

René Descartes (1596-1650)

Daniel Garber

Biography

René Descartes, often called the father of modern philosophy, attempted to break with the philosophical traditions of his day and start philosophy anew. Rejecting the Aristotelian philosophy of the schools, the authority of tradition and the authority of the senses, he built a philosophical system that included a method of inquiry, a metaphysics, a mechanistic physics and biology, and an account of human psychology intended to ground an ethics. Descartes was also important as one of the founders of the new analytic geometry, which combines geometry and algebra, and whose certainty provided a kind of model for the rest of his philosophy.

After an education in the scholastic and humanistic traditions, Descartes' earliest work was mostly in mathematics and mathematical physics, in which his most important achievements were his analytical geometry and his discovery of the law of refraction in optics. In this early period he also wrote his unfinished treatise on method, the *Rules for the Direction of the Mind*, which set out a procedure for investigating nature, based on the reduction of complex problems to simpler ones solvable by direct intuition. From these intuitively established foundations, Descartes tried to show how one could then attain the solution of the problems originally posed.

Descartes abandoned these methodological studies by 1628 or 1629, turning first to metaphysics, and soon afterwards to an orderly exposition of his physics and biology in *The World*. But this work was overtly Copernican in its cosmology, and when Galileo was condemned in 1633, Descartes withdrew *The World* from publication; it appeared only after his death.

Descartes' mature philosophy began to appear in 1637 with the publication of a single volume containing the *Geometry*, *Dioptrics* and *Meteors*, three essays in which he presented some of his most notable scientific results, preceded by the *Discourse on the Method*, a semi-autobiographical introduction that outlined his approach to philosophy and the full system into which the specific results fit. In the years following, he published a series of writings in which he set out his system in a more orderly way, beginning with its metaphysical foundations in the *Meditations* (1641), adding his physics in the *Principles of Philosophy* (1644), and offering a sketch of the psychology and moral philosophy in the *Passions of the Soul* (1649).

In our youth, Descartes held, we acquire many prejudices which interfere with the proper use of our reason. Consequently, later we must reject everything we believe and start anew. Hence the *Meditations* begins with a series of arguments intended to cast doubt upon everything formerly believed, and culminating in the hypothesis of an all-deceiving evil genius, a device to keep former beliefs from returning. The rebuilding of the world begins with the discovery of the self through the 'Cogito Argument' ('I am thinking, therefore I exist') – a self known only as a thinking thing, and known independently of the senses. Within this thinking self, Descartes discovers an idea of God, an idea of something so perfect that it could not have been caused in us

by anything with less perfection than God Himself. From this he concluded that God must exist which, in turn, guarantees that reason can be trusted. Since we are made in such a way that we cannot help holding certain beliefs (the so-called 'clear and distinct' perceptions), God would be a deceiver, and thus imperfect, if such beliefs were wrong; any mistakes must be due to our own misuse of reason. This is Descartes' famous epistemological principle of clear and distinct perception. This central argument in Descartes' philosophy, however, is threatened with circularity – the Cartesian Circle – since the arguments that establish the trustworthiness of reason (the Cogito Argument and the argument for the existence of God) themselves seem to depend on the trustworthiness of reason.

Also central to Descartes' metaphysics was the distinction between mind and body. Since the clear and distinct ideas of mind and body are entirely separate, God can create them apart from one another. Therefore, they are distinct substances. The mind is a substance whose essence is thought alone, and hence exists entirely outside geometric categories, including place. Body is a substance whose essence is extension alone, a geometric object without even sensory qualities like colour or taste, which exist only in the perceiving mind. We know that such bodies exist as the causes of sensation: God has given us a great propensity to believe that our sensations come to us from external bodies, and no means to correct that propensity; hence, he would be a deceiver if we were mistaken. But Descartes also held that the mind and body are closely united with one another; sensation and other feelings, such as hunger and pain, arise from this union. Sensations cannot inform us about the real nature of things, but they can be reliable as sources of knowledge useful to maintaining the mind and body unity. While many of Descartes' contemporaries found it difficult to understand how mind and body can relate to one another, Descartes took it as a simple fact of experience that they do. His account of the passions is an account of how this connection leads us to feelings like wonder, love, hatred, desire, joy and sadness, from which all other passions derive. Understanding these passions helps us to control them, which was a central aim of morality for Descartes.

Descartes' account of body as extended substance led to a physics as well. Because to be extended is to be a body, there can be no empty space. Furthermore, since all body is of the same nature, all differences between bodies are to be explained in terms of the size, shape and motion of their component parts, and in terms of the laws of motion that they obey. Descartes attempted to derive these laws from the way in which God, in his constancy, conserves the world at every moment. In these mechanistic terms, Descartes attempted to explain a wide variety of features of the world, from the formation of planetary systems out of an initial chaos, to magnetism, to the vital functions of animals, which he considered to be mere machines.

Descartes never finished working out his ambitious programme in full detail. Though he published the metaphysics and the general portion of his physics, the physical explanation of specific phenomena, especially biological, remained unfinished, as did his moral theory. Despite this, however, Descartes' programme had an enormous influence on the philosophy that followed, both within the substantial group that identified themselves as his followers, and outside.

1. Life

René Descartes was born on 31 March 1596 in the Touraine region of France, in the town of La Haye, later renamed Descartes in his honour. In 1606 or 1607 he was sent to the Collège Royal de La Flèche, run by the Jesuit order. Here he received an education that combined elements of earlier Aristotelian scholasticism with the new humanistic emphasis on the study of language and literature. But the core of the collegiate curriculum was the study of Aristotelian logic, metaphysics, physics and ethics. Descartes left La Flèche in 1614 or 1615, and went to the University of Poitiers, where he received his *baccalauréat* and his *licence en droit* in late 1616. In Part I of the *Discours de la méthode* (Discourse on the Method) (1637), he discusses his education in some detail, explaining why he found it increasingly unsatisfactory. In the end, he reports, he left school, rejecting much of what he had been taught there. He chose the life of the military engineer, and set out across Europe to learn his trade, following the armies and the wars. On 10 November 1618, in the course of his travels, he met Isaac Beeckman. An enthusiastic scientific amateur since his early twenties, Beeckman introduced Descartes to some of the new currents in science, the newly revived atomist ideas, and the attempt to combine mathematics and physics (see Atomism, ancient). Despite the fact that they only spent a few months together, Beeckman put Descartes on the path that led to his life's work. A number of discussions between them are preserved in Beeckman's extensive notebooks (1604–34), which still survive, and include problems Beeckman set for Descartes, as well as Descartes' solutions. It was for Beeckman that Descartes wrote his first surviving work, the *Compendium musicum*, a tract on music theory, then considered a branch of what was called mixed mathematics, along with other disciplines such as mathematical astronomy and geometric optics. Exactly a year after first meeting Beeckman, this new path was confirmed for Descartes in a series of three dreams that he interpreted as a call to settle down to his work as a mathematician and philosopher.

During the 1620s, Descartes worked on a number of projects including optics and the mathematics that was eventually to become his analytic geometry. In optics, he discovered the law of refraction – the mathematical law that relates the angle of incidence of a ray of light on a refractive medium, with the angle of refraction. Though some claim that Descartes learned this law from Willebrod Snel, after whom the law is now named, it is generally thought that Descartes discovered it independently. In his mathematical programme, he showed how algebra could be used to solve geometric problems, and how geometric constructions could be used to solve algebraic problems.

Descartes' most extensive writing from this period is the *Regulae ad directionem ingenii* (Rules for the Direction of the Mind), a treatise on method that he worked on between 1619 or 1620 and 1628, when he abandoned it incomplete. He continued to travel extensively throughout Europe, returning to Paris in 1625, where he was to stay until spring 1629. In Paris, Descartes became closely associated with Marin Mersenne who later became a central figure in the dissemination of the new philosophy and science in Europe, the organizer of a kind of scientific academy and the centre of a circle of correspondents, as well as Descartes' intellectual patron (see Mersenne, M.). Through his voluminous correspondence with Mersenne, Descartes remained connected to all the intellectual currents in Europe, wherever he was to live in later years. An important event in this period took place at a gathering at the home of the Papal Nuncio in Paris in 1627 or 1628, where Descartes, responding to an alchemical lecture by one M. Chandoux, took the occasion to

present his own ideas, including his 'fine rule, or natural method' and the principles on which his own philosophy was based (letter to Villebressieu, summer 1631; Descartes 1984–91 vol 3: 32). This attracted the attention of the Cardinal Bérulle, who in a private meeting, urged Descartes to develop his philosophy.

