largely a reconstruction of what kind of response was available to him on the basis of some very inconclusive remarks that he makes, but I believe that it does represent a strategy that is consonant with his general approach.

The first question, the difference between sentience and non-sentience, is of course a grey area, but one crucial difference we might point to is that there is a sense in which sentient beings are

able to process information: they are able to interpret stimuli, and this interpretation determines their response. Descartes gives us some hints as to how this difference might be manifested in Chapter I of *Le Monde*, for not only is it established there that there is a certain level of processing of visual information that requires nothing over and above corporeal organs, but we are also given some account of what such processing would consist of.

In Chapter I, Descartes looks at the relation between the physical agitation of matter that results in a stimulation of the eye, and the visual cognition that we have as a result of this. Previously, his account had focused on getting the 'perceptual' part of perceptual cognition right, whereas here he concentrates on the 'cognition' side of the question. The account of cognition in the *Regulae*, for example, is little more than a mechanist reworking of medieval faculty psychology: the perceptual process involves stimulation of the external sense organ, which in turn conveys motions or 'agitations' to the common sense, and then to the memory and finally to the imagination. The account presented in the first chapter of *Le Monde* is different. Perceptual cognition is not thought of in causal terms, and it is not thought of as a multi-stage process. Rather, the treatment focuses on the question of how we are able to respond to certain properties or events as information.

In that chapter Descartes suggests that we conceive of visual cognition, not in terms of the mechanical-causal process involved in perception, but in terms of a single unified act of comprehension. He spells this out in terms of a new linguistic model of perception:

> Words, as you well know, bear no resemblance to the things they signify, and yet they make us think of these things, frequently even without our paying attention to the sound of the words or to their syllables. Thus it may happen that we hear an utterance whose meaning we understand perfectly well, but afterwards we cannot say in what language it was spoken. Now if words, which signify nothing except by human convention, suffice to make us

> think of things to which they bear no resemblance, then why should nature not also have established some sign which would make us have the sensation of light, even if the sign contained nothing in itself which is similar to this sensation? Is it not thus that nature has established laughter and tears, to make us read joy and sadness on the faces of men?[9]

If we distinguish between the question of how perceptual information is conveyed and the question of how perceptual information is represented, then we can see that Descartes is retaining a causal-mechanical model for the first, and advocating a linguistic model for the second. On the linguistic model, we grasp an idea by virtue of a sign which represents that idea to us. So, in the case of a conventional linguistic sign, when we know English, the word 'dog' conveys to us the idea of a dog. And just as conventional signs do not resemble what they signify, so too natural signs do not resemble what they signify either. Descartes tells us that there is in nature a sign which is responsible for our sensation of light but which is not itself light, and which does not resemble light. All there is in nature is motion. In the case of a natural sign like motion of a particular kind, provided we have the ability to recognise and interpret it, when we grasp motion of that kind what it will convey to us is light. Light is what we will experience when we respond in the appropriate way to the sign. As examples of natural signs, Descartes tells us that tears are a natural sign of sadness and laughter a natural sign of joy. One of the things that distinguishes signs from causes is that whether a sign signifies something to us—that is, whether we can call it a sign in the first place—depends on our ability to recognise and interpret the sign, and it is this ability on our part that makes the signs what they are. Causation is clearly different from this, for causes do not depend in any way upon our ability to recognise them. The question is, what makes natural signs signs? It cannot be, or cannot merely be, something in nature, for something cannot be a sign for us unless we can recognise it, so it must be something in us that makes tears, or laughter, or a particular kind of motion, signs. This something in us must be

an acquired or an innate capacity; and Descartes' view is that it is an innate capacity which, it will turn out, God has provided us with. There would be no natural signs unless we had the capacity to recognise them as such.

Here, I suggest, we have the two key pieces in the account of sentience. Sentient responses are different from non-sentient responses in that in the latter case we can give a full account merely by showing the causal-mechanical processes involved. In the case of sentient responses this will not tell us everything we need to know, and we need to supplement it with a different kind of account. There is an element of reciprocity in perceptual cognition as linguistically modelled that we do not find in the causal-mechanical account. The linguistic model enables us to grasp what perceptual understanding consists in, whereas the causal-mechanical account describes what physical-cum-physiological processes must occur if this understanding is to take place. This is the core difference between sentience and non-sentience. The next question is whether such a form of interpretation modelled on language is realisable in a mechanistic physiology alone. What is needed over and above the causal-mechanical account that we provide of non-sentient responses? Above all, what we need is some means of forming representations in response to perceptual stimuli, and we need some means of storing and recalling these representations. In one sense, many automata—those to which we are inclined to ascribe some kind of sophistication in perceptual cognition, such as higher mammals—clearly have the physiological means to do this: they have pineal glands, which is where perceptual representations are formed, and they have memories, i.e. corporeal means of storage of representations. Note, in particular, that straightforward stimulus-response behaviour does not involve representation and so does not involve the pineal gland: in Descartes' account of the reflex arc in *L'Homme*, the arc bypasses the pineal gland, travelling instead in the brain, through what he terms a 'cavity', which is almost certainly one of the cerebral ventricles.