In spring 1629 Descartes left Paris and moved to the Low Countries, where he set his methodological writing aside and began his philosophy in earnest. The winter of 1629–30 was largely occupied with the composition of a metaphysical treatise, which, as we shall later see, represents the foundations of his philosophy. The treatise is now lost, but Descartes told Mersenne that it had tried to 'prove the existence of God and of our souls when they are separated from the body, from which follows their immortality' (letter to Mersenne, 25 November 1630; Descartes 1984–91 vol 3: 29). This was followed by the drafting of *Le Monde* (The World), Descartes' mechanist physics and physiology, a book intended for publication. In the first part, also called the *Traité de la lumière* (Treatise on Light), Descartes begins with a general account of the distinction between a sensation and the motion of tiny particles of different sizes and shapes that is its cause, followed by an account of the foundations of the laws of nature. After then positing an initial chaos of particles in motion (not *our* cosmos, but one made by God in some unused corner of the world), Descartes argues that by means of the laws of nature alone, this cosmos will sort itself into planetary systems, central suns around which swirl vortices of subtle matter which carry planets with them. He concludes the *Traité de la lumière* with an account of important terrestrial phenomena, including gravity, the tides and light, showing how much like our cosmos this imaginary mechanist cosmos will appear. The second part, the *Traité de l'homme* (Treatise on Man), begins abruptly by positing that God made a body that looks exactly like ours, but which is merely a machine. Presumably missing – or never written – is a transition between the two treatises that shows how by the laws of nature alone this human body could arise in our world. (This part of the argument is noted in Part V of the later *Discourse on the Method*.) In the text that we now have, Descartes then went on to argue that all phenomena that pertain to life (thought aside) can arise in this body in a purely mechanical way, including nutrition and digestion, the circulation of blood, the movement of the muscles and the transmission of sensory information to the brain.

By 1633 Descartes had in hand a relatively complete version of his philosophy, from method, to metaphysics, to physics and biology. But in late 1633, he heard of the condemnation of Galileo's Copernicanism in Rome, and cautiously decided not to publish his *World*, which was evidently Copernican (see Galileo Galilei). Indeed, he first decided never to publish anything at all. But the despair did not last. Between 1634 and 1636, Descartes collected some of the material he had been working on, and prepared three essays for publication, the *Géométrie*, the *Météors* and the *Dioptrique*. These scientific essays were preceded by a general introduction, the *Discours de la méthode pour bien conduire sa raison et chercher la vérité dans les sciences* (*Discourse on the Method for Properly Conducting Reason and Searching for Truth in the Sciences*).

The *Discourse* presents itself as autobiography, an account of the path the young author (the book was published anonymously) followed in his discoveries, including a summary of his method (Part II), of his early metaphysical speculations (Part IV) and of the programme of *The World* (Part V). In the scientific essays, Descartes presented some of his most striking results,

hiding the foundational elements (such as his apparent Copernicanism and his rejection of scholastic form and matter) that would be most controversial.

While not uncontroversial, the Discourse and Essays were very successful, and induced Descartes to continue his programme for publishing his philosophy. The next work to appear was the *Meditationes* (Meditations) of 1641, which included an extensive selection of objections to the Meditations from various scholars in learned Europe, including Hobbes, Gassendi, Arnauld, and Mersenne himself, along with Descartes' responses, a total of seven sets in all (these are cited in this entry as the First Objections, Second Replies, and so on). This was followed in 1644 by the publication of the *Principia Philosophiae* (Principles of Philosophy) in which, after a review of his metaphysics, Descartes gives an exposition of his physics adapted and expanded from *The World*. French translations of the Meditations and the Principles done by others, but with important variants from the original Latin (presumably introduced by Descartes himself), appeared in 1647.

By the late 1630s, Descartes' work had entered the Dutch universities, and was taught at the University of Utrecht by Henricus Reneri and, following him, by Henricus Regius. Descartes' un-Aristotelian views called down the wrath of Gisbertus Voëtius, who started a pamphlet war against Descartes and Regius that raged for some time. Descartes supported Regius, and gave him advice as to how to respond and contain the affair. Eventually, however, Descartes broke with him when Regius wrote and in 1646 published his *Fundamenta physices*, about which Descartes had severe reservations. Regius responded with a broadsheet, a kind of summary of his main theses, emphasizing their differences. Descartes, in turn, responded in 1648 with the *Notae in programma quoddam* (Comments on a Certain Broadsheet). There was a similar incident in Leiden, where Descartes had disciples (François du Ban, Adriaan Heereboord) as well as an influential enemy (Revius).

In the late 1640s Descartes was working on drafting and publishing more of his philosophy. Two additional parts of the Principles were planned, extending the work to cover elements of human biology. While notes remain in the form of an incomplete treatise on the human body (*La description du corps humain* – Description of the Human Body) and on the foetus (*Prima cogitationes circa generationem animalium* – First Thoughts on the Generation of Animals), the larger work was never finished. There are also important works concerning morals and moral psychology dating from these years. Some of this material is found in the letters to the Princess Elisabeth of Bohemia, with whom he had a long and important correspondence, starting in 1643. Descartes' account of the passions is found in the last work he published in his lifetime, the short *Passions de l'âme* (Passions of the Soul), which appeared in 1649.

With the exception of a few short trips to Paris in 1644, 1647 and 1648, Descartes remained in the Low Countries until October 1649, when he was lured to Stockholm to be a member of the court of Queen Christina. There he fell ill in early 1650, and died on 11 February of that year.

2. The programme

Descartes' thought developed and changed over the years. But even so, there are a number of threads that run through it. Like most of his lettered contemporaries, Descartes was educated in a

scholastic tradition that attempted to combine Christian doctrine with the philosophy of Aristotle. Indeed, at La Flèche, where he first learned philosophy, Aristotle as interpreted by Aquinas was at the centre of the curriculum. What he learned was an interconnected system of philosophy, including logic, physics, cosmology, metaphysics, morals and theology.

On his own account, Descartes rejected the Aristotelian philosophy as soon as he left school. From the notes Beeckman took on their conversations, it is probable that what dissatisfied him most in what he had been taught was natural philosophy. For an Aristotelian, the understanding of the natural world was grounded in a conception of body as composed of matter and form. Matter was that which remained constant even during the generation and corruption of bodies of different kinds, and that which all bodies of all sorts have in common; form was that which was responsible for the characteristic properties of particular sorts of bodies. For example, form was to explain why earth falls and tends to be cold, and why fire rises and tends to be hot. In contrast, though he came to reject Beeckman's rather strict atomism, Descartes seems to have been attracted to the kind of mechanistic view of the world that his mentor espoused. Descartes held from then on that the manifest properties of bodies must be explained in terms of the size, shape and motion of the tiny parts that make them up, and rejected the appeal to innate tendencies to behaviour that lay at the foundation of the Aristotelian view (see Aristotle §10).

But even though he rejected much of the philosophy of the schools, there was one element that remained with him: like his teachers at La Flèche, Descartes always held that knowledge has a kind of systematic coherence. In Rule 1 of the Rules Descartes wrote that 'everything is so interconnected that it is far easier to learn all things together than it is to separate one from the others... All [sciences are] connected with one another and depend upon one another'. Later, when he read Galileo's *Two New Sciences* (1638), Descartes dismissed the Italian scientist because his work lacked that kind of coherence (letter to Mersenne, 11 October 1638; Descartes 1984–9 1 vol 3: 124–8). His own project was to build his own interconnected system of knowledge, a system comprising an account of knowledge, a metaphysics, a physics and other sciences. This ambition is summarized in one of his last writings, the Preface to the French edition of the *Principles*, where he wrote that 'all philosophy is like a tree, whose roots are metaphysics, whose trunk is physics, and whose branches, which grow from this trunk, are all of the other sciences, which reduce to three principle sciences, namely medicine, mechanics, and morals'. In this way, Descartes saw himself as reconstituting the Aristotelian–Christian synthesis of the scholastics, grounded not in a natural philosophy of matter and form, but in a mechanist conception of body, where everything is to be explained in terms of size, shape and motion.

Certain important features of the Cartesian programme are worth special mention. The Aristotelian–Christian synthesis is founded in a variety of kinds of authority: the authority of the senses, the authority of ancient texts and the authority of his teachers. Descartes wanted to ground his thought in himself alone, and in the reason that God gave him. Since, Descartes claimed, reason gives us genuine certainty, this means that true knowledge is certain. In Rule 3 of the Rules he wrote that 'concerning things proposed, one ought to seek not what others have thought, nor what we conjecture, but what we can clearly and evidently intuit or deduce with certainty; for in no other way is knowledge acquired'. The rejection of the authority of the

senses, texts and teachers shaped Descartes' thought in fundamental ways. Because of it, his philosophical system began with the Cogito Argument, which establishes the self as the starting-place of knowledge. Moreover, his two most influential works, the Discourse and the Meditations, were written in the first person so as to *show* the reader how Descartes did or might have come to his own state of knowledge and certainty, rather than *telling* readers what they are to believe, and thus setting himself up as an authority in his own right. Despite his rejection of authority, however, Descartes always claimed to submit himself to the authority of the Church on doctrinal matters, separating the domain of revealed theology from that of philosophy.

Another important feature of Descartes' tree of knowledge was its hierarchical organization. Throughout his career he held firmly to the notion that the interconnected body of knowledge that he sought to build has a particular order. Knowledge, for Descartes, begins in metaphysics, and metaphysics begins with the self. From the self we arrive at God, and from God we arrive at the full knowledge of mind and body. This, in turn, grounds the knowledge of physics, in which the general truths of physics (the nature of body as extension, the denial of the vacuum, the laws of nature) ground more particular truths about the physical world. Physics, in turn, grounds the applied sciences of medicine (the science of the human body), mechanics (the science of machines) and morals (the science of the embodied mind).

3. Method

Before beginning an account of the individual parts of Descartes' tree of knowledge, it is necessary to discuss his method. Method was the focus of his earliest philosophical writing, the Rules, and appeared prominently in his first published writing, the Discourse on the Method. But what exactly that method was is somewhat obscure.

In the second part of the Discourse, the method is presented as having four rules: (1) 'never to accept anything as true if I did not have evident knowledge of its truth: that is, carefully to avoid precipitate conclusions and preconceptions'; (2) 'to divide each of the difficulties I examined into as many parts as possible'; (3) 'to direct my thoughts in an orderly manner, by beginning with the simplest and most easily known objects in order to ascend little by little... to knowledge of the most complex'; and (4) 'throughout to make enumerations so complete and reviews so comprehensive, that I could be sure of leaving nothing out'. Given the general nature and apparent obviousness of these rules, it is not surprising that many of Descartes' contemporaries suspected him of hiding his *real* method from the public.

But Descartes' account of the method in the Rules is somewhat fuller. In Rule 5 he says: 'We shall be following this method exactly if we first reduce complicated and obscure propositions step by step to simpler ones, and then, starting with the intuition of the simplest ones of all, try to ascend through the same steps to a knowledge of all the rest'. This method is illustrated with an example in Rule 8. There Descartes considers the problem of the anaclastic line, the shape of a lens which will focus parallel lines to a single point. The first step in the solution of the problem, Descartes claims, is to see that 'the determination of this line depends on the ratio of the angles of refraction to the angles of incidence'. This, in turn, depends on 'the changes in these angles

brought about by differences in the media'. But 'these changes depend on the manner in which a ray passes through the entire transparent body, and knowledge of this process presupposes also a knowledge of the nature of the action of light'. Finally, Descartes claims that this last knowledge rests on our knowledge of 'what a natural power in general is'. This last question can, presumably, be answered by intuition alone, that is, a purely rational apprehension of the truth of a proposition that has absolute certainty. Once we know what the nature of a natural power is, we can, Descartes thought, answer one by one all the other questions raised, and eventually answer the question originally posed, and determine the shape of the lens with the required properties. These successive answers are to be connected deductively (in a way outlined in the Rules) with the first intuition, so that successive answers follow intuitively from the first intuition.

The example of the anaclastic line suggests that Descartes' method proceeds as follows. One starts with a particular question, q_1 . The reductive moment in the method then proceeds by asking what we have to know in order to answer the question originally posed. This leads us from q_1 to another question, q_2 , whose answer is presupposed in order for us to be able to answer q_1 ; it is in this sense that q_1 is said to be reduced to q_2 . This reductive process continues until we reach a question whose answer we are capable of knowing through intuition, say q_n . At that point, we begin what might be called the constructive moment of the method, and successively answer the questions we have posed for ourselves, using the answer to q_n to answer , the answer to to answer , and so on until we arrive at q_1 , the question originally posed, and answer that.

Understood in this way, the method has some very interesting properties. First, it results in knowledge that is completely certain. When we follow this method, the answer to the question originally posed is grounded in an intuition; the answers to the successive questions in the series are to be answered by deducing propositions from propositions that have been intuitively grasped as well. Second, the method imposes a certain structure on knowledge. As we follow the series of questions that constitute the reductive step of the method, we proceed from more specific questions to more general, from the shape of a particular lens to the law of refraction, and ultimately to the nature of a natural power. The answers that are provided in the constructive stage follow the opposite path, from the metaphysically more general and more basic to the more specific.

The Rules was written over a long period of time, and there are numerous strata of composition evident in the work as it survives. In a passage from Rule 8 that is probably in one of the last strata of composition, Descartes raises a problem for the method itself to confront, indeed the *first* problem that it should confront: 'The most useful inquiry we can make at this stage is to ask: What is human knowledge and what is its scope?... This is a task which everyone with the slightest love of truth ought to undertake at least once in life, since the true instruments of knowledge and the entire method are involved in the investigation of the problem'. While it is not entirely clear what Descartes had in mind here, it is not implausible to interpret him as raising the problem of the justification of intuition itself, the epistemological foundation of the method. In framing the method in the Rules, Descartes takes for granted that he has a faculty, intuition, by which he is capable of grasping truth in some immediate way, and what he knows by intuition is worthy of trust. But why *should* we trust intuition? This, in essence, is one of the

central questions in the *Meditations*, where Descartes argues that whatever we perceive clearly and distinctly is true.

Method was a central concern of Descartes' earlier writings, in both the *Rules* and the *Discourse*. In later writings it seemed to play little explicit role in his thought, but the hierarchical structure of knowledge with which the method is closely connected – the idea that knowledge is grounded in a structure of successively more metaphysically basic truths, ultimately terminating in an intuition – remained basic to his thought. In his later work, that ultimate intuition is not the nature of a natural power, as it was in the anaclastic line example, but the intuition that establishes the existence of the knowing subject, the *Cogito Argument*.

4. Doubt and the quest for certainty

In the *Rules for the Direction of the Mind*, Rule 2 reads: 'We should attend only to those objects of which our minds seem capable of having certain and indubitable cognition'. While, as we shall later see, Descartes seemed to relax this demand somewhat in his later writings, the demand for certainty was prominent throughout many of his writings. Historically, this can be seen as a reaction against important sceptical currents in Renaissance thought, the so-called 'Pyrrhonist Crisis'. In the face of the rapidly expanding boundaries of the European world in the sixteenth century, from new texts to new scientific discoveries to the discoveries of new worlds, contradictions and tensions in the intellectual world abounded, making it more and more attractive to hold, with the classical sceptics, that real knowledge is simply beyond the ability of human beings to acquire (see *Scepticism, Renaissance; Pyrrhonism*). Against this, Descartes asserted that real, certain knowledge is possible; though his name is associated with scepticism, it is as an opponent and not an advocate.

But though certainty was central to Descartes, the path to certainty begins with doubt. In *Meditation I*, entitled 'What can be called into doubt', Descartes says that 'I realised that it was necessary, once in the course of my life, to demolish everything completely and start again right from the foundations if I wanted to establish anything at all in the sciences that was stable and likely to last'. Following that, he presents a series of three sceptical arguments designed to eliminate his current beliefs in preparation for replacing them with certainties. The strategy is to undermine the beliefs, not one by one but by undermining 'the basic principles' on which they rest. While at least some of these arguments can be found in versions in the *Discourse* and in other writings by Descartes, they receive their fullest exposition in the *Meditations*.

The first argument is directed at the naïve belief that everything learned via the senses is worthy of belief. Against this Descartes points out that 'from time to time I have found that the senses deceive, and it is prudent never to trust completely those who have deceived us even once'. The second, the famous dream argument, is directed against the somewhat less naïve view that the senses are at least worthy of belief when dealing with middle-sized objects in our immediate vicinity: 'A brilliant piece of reasoning! As if I were not a man who sleeps at night... I plainly see that there are never any sure signs by means of which being awake can be distinguished from being asleep'. But even if I doubt the reliability of what the senses seem to be conveying to me right now, Descartes supposes, the dream argument still leaves open the possibility that there are

some general truths, not directly dependent on my present sensations, that I can know. Descartes replies to this with his deceiving God argument.