But Descartes needs to say more than this, and it is in his tantalisingly brief account of light in the first chapter of *Le Monde* that he gives his indication of what this more might be. Remember that we are told that light is not the stimulus but the response to the stimulus. The stimulus is a particular kind of motion in the smallest kind of matter which is transmitted via the second matter. Note also that in order to respond to this particular kind of motion by perceiving light, we have to be able to respond in the right way (this is what makes this a significatory event as well as a causal one). To be able to respond in the right way, we need some kind of innate or built-in capacity. Here the question arises of whether such innate capacities are part of our corporeal organs or of our minds. One only has to note the fact that automata are able to see, that is to perceive light, whereas disembodied minds (souls in heaven, or whatever) are not, to recognise that the capacity to grasp various kinds of translational and rotary motion as light must naturally reside in corporeal organs. Descartes never suggests that automata cannot respond to natural signs; indeed, such functions as nutrition in higher animals, where the appropriate kind of food has to be sought out visually or olfactorily, clearly require such recognitional capacities. Indeed, more generally, it is difficult to explain how animal instincts are to be accounted for if not in terms of some innate capacity.

In more modern terms, what we need is 'hard wiring'. The brain needs to be fitted out so as to respond in the appropriate way. The hard wiring makes sure you get the right kind of representations: that you see light, that is, have a visual image which displays shapes and perhaps colours, when stimulated in the requisite way. It is not something in nature that causes us to have visual images, it is a combination of a stimulation produced by nature and certain features of an animal's physiology which results in a particular kind of representation, a visual perception.

This is clearly different from what happens when an act of perceptual judgement is made, but is it so different from what happens when, say, a plant bends towards the light, or the foetus

develops into a fully formed member of the species, which are similar kinds of process on Descartes' account?

I think the difference might be characterised in this way. In the case of embryology, Descartes effectively denies that a functional understanding of the development of the foetus, for example, one that says that the foetus develops in the way it does so that it can become an adult of the species, tells us anything at all, and he replaces it with a mechanical-causal story. In the case of perceptual cognition in automata, he does not deny that there is a functional story to be told, but rather indicates how the functional story can be translated into the terms of a mechanistic psychology without losing the key insight that perception of *x* by *y* involves *x meaning something to y*, so that, for example, *y* perceives *x* as a lion. What is needed is the capacity to translate the visual stimulation, which might be characterised as agitation of the corpuscles making up the retina, into the requisite perceptual representation, that is, one that conveys the idea of a lion. This can be achieved by the requisite organs in the brain.

Conclusion

In his embryology, Descartes does not deny that there is a question as to why its constituent matter behaves in such a way that the foetus develops into an adult of a particular species. What he is saying is that the explanation for that is not something internal to the development of the foetus but external to it. God made it so, and God is the only final cause. What Descartes is concerned with is internal causes. The same holds for his account of perceptual cognition. Descartes does not deny that God has given automata the sense organs they have so that they might sustain themselves in the world. It is just that the question of how the sense organs operate, which is what he is concerned with, is different from why they operate in that way: indeed, on Descartes' account, these are completely different questions.

However, when the body is considered, no longer as the body of an animal or an homme machine, but as part of what Descartes

will refer to as 'the substantial union of mind and body', intrinsic goals re-enter the picture. Human beings are able to reflect upon and make judgements about the content of their perceptual representations, and the nature of perception is transformed as a result. Unlike the perceptual cognition of an automaton, such as a dog or a bat or an earthworm, which has no intrinsic goals, human perception must be considered in terms of a goal, the goal of understanding the world, and it can be criticised, for example, to the extent to which it fails to achieve that goal. Intrinsic goals enter the picture because of the presence of a conscious intelligence, and that, on Descartes' account, is their proper place.

Notes

1 *A General Collection of the Discourses of the Virtuosi of France*, London, 1664, p.139.
2 Thomas Wright, *Passions of the Minde*, London, 1601, p.41.
3 Martin Cureau de la Chambre, *Les Caractères des Passions*, 4 vols in 2, Paris, 1658–62.
4 Richard Ryder, *Animal Revolution*, Oxford, 1989, pp.56–57.
5 The original texts are found in Charles Adam and Paul Tannery, eds, *Œuvres de Descartes*, 2nd edn, 11 vols, Paris, 1974–86, vol.10. For English translations see Stephen Gaukroger, *Descartes, The World and Other Writings*, Cambridge, 1998.
6 *Œuvres de Descartes*, vol.7, pp.413–14.
7 *Œuvres de Descartes*, vol.6, pp.50, 59.
8 *Œuvres de Descartes*, vol.10. Reg.12ff.
9 *Œuvres de Descartes*,vol.10, p.4.