This complex argument has two horns. Descartes first supposes ‘the long-standing opinion that there is an omnipotent God who made me the kind of creature that I am’. Because God is omnipotent, he might have made me in such a way that I go wrong in even the simplest and most evident beliefs that I have – for example, that $2 + 3 = 5$, or that a square has four sides. Though God is thought to be good, the possibility that I am so deeply prone to error seems as consistent with his goodness as the fact that I go wrong even occasionally, at least at this stage of the investigation. But what if there is no God, or what if I arose by ‘fate or chance or a continuous chain of events, or by some other means’? In this case, Descartes argues, the less powerful my original cause, ‘the more likely it is that I am so imperfect as to be deceived all the time’.

With this, the sceptical arguments of Meditation I are complete: ‘I am finally compelled to admit that there is not one of my former beliefs about which a doubt may not properly be raised’. But, Descartes notes, ‘my habitual opinions keep coming back’. It is for that reason that Descartes posits his famous evil genius: ‘I will suppose therefore that not God, who is supremely good and the source of truth, but rather some evil genius of the utmost power and cunning has employed all his energies in order to deceive me’. The evil genius (sometimes translated as the ‘evil demon’) is introduced here not as a separate argument for doubt, but as a device to help prevent the return of the former beliefs called into doubt.

These arguments have a crucial function in Descartes’ project. As he notes in the introductory synopsis of the Meditations, these arguments ‘free us from all our preconceived opinions, and provide the easiest route by which the mind may be led away from the senses’. In this way the sceptical doubt of Meditation I prepares the mind for the certainty to which Descartes aspired. But in the Third Replies, responding to criticisms from Hobbes, Descartes notes two other roles that the sceptical arguments play in his thought. Descartes remarks that they are introduced ‘so that I could reply to them in the subsequent Meditations’. As considered below, the deceiving God argument is answered in Meditations III and IV, and the dream argument is answered in the course of his discussion of sensation in Meditation VI. (Since Descartes, quite rightly, continued to maintain that sensation is not entirely trustworthy as a guide to how things really are, the first sceptical argument is never fully answered, though in Meditation VI he carefully sets out the conditions under which we can trust the senses.) Finally, he notes that the arguments are there as a kind of standard against which he can measure the certainty of his later conclusions: ‘I wanted to show the firmness of the truths which I propounded later on, in the light of the fact that they cannot be shaken by these metaphysical doubts’. In all these ways, Descartes presented himself as addressing the sceptic, and defending a kind of dogmatic philosophy.

5. The Cogito Argument

Descartes’ philosophy begins in doubt. The first step towards certainty, the Archimedean point from which the whole structure will grow, is the discovery of the existence of the self. At the beginning of Meditation II, reflecting on the evil genius posited at the end of Meditation I, Descartes observes: ‘Let him deceive me as much as he can, he will never bring it about that I

am nothing so long as I think that I am something... I must finally conclude that this proposition, *I am, I exist*, is necessarily true whenever it is put forward by me or conceived in my mind'. In the earlier Discourse (Part IV) and the later Principles of Philosophy (Part I §7), this proposition has the more familiar form, 'I am thinking, therefore I exist,' or, 'ego cogito, ergo sum,' in its Latin formulation. Here, it is called the Cogito Argument.

There is considerable discussion about how exactly Descartes thought this argument functions. There are two strains of interpretation that derive directly from his texts. In the Second Replies, Descartes observes that 'when we become aware that we are thinking things, this is a primary notion which is not derived by means of any syllogism'. This suggests that the Cogito Argument is known immediately by direct intuition. In the Principles (Part I §10), however, Descartes notes that before knowing the Cogito, we must grasp not only the concepts of thought, existence and certainty, but also the proposition that 'it is impossible that that which thinks should not exist'. This suggests that the Cogito is a kind of syllogism, in which I infer my existence from the fact that I am thinking, and with the premise that whatever thinks must exist. Recent analytic philosophers have also been attracted to the Cogito, trying to understand its obvious allure through speech act theory and theories of demonstratives (Hintikka 1967; Markie 1992). These accounts, however, are distant from anything that Descartes himself conceived.

There is also some confusion about what the conclusion of the Cogito Argument is supposed to be. In the body of Meditation II, Descartes clearly establishes the existence of the self as a thinking thing or a mind. But the title of Meditation II, 'The nature of the human mind, and how it is better known than the body' suggests that Descartes believed that he had established that the nature of the human mind is thought. Further still, in parallel texts in the Discourse (Part IV) and the Principles (Part I §7–8), Descartes suggests that the Cogito establishes the existence of a thinking substance distinct from the body, though in the text of Meditation II, this seems to be denied.

Though most closely associated with Descartes, the Cogito Argument may not be altogether original. A number of Descartes' contemporaries, both during his life and afterwards, noticed the connection between the Cogito and similar formulations in Augustine (see Augustine §2). However, what was important to Descartes about the Cogito is the foundational role it plays in his system. For Descartes, it is 'the first thing we come to know when we philosophise in an orderly way' (Principles:Part I §7). Common sense might think that the physical world of bodies, known through sensation, is more accessible to us than is the mind, a thinking thing whose existence is established, even though we have rejected the senses. But, as Descartes argues in Meditation II using the example of a piece of wax, despite our prejudices, bodies are not conceived through the senses or the imagination but through the same process of purely intellectual conception that gives us the conception of ourselves as thinking things. Furthermore, knowledge of the external world is less certain than knowledge of the mind, since whatever thought could lead us to a probable belief in the existence of bodies will lead us to believe in the existence of the self with certainty.

The project, then, is to build the entire world from the thinking self. It is important here that it is not just the mind that is the foundation, but *my* mind. In this way, the starting place of philosophy

for Descartes was connected with the rejection of authority that is central to the Cartesian philosophy. In beginning with the Cogito, we build a philosophy detached from history and tradition.

6. God

The next stage in the system, as outlined in the Meditations, seeks to establish that God exists. In his writings, Descartes made use of three principal arguments. The first (at least in the order of presentation in the Meditations) is a causal argument. While its fullest statement is in Meditation III, it is also found in the Discourse (Part IV) and in the Principles (Part I §§ 17–18). The argument begins by examining the thoughts contained in the mind, distinguishing between the formal reality of an idea and its objective reality. The formal reality of any thing is just its actual existence and the degree of its perfection; the formal reality of an idea is thus its actual existence and degree of perfection as a mode of mind. The objective reality of an idea is the degree of perfection it has, considered now with respect to its content. (This conception extends naturally to the formal and objective reality of a painting, a description or any other representation.) In this connection, Descartes recognized three fundamental degrees of perfection connected with the capacity a thing has for independent existence, a hierarchy implicit in the argument of Meditation III and made explicit in the Third Replies (in response to Hobbes). The highest degree is that of an infinite substance (God), which depends on nothing; the next degree is that of a finite substance (an individual body or mind), which depends on God alone; the lowest is that of a mode (a property of a substance), which depends on the substance for its existence. Descartes claims that ‘it is manifest by the natural light that there must be at least as much reality in the efficient and total cause as in the effect of that cause’. From that he infers that there must be as much *formal* reality in the cause of an idea as there is *objective* reality in the idea itself. This is a bridge principle that allows Descartes to infer the existence of causes from the nature of the particular ideas that are in the mind, and thus are effects of some causes or another. In Meditation III, Descartes discusses various classes of ideas, one by one, and concludes that, as a finite substance, he can conceivably be the cause of all the ideas he has in his mind except for one: the idea of God. Since the idea of God is an idea of something that has infinite perfection, the only thing that can cause that idea in my mind is a thing that formally (actually) has the perfection that my idea has objectively – that is, God himself.

Descartes used two other arguments for the existence of God in his writings. In Meditation III, following the causal argument, he offers a version of the cosmological argument for those who, still blinded by the senses, may be reluctant to accept the bridge principle that his causal argument requires. (Versions of this argument are also found in Discourse Part IV, and in Principles Part I §§20–1.) This argument begins with the author’s own existence, as established in Meditation II. But, the author might ask, what could have created me? It will not do, Descartes argues, to suggest that I have been in existence always, and thus I do not need a creator, since it takes as much power to sustain me from moment to moment as it does to create me anew. I could not have created myself because then I would have been able to give myself all the perfections that I so evidently lack. Furthermore, if I could create myself, then I could also sustain myself, which I do not have the power to do; being a thinking thing, if I had such a

power, I would be aware of having it. My parents cannot be my creators, properly speaking, since they have neither the ability to create a thinking thing (which is all I know myself to be at this stage of the Meditations), nor to sustain it once created. Finally, I could not have been created by another creature of lesser perfection than God, since I have an idea of God, an idea I could not acquire from a lesser being. (Here one suspects that this cosmological argument really collapses into the first causal argument.) From this Descartes concludes ‘that the mere fact that I exist and have within me an idea of a most perfect being... provides a very clear proof that God indeed exists’.

These first two arguments for the existence of God play a central role in the validation of reason, as discussed below. But after reason has been validated on theological grounds, Descartes presents in Meditation V a version of the ontological argument (see God, arguments for the existence of §§2–3). After reflecting on the basis of geometric reasoning, the fact that ‘everything which I clearly and distinctly perceive to belong to that thing really does belong to it’, Descartes concludes that this applies to the idea of God as well. Hence he concludes that ‘it is quite evident that existence can no more be separated from the essence of God than the fact that its three angles equal to two right angles can be separated from the essence of a triangle, or than the idea of a mountain can be separated from the idea of a valley’. Though apparently circular in so far as its validity seems to depend on the prior arguments for the existence of God, it is not; Descartes’ point is that ‘even if it turned out that not everything on which I have meditated in these past days is true, I ought still to regard the existence of God as having at least the same level of certainty as I have hitherto attributed to the truths of mathematics’. As with the other two arguments, Descartes’ ontological argument is also found in the Discourse (Part IV) and in the Principles (Part I §§14–16); indeed, in the Principles it is the first argument he gives.

As noted above, the existence of God plays a major role in the validation of reason. But it also plays a major role in two other parts of Descartes’ system. As we shall later see in connection with Descartes’ physics, God is the first cause of motion, and the sustainer of motion in the world. Furthermore, because of the way he sustains motion, God constitutes the ground of the laws of motion. Finally, Descartes held that God is the creator of the so-called eternal truths. In a series of letters in 1630, Descartes enunciated the view that ‘the mathematical truths which you call eternal have been laid down by God and depend on Him entirely no less than the rest of His creatures’ (letter to Mersenne, 15 April 1630; Descartes 1984–91 vol 3: 23), a view that Descartes seems to have held into his mature years. While it never again gets the prominence it had in 1630, it is clearly present both in correspondence (for example, letter to Arnauld, 29 July 1648; Descartes 1984–91 vol 3: 358–9) and in published writings (for example, in the Sixth Responses).

Various commentators have proposed that Descartes was really an atheist, and that he includes the arguments for the existence of God as window dressing. While this is not impossible, the frequent appeal to God in philosophical contexts, both in private letters and in published work, suggests that it is rather unlikely.

7. The validation of reason

With the existence of God established, the next stage in Descartes' programme is the validation of reason. At the beginning of Meditation III, before proving God's existence, Descartes notes that the uncertainty that remains is due only to the fact that the meditator does not know whether or not there is a God and, if there is, if he can be a deceiver. This suggests that all one must do to restore reason and defeat the third and most general sceptical argument presented in Meditation I is to prove that there is a benevolent God. And at the end of Meditation III, after two proofs for the existence of God, Descartes concludes directly that this God 'cannot be a deceiver, since it is manifest by the natural light that all fraud and deception depend on some defect'. But this is not enough. In the course of the deceiving-God argument of Meditation I, Descartes notes that if some deception is consistent with divine benevolence, then total deception would be as well. Since it is undeniable that we do make mistakes from time to time, and are thus deceived, this raises a problem for Descartes: what, if anything, does God's benevolence and veracity guarantee?

Descartes answers this question by way of an account of error in Meditation IV. Roughly speaking, the mistakes I make are due to myself and my (improper) exercise of my free will, while the truths I come to know are because of the way God made me. More exactly, Descartes asserts that judgments depend on two faculties of the mind, 'namely, on the faculty of knowledge [or intellect] which is in me, and on the faculty of choice or freedom of the will'. A judgment is made when the will assents to an idea that is in the intellect. But the intellect is finite and limited in the sense that it does not have ideas of all possible things. On the other hand, the will is indefinite in its extent, Descartes claims: 'It is only the will or freedom of choice which I experience within me to be so great that the idea of any greater faculty is beyond my grasp'. It is in our free will that we most resemble God. In certain circumstances, Descartes held, 'a great light in the intellect is followed by a great inclination in the will', and in this way the intellect determines the will to assent. This, he thought, is a proper use of the will in judgment. In this situation, where the intellect determines the will to assent, Descartes talks of our having a clear and distinct perception of a truth. In this case, God has made us in such a way that we cannot but assent. (Clear and distinct perceptions are very close to what he calls 'intuitions' in the Rules, as discussed above.) But because the will has a greater extent than the intellect, and is not restrained by it, sometimes things outside the intellect move the will to assent. This is where error enters: 'The scope of the will is wider than that of the intellect; but instead of restricting it within the same limits, I extend its use to matters which I do not understand. Since the will is indifferent in such cases, it easily turns aside from what is true and good, and this is the source of my error and sin.' In this way, I am responsible for error by extending my will beyond where it belongs. God can in no way be held accountable for my mistakes any more than he can be responsible for my sins. I cannot reproach my maker for not having given me more ideas in the intellect than I have, nor can I fault him for having made me more perfect by giving me a free will. But as a result of a limited intellect and a free will, it is possible for me both to make mistakes and to sin.

As a result of this analysis of error, Descartes is able, in Meditation IV to assert his famous principle of clear and distinct perception, an epistemological principle to replace the principles that were rejected as a result of the sceptical arguments of Meditation I: 'If I simply refrain from making a judgement in cases where I do not perceive the truth with sufficient clarity and

distinctness, then it is clear that I am behaving correctly and avoiding error. But if in such cases I either affirm or deny, then I am not using my free will correctly'. With this, reason is validated, and the deceiving-God argument answered. Yet, this does not end Descartes' engagement with the sceptical arguments of Meditation I, and in Meditation VI he also addresses the question of the reliability of the senses, presents a limited validation of sensory knowledge, and answers the dream argument.

The validation of reason, central as it is to Descartes' project in the *Meditations*, has one apparent flaw: it seems to be circular. The validation of reason in Meditation IV depends on the proof of the existence of God which, in turn, depends on the proof of the existence of the self as a thinking thing. But evidently we must assume that clear and distinct perceptions are trustworthy in order to trust the Cogito and the proofs for the existence of God that ground the validation of reason – the so-called 'Cartesian Circle'. Two of the objectors to the *Meditations* noticed this point, and elicited responses from Descartes, in the Second and the Fourth Replies. Descartes' answer is not altogether clear. In the Second Replies he remarks, in answer to one such objection, that 'when I said that we can know nothing for certain until we are aware that God exists, I expressly declared that I was speaking only of knowledge of those conclusions' deduced by long arguments, and not of 'first principles', such as the Cogito Argument. This suggests that Descartes would exempt immediately intuitable (self-evident) propositions from the scope of the doubt of Meditation I, and use them as tools for establishing the premises of the argument that leads to the validation of reason in Meditation IV. There are serious problems with this approach. For one, it seems arbitrary to exempt self-evident propositions from the scope of doubt. Such propositions would seem to fall quite naturally among those most obvious of things that Descartes calls into doubt there; if God could create me in such a way that I go wrong when I add two and three, he could create me in such a way that I go wrong with any other self-evident belief. Furthermore, even if those propositions that are immediately evident are outside the scope of doubt, Descartes' proofs for the existence of God, necessary premises of his validation of reason, are not self-evident. These apparent problems might be either weaknesses in Descartes' response, or reasons to doubt that we have understood Descartes correctly in his responses.

The problem of circularity and the obvious problems in Descartes' apparent answer have elicited numerous examinations of the issue in the commentary literature. It is not clear just what Descartes' own solution was, nor whether or not there is a good response to the Cartesian Circle. But whatever the answer, the problem is not a superficial oversight on Descartes' part. It is a deep philosophical problem that will arise in some form or another whenever one attempts a rational defence of reason.

8. Mind and body

One of Descartes' most celebrated positions is the distinction between the mind and the body. Descartes did not invent the position. It can be found in various forms in a number of earlier thinkers. It is a standard feature of Platonism and, in a different form, is common to most earlier Christian philosophers, who generally held that some feature of the human being – its mind or its soul – survives the death of the body (see Plato §13). But the particular features of Descartes'

way of drawing the distinction and the arguments that he used were very influential on later thinkers.

There are suggestions, particularly in the Discourse (Part IV) and in the Principles (Part I §§7–8) that the distinction between mind and body follows directly from the Cogito Argument, as discussed above. However, in the Meditations Descartes is quite clear that the distinction is to be established on other grounds. In Meditation VI he argues as follows: I have a clear and distinct idea of myself as a thinking non-extended thing, and a clear and distinct idea of body as an extended and non-thinking thing. Whatever I can conceive clearly and distinctly, God can so create. So, Descartes argues, the mind, a thinking thing, can exist apart from its extended body. And therefore, the mind is a substance distinct from the body, a substance whose essence is thought.

Implicit in this argument is a certain conception of what it means to be a substance, a view made explicit in the Principles (Part I §51) which defines a substance as ‘nothing other than a thing which exists in such a way as to depend on no other thing for its existence’, no other thing but God, of course. In so far as the mind can exist independently of the body, it is a substance on this definition. (God is the third kind of substance, along with mind and body, though because of his absolute independence, he is a substance in a somewhat different sense.) On Descartes’ metaphysics, each substance has a principal attribute, an attribute that characterizes its nature. For mind it is thought, and for body it is extension. In addition, substances have modes, literally ways of instantiating the attributes. So, for Descartes, particular ideas, particular volitions, particular passions are modes of mind, and particular shapes, sizes and motions are modes of body.

Descartes’ conception of mind and body represents significant departures from the conceptions of both notions in the late scholastic thought in which he was educated. For the late scholastics, working in the Aristotelian tradition, body is composed of matter and form. Matter is that which remains constant in change, while form is that which gives bodies the characteristic properties that they have. For Descartes, however, all body is of the same kind, a substance that contains only geometric properties, the objects of geometry made concrete. The characteristic properties of particular forms of body are explained in terms of the size, shape and motion of its insensible parts (see §11 below). For the late scholastics, the mind is connected with the account of life. On the Aristotelian view, the soul is the principle of life, that which distinguishes a living thing from a dead thing; it is also taken to be the form that pertains to the living body. The mind is the rational part of the soul, that which characterizes humans, and not usually considered a genuine substance, though by most accounts, with divine aid, it can survive the death of the body (see Nous; Psychē). For Descartes, the majority of the vital functions are explained in terms of the physical organization of the organic body. The mind, thus, is not a principle of life but a principle of thought. It involves reason, as does the rational soul of the Aristotelians, but it also involves other varieties of thought, which pertain to other parts of the Aristotelian soul (see Aristotle §17). Furthermore, it is a genuine substance, and survives the death of the body naturally and not through special divine intervention.

Mind and body are distinct because they can exist apart from one another. However, in this life, they do not. In Meditation VI Descartes observed: 'Nature also teaches me, by these sensations of pain, hunger, thirst and so on that I am not merely present in my body as a sailor is present in a ship, but that I am very closely and, as it were, intermingled with it, so that I and the body form a unit'. He sometimes went so far as to say that the human mind is the form of the human body, the only kind of form that he recognizes in nature, and that the human being – the union of a mind and a body – constitutes a genuine substance, though the context of these statements suggests that they may be made more for orthodoxy's sake than an expression of his own views (see, for example, the letter to Regius, January 1642 (Descartes 1984–91 vol 3: 208), where he is advising Regius on the best way to answer the attacks made by the more orthodox Aristotelian Gisbertus Voëtius in connection with the controversy at Utrecht.) But be that as it may, he was clearly committed to holding that the mind and the body are united. Some of his contemporaries found it difficult to understand how two such different substances could interact and be joined. Sometimes Descartes dismissed this objection by saying that it is no more difficult than understanding how form and matter unite for the Aristotelians, something that everyone learns at school (letter to Arnauld, 29 July 1648; Descartes 1984–91 vol 3: 358). But elsewhere, particularly in an important exchange of letters with the Princess Elisabeth of Bohemia, Descartes offered a different explanation, remarking that it is simply an empirical fact that they do unite and interact, something that we learn from everyday experience, and suggesting that just as we have innate notions that allow us to understand the notions of thinking and extended substance, we also have an innate notion that allows us to comprehend how mind and body interact, and how together they can constitute a unity (letters to Elisabeth, 21 May 1643 and 28 June 1643; Descartes 1984–91 vol 3: 217–20, 226–9).

According to Descartes, the mind is joined to the body in one specific place: the pineal gland, a single gland in the centre of the brain, between the two lobes. This is the spot in which interaction takes place. The mind has the ability to move the pineal gland, and by doing so, to change the state of the brain in such a way as to produce voluntary motions. Similarly, the sensory organs all transmit their information to the pineal gland and, as a result of that, sensation is transmitted to the attached mind. However, because of the interconnection of the parts that make up the organic body, by virtue of being connected to the pineal gland, the mind can properly be said to be connected with the body as a whole (Passions: §§30–2) (see Persons).

9. The external world and sensation

The argument for the distinction between mind and body in Meditation VI establishes the nature of body as extension, but it does not establish the real existence of the world of bodies outside of the mind. This is the focus of the last series of arguments in the Meditations. The argument begins in Meditation VI with the recognition that I have 'a passive faculty of sensory perception', which would be useless unless there was also an 'active faculty, either in me or in something else' which produces the ideas of sensation. Descartes has already established in Meditation IV that the mind has only two faculties – a passive faculty of perception, and the active faculty of will. Since it is passive, perception cannot be the source of my ideas of sensation, and since sensations are involuntary, they cannot be the product of my will. So, the

ideas of sense must come from somewhere else. God ‘has given me a great propensity to believe that they are produced by corporeal things’, and no means to correct my error if that propensity is deceptive. So, Descartes concluded, God would be a deceiver if my sensory ideas come from anything but from bodies. This argument does not prove that everything we sense about bodies is reliable, but only that ‘they possess all the properties which I clearly and distinctly understand, that is, all those which, viewed in general terms, are comprised within the subject-matter of pure mathematics’. (In the Principles Part II §1 there is also an argument for the existence of the external world, but it is somewhat different.)

The proof of the existence of the external world tells us that, in general, bodies are the causes of our sensations and it tells us, in general, what the nature of body is. But it does not seem to tell us much about what we can (and cannot) learn about specific bodies in the world around us in specific circumstances. These questions are addressed at the end of Meditation VI in a general discussion of the reliability of sensation, the most extensive such discussion in Descartes’ writings. He argues there that the senses are given to me ‘simply to inform the mind of what is beneficial or harmful for the composite of which the mind is a part; and to this extent they are sufficiently clear and distinct’. That is, while they cannot tell me anything about the real nature of things – that is for the intellect or reason to determine – they can inform me about specific features of my environment that relate to maintaining the union of my mind and body. So, for example, when the senses tell us that some particular apples are red and others green, this can give us reliable information that some may be ripe (and thus nutritious) and others not, but it cannot tell us that the one is, in its nature, red, and the other really green. Similarly, when I feel a pain in my toe, this tells me that there is damage to my toe, not that there is something resembling the sensation that is actually in the toe. Even in this, the sensation may be misleading. As Descartes points out, people sometimes feel pain in limbs even after they have been amputated.

Given the nature of the extended body, and the causal process by which pains (and other sensations) are transmitted through the body to the pineal gland, where the non-extended mind is joined to the extended body, such misleading sensations are inevitable; similar sensations in the mind can be the result of very different causal processes in the body. For example, a sensation of pain-in-the-toe can be caused either by a change in the state of the toe itself, or by an appropriate stimulation of the nerve connecting the toe to the brain at any point between the two. But, Descartes claims, though sensation is fallible, ‘I know that in matters regarding the well-being of the body, all my senses report the truth much more frequently than not’. Furthermore, I can use multiple senses and memory, together with the intellect, ‘which has by now examined all the causes of error’ in order to weigh the evidence of the senses and use it properly. And with this, Descartes is finally able to answer the dream argument of Meditation I. For my waking experience is interconnected in a way in which my dreaming experience is not; the things I see in waking life, unlike those in dreams, come to me through all my senses, and connect with my memory of other objects. I can use this interconnectedness of waking experience, together with my intellect and my knowledge of the causes of error, to sort out veridical sensations and distinguish them from the deceptive sensory experiences of dreams. Sometimes even my waking experiences will be deceptive, of course, but we are capable of determining specific

circumstances in which the senses are worthy of our trust. And so, contrary to the original doubts raised by the dreaming argument in Meditation I, there is no general reason to reject waking experience as such.

Though subordinated to reason, sensation, cast into doubt in Meditation I, re- enters as a legitimate source of knowledge about the world by the end of Meditation VI.

10. Philosophical psychology and morals

Morality was a concern of Descartes' in a variety of texts. In the third part of his Discourse he presents what he calls a 'provisional morality', a morality to govern our behaviour while we are in the process of revising our beliefs and coming to certainty. In the tree of philosophy in the Preface to the French edition of the Principles, morals is listed as one of the fruits of the tree, along with medicine and mechanics. It is also a theme in the letters he exchanged with the Princess Elisabeth of Bohemia in the mid-1640s, together with another concern – the passions, what they are and, more importantly, how to control them. These themes are intertwined again in Descartes' last major work, the Passions of the Soul (1649).

In one of the letters that serves as a preface to the Passions, Descartes announces that he will treat the passions 'only as a natural philosopher [*en physicien*], and not as a rhetorician or even as a moral philosopher'. Accordingly, the bulk of the Passions is taken up with detailed accounts of what the passions are, and how they arise from the connection between the human body and the human mind. As Descartes conceived them, the passions are grouped with sensation and imagination, perceptions of the mind that arise from external impulses. In this respect, Descartes differed radically from the Aristotelian scholastic philosophers who attached the passions to the appetitive faculty rather than the perceptive. But though grouped with other perceptions, the ones that concern Descartes in this treatise are a special group of perceptions, 'those whose effects we feel as being in the soul itself, and for which we do not normally know any proximate cause to which we can refer them', those 'which are caused, maintained, and strengthened by some movement of the spirits' (Passions: §§25, 27). (The 'spirits' in question are the animal spirits, a fluid matter that played a major role in Descartes' biology.) The principal effect of the passions is to 'move and dispose the soul to want the things for which they prepare the body. Thus the feeling of fear moves the soul to want to flee, that of courage to want to fight' and so on (Passions: §40). As with sensations, the passions of the soul play a role in the preservation of the mind – body union: 'The function of all the passions consists solely in this, that they dispose our soul to want the things which nature deems useful for us, and to persist in this volition; and the same agitation of the spirits which normally causes the passions also disposes the body to make movements which help us to attain these things' (Passions: §52).

For the schoolmen, the passions pertained to the appetitive faculty, and were principally organized around a distinction between the 'irascible' and the 'concupiscent' appetites. Descartes, however, was attempting to fashion a conception of the passions based on a very different conception of the soul, one in which there is no distinction among appetites (Passions: §68). His categorization of the passions was based on a list of six primitive passions, which pertain to the perceptive rather than to the appetitive faculty: wonder, desire, love and hatred, joy

and sadness – ‘all the others are either composed from some of these six or they are species of them’ (Passions: §69). Much of his attention in the short book is directed at accounts of what each of these basic passions is, what it feels like and its physiological causes and effects in the body, and how all the other passions can be understood in terms of the six basic ones.

But although Descartes presents himself as examining the passions ‘*en physicien*’, there is a moral dimension to the discussion as well. Part of the motivation for the examination of the passions is their control. While the passions, like everything given to us by God, can contribute to our well-being, they can also be excessive and must be controlled (Passions: §211). While the passions are not under our direct control, by understanding what they are and how they are caused we can learn indirect means for controlling them (Passions: §§45–50; 211). This, Descartes asserts, is the ‘chief use of wisdom, [which] lies in its teaching us to be masters of our passions and to control them with such skill that the evils which they cause are quite bearable, and even become a source of joy’ (Passions: §212). Important in this process is what Descartes calls *générosité*, best translated as ‘nobility’. *Générosité* is the knowledge that all that belongs to us, properly speaking, is our own free will, and the resolution to use it well, ‘that is, never to lack the will to undertake and carry out whatever one judges to be best’ (Passions: §53). Understood in this way, *générosité* is both a passion (an immediate feeling) and a virtue (‘a habit of the soul which disposes it to have certain thoughts’) (Passions: §§160–1). The person who has *générosité* ‘has very little esteem for everything that depends on others’, and as a result, Descartes claims, is able to control their passions (Passions: §156).

11. Physics and mathematics

To his contemporaries, Descartes was as well-known for his system of physics as he was for the metaphysical views that are now more studied. Indeed, as he indicates in the Preface to the French edition of the *Principles*, metaphysics constitutes the roots of the tree of philosophy, but the trunk is physics.

Descartes’ physics was developed in two main places. The earliest is in the treatise *Le Monde* (The World) which he suppressed when Galileo was condemned for Copernicanism in 1633, though summarized in Part V of the *Discourse*. Later, in the early 1640s, he presented much of the material in a more carefully worked-out form, in Parts II, III and IV of the *Principles*. Like the physical thought of many of his contemporaries, his physics can be divided into two parts – a general part, which includes accounts of matter and the general laws of nature, and a specific part, which includes an account of particular phenomena.

The central doctrine at the foundations of Descartes’ physics is the claim that the essence of body is extension (discussed in §8 above). This doctrine excludes substantial forms and any sort of sensory qualities from body. For the schoolmen there are four primary qualities (wet and dry, hot and cold) which characterize the four elements. For Descartes, these qualities are sensations in the mind, and only in the mind; bodies are in their nature simply the objects of geometry made real. Descartes also rejected atoms and the void, the two central doctrines of the atomists, an ancient school of philosophy whose revival by Gassendi and others constituted a major rival among contemporary mechanists. Because there can be no extension without an extended

substance, namely body, there can be no space without body, Descartes argued. His world was a plenum, and all motion must ultimately be circular, since one body must give way to another in order for there to be a place for it to enter (Principles II: §§2–19, 33). Against atoms, he argued that extension is by its nature indefinitely divisible: no piece of matter in its nature indivisible (Principles II: §20). Yet he agreed that, since bodies are simply matter, the apparent diversity between them must be explicable in terms of the size, shape and motion of the small parts that make them (Principles II: §§23, 64) (see Leibniz, G.W. §4).

Accordingly, motion and its laws played a special role in Descartes' physics. The essentials of this account can be found in *The World*, but it is set out most clearly in the *Principles* (see Motion 2§). There (Principles II: §25), motion is defined as the translation of a body from one neighbourhood of surrounding bodies into another. Descartes is careful to distinguish motion itself from its cause(s). While, as we have seen, motion is sometimes caused by the volition of a mind, the general cause of motion in the inanimate world is God, who creates bodies and their motion, and sustains them from moment to moment. From the constancy of the way in which God sustains motion, Descartes argues, the same quantity of motion is always preserved in the world, a quantity that is measured by the size of a body multiplied by its speed (Principles II: §36). To this general conservation law he adds three more particular laws of nature, also based on the constancy by which God conserves his creation. According to the first law, everything retains its own state, in so far as it can. As a consequence, what is in motion remains in motion until interfered with by an external cause, a principle directly opposed to the Aristotelian view that things in motion tend to come to rest (Principles II: §§37–8). According to the second law, bodies tend to move in rectilinear paths, with the result that bodies in circular motion tend to move away at the tangent (Principles II: §39). The first and second laws together arguably constitute the first published statement of what Newton, later called the law of inertia. Descartes' third law governs the collision between bodies, specifying when one body imposes its motion on another, and when two bodies rebound from one another without exchanging motion. The abstract law is followed by seven specific rules covering special cases (Principles II: §§40–52). Though the law of collision turns out to be radically inadequate, it casts considerable light on Descartes' conception of the physical world. One of the determinants of the outcome of a collision is what Descartes calls the 'force' of a body, both its force for continuing in motion, and its resistance to change in its motion (Principles II: §43). The role of such forces in Descartes' mechanist world has generated much discussion, since they would seem to be completely inconsistent with Descartes' view that the essence of body is extension alone.

These general accounts of matter and motion form the basis of Descartes' physical theories of particular phenomena. The *Principles* goes on to explain how the earth turns around the sun in an enormous fluid vortex and how the light that comes from the sun is nothing but the centrifugal force of the fluid in the vortex, with ingenious explanations of many other particular phenomena in terms of the size, shape and motion of their parts. Other works contain further mechanistic explanations, for example of the law governing the refraction of light (*Dioptrics* II) and the way colours arise in the rainbow (*Meteors* VIII).

Descartes' hope was that he could begin with an assumption about how God created the world, and then deduce, on the basis of the laws of motion, how the world would have to have come out (Discourse V, VI; Principles III: §46). But this procedure caused some problems. It is not easy to specify just how God might have created the world – whether the particles that he first created were of the same size, for example, or of every possible size. Furthermore, any hypothesis of this sort would seem to be inconsistent with the account of creation in Genesis (Principles III: §§43–7). These difficulties aside, it seemed obvious to Descartes how to proceed. For example, from his denial of the vacuum it would seem to follow that bodies in motion would sort themselves out into circular swirls of matter, the vortices which were to explain the circulation of the planets around a central sun. Similarly, Descartes used the tendency to centrifugal motion generated by the circular motion of the vortex to explain light, which, he claimed, was the pressure of the subtle matter in the vortex. But the very complexity of the world militates against the full certainty that Descartes originally sought, particularly when dealing with the explanation of particular phenomena, such as the magnet. Indeed, by the end of the Principles, it can seem that he has given up the goal of certainty and come to accept the kind of probability that he initially rejected (Principles IV: §204–6).

Central to Descartes' physics is his rejection of final causes: 'When dealing with natural things we will, then, never derive any explanations from the purposes which God or nature may have had in view when creating them. For we should not be so arrogant as to suppose that we can share in God's plans' (Principles I: §28). The emphasis on efficient causes was to prove very controversial later in the century.

One especially curious feature of Descartes' physics, however, is the lack of any substantive role for mathematics. Descartes was one of the great mathematicians of his age. While it is, perhaps, anachronistic to see modern analytic geometry and so-called Cartesian coordinates in his *Geometry* (1637), there is no question but that it is a work of real depth and influence. In it he shows how one could use algebra to solve geometric problems and geometry to solve algebraic problems by showing how algebraic operations could be interpreted purely in terms of the manipulation and construction of line segments. In traditional mathematics, if a quantity was represented as a given line, then the square of that quantity was represented as a square constructed with that line as a side, and the cube of the quantity represented as a cube constructed with that line as an edge, effectively limiting the geometric representation of algebraic operations to a very few. By demonstrating how the square, cube (and so on) of a given quantity could all be represented as other lines, Descartes opened the way to a more complete unification of algebra and geometry. Also important to his mathematical work was the notion of analysis. Descartes saw himself as reviving the work of the ancient mathematician, Pappus of Alexandria, and setting out a methodology for the solution of problems, a methodology radically different from the Euclidean style of doing geometry in terms of definitions, axioms, postulates and propositions, which he regarded as a method of presentation rather than a method of discovery. According to the procedure of analysis, as Descartes understood it, one begins by labelling unknowns in a geometric problem with letters, setting out a series of equations that involve these letters, and then solving for the unknowns to the extent that this is possible.

Unlike his contemporary, Galileo, or his successors, Leibniz and Newton, Descartes never quite figured out how to apply his mathematical insights to the physical world. Indeed, it is a curious feature of his tree of knowledge that, despite the central place occupied by mathematics in his own accomplishments, it seems to have no place there.

12. Life and the foundations of biology

The last part of the Cartesian programme was his biology. First presented in the Treatise on Man, part of The World project which was abandoned in 1633 when Galileo was condemned, Descartes intended to rework some of that material and publish it – as Parts V and VI of the Principles under the title ‘De Homine’. Although he never finished this rewriting, it is clear from the notes left behind that it was very much on his mind in years that preceded his sudden and premature death.

His hope seems to have been to show how, from matter and the laws of motion alone, life would arise spontaneously as matter came to organize itself in an appropriate way (Discourse V). Unfortunately he never worked out this view, suggestive of later theories of evolution, in any detail. Yet, he was quite clear that all the functions of life (with the exception of thought and reason in humans) are to be explained not in terms of the soul, the principle of life, but in terms of matter in motion. Accordingly, in the Treatise on Man, he accounts for a variety of phenomena, including digestion, involuntary motion, the action of the heart, and sense perception, in purely mechanical terms. (Summarized in Discourse Part V, with special emphasis on the circulation of the blood.)

While Descartes’ biology was controversial among his contemporaries, one aspect was especially so. According to his account, there is only one kind of soul in the world, the rational soul, which humans and angels have and animals do not. Humans are organic machines, collections of matter organized so as to be able to perform vital functions, attached to rational souls. Animals, on the other hand, are just machines: their behaviour is purely mechanical and they are, strictly speaking, incapable of conscious experience of any sort (Discourse V).

13. The Cartesian heritage

It is difficult to overestimate the influence of Descartes. In philosophy, the Cogito Argument signalled the centrality of the self and the rejection of authority from without, the authority of both texts and teacher. For physics, Descartes represented the rejection of the scholastic physics of matter and form, and its replacement by a mechanistic physics of matter and motion. So in biology, he stood for mechanism and the rejection of Aristotelian vitalism.

Descartes had many followers who took his ideas (as they understood them) as dogma, and developed them as they thought he would have wanted them to do. The most important centres of Cartesian thought were France, where he was remembered as a countryman, despite his long absence, and the Netherlands, where he had lived. In France, his thought was carried on by a circle around Claude Clerselier, who gathered and published his letters as well as other works. Louis de La Forge commented on Descartes’ physiology, and wrote a Cartesian treatise on the mind, extending Descartes’ ideas. Gerauld de Cordemoy, tried to blend Cartesian philosophy

with atomism, to the puzzlement of most of his contemporaries. Jacques Rohault was influential in Cartesian physics well after Newton had published the work that would eventually eclipse such theories. Other followers, mainly in the Low Countries, include Henricus Regius, considered Cartesian by many despite Descartes' public rejection; Adriaan Heereboord, one of Descartes' partisans in Leiden; Johannes de Raey, one of those who attempted to reconcile Descartes with the true philosophy of Aristotle; and Johannes Clauberg, who recast Cartesianism into more scholastic garb. There were many more minor Cartesians of various nationalities. Late seventeenth-century Europe was flooded with paraphrases of and commentaries on Descartes' writings.

Other more independent thinkers were strongly influenced by Descartes without explicitly being followers. The best-known such figure is probably Nicolas Malebranche. While his thought owes much to other influences, particularly to seventeenth-century Augustinianism, in his *Recherche de la vérité* (Search after Truth) (1674–5) he follows Descartes in offering a critique of the senses, rejecting the authority of tradition, and appealing to clear and distinct perceptions. Descartes was also an important influence on the Cambridge Platonist Henry More, who regarded Descartes' philosophy, in particular his distinction between mind and body, as support for his own attacks on materialism (see Cambridge Platonism). Spinoza, too, was influenced by Descartes. His first published book was a commentary on Descartes' *Principles*, and although he later moved well outside the Cartesian camp, Descartes' doctrines helped to structure his mature thought. Spinoza's metaphysical vocabulary (substance, attribute and mode) is borrowed from Descartes, as is the centrality of the attributes of thought and extension in his metaphysics.

While many of Descartes' partisans tried to remain orthodox, there is at least one doctrine characteristic of later Cartesianism that Descartes himself probably did not hold, namely, occasionalism (see Occasionalism). Malebranche and the Flemish Cartesian Arnold Geulincx are most often associated with the doctrine, but it appears in Cartesian writings long before theirs. According to occasionalism, God is the only active causal agent in the world; finite minds and bodies are not real causes, but only occasions for God to exercise his causal efficacy. Motivated by the picture of divine sustenance from moment to moment that underlies Descartes' derivation of the laws of motion, together, perhaps, with general worries about the efficacy of finite causes and specific worries about mind – body interaction, occasionalism became a standard doctrine. Though often also attributed to Descartes himself, the grounds for doing so are rather slim.

Descartes' mark can also be seen among his opponents. He was clearly a target of Hobbes' materialism and sensationalism in, for example, Part I of *Leviathan* (1651). His epistemology and treatment of God were explicitly targeted by Pascal in the *Pensées* (1658–62, published 1670). Leibniz, too, attacked his physics, his rejection of formal logic, his conception of body and his conception of the mind, among many other things. The inadequacy of the Cartesian philosophy is a constant subtext to Locke's *Essay Concerning Human Understanding* (1689), particularly in his discussion of our knowledge of mind and his rejection of the dogmatic claim to know the essences of substances. In natural philosophy, Newton's early writings show a careful study of Descartes' writings, particularly those on motion, and book II of his *Principia* was devoted to a refutation of the vortex theory of planetary motion. Between around 1650 and

the eclipse of Cartesian philosophy some time in the early eighteenth century, it was simply impossible to write philosophy without reacting in some way to Descartes.

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References and further reading

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