

## SCEPTICISM AND SCIENCE IN DESCARTES\*

Recent work on Descartes has drastically revised the traditional conception of Descartes as a paradigmatic rationalist and foundationalist. The traditional picture, familiar from histories of philosophy and introductory lectures, is of a solitary meditator dedicated to the pursuit of certainty in a unified science via a rigorous process of logical deduction from indubitable first principles. But the Descartes that has emerged from recent studies strikes a more subtle balance between metaphysics, physics, epistemology and the philosophy of science. There is much to be praised in this revaluation, but a dangerous amount of over-compensation has gone on, particularly in the reinterpretation of the role of sceptical doubt in Descartes' thought. This reinterpretation plays down the epistemological reasons for worrying about scepticism, suggesting that Cartesian physics is what ultimately drives the introduction of scepticism in the First Meditation.

In the first section I will outline how a certain conception of the importance of sceptical doubt is deeply implicated in the traditional view of Descartes as a paradigm rationalist and foundationalist. The second section outlines some of the principal respects in which this traditional view has been attacked. In the third I discuss the revaluation of the role of sceptical doubt which has accompanied these attacks on the traditional view. The fourth section outlines some specific worries with the revaluation of the role of sceptical doubt in the First Meditation. These worries are both philosophical and textual. In the fifth section I outline an alternative account of the relation between science and scepticism in Descartes' thought. This alternative account preserves the idea that the ultimate reasons for worrying about scepticism are epistemological, while arguing that these epistemological reasons are ultimately driven by science. My argument will be that those aspects of Descartes' scientific thought which militate against the traditional view are precisely what makes scepticism such a problem for him.

### 1. The role of scepticism on the traditional view

The best place to start in discussing the traditional view of Descartes is with his own early writings, particularly the Rules for the Direction of the Mind. The traditional view is best seen as a one-sided reading of some of the pronouncements that he makes there.

According to Rule Two, enquiry should be confined to areas in which certainty is possible, since considering subjects in which probability is all that can be hoped for will not only not lead to

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References to Descartes' writings in the text are given in the standard manner to the Adam and Tannery edition of the Oeuvres de Descartes (Paris, Cerf, 1897-1913: 12 volumes), cited as AT, and to the translation by Cottingham, Stoothof, Murdoch and Kenny of the Philosophical Writings of Descartes (Cambridge, Cambridge University Press,

knowledge, but can endanger whatever knowledge one might independently possess. Descartes suggests that the certainty of mathematics be taken as a paradigm, and his suggestions for how certainty is to be attained in the sciences extend the parallel further. Just as mathematicians proceed by deduction from first principles, so too must philosophy and the sciences proceed by a combination of intuition and deduction - intuition to yield a knowledge of self-evident first principles, and deduction to move beyond those first principles in a certainty-preserving manner.

The traditional view of Cartesian method takes these and similar pronouncements as the last word on his methodology, interpreting them in a rather narrow way. In Descartes' characterisation of deduction everything depends upon how 'following necessarily' is understood. On one reading Cartesian deduction involves logical entailment so that the conclusions reached by deduction are implicitly contained in their premises, but there are weaker readings available. An example would be Garber's suggestion that a deduction is any argument whose steps are connected by acts of intuition.<sup>1</sup> But the traditional view takes the strong reading and interprets Descartes as holding that scientific knowledge ought to be a rigorously deductive and entirely a priori edifice built on the foundations provided by the cogito and the innate idea of God. As Bernard Williams expresses it in his article on Rationalism in the Encyclopedia of Philosophy, Descartes had "a picture of a completed science as a complete deductive system, ideally expressed in a unique system of theorems with necessary truths (of a metaphysical character) as its axioms".<sup>2</sup>

On the traditional view, moreover, it is the threat of philosophical scepticism that gives impetus and justification to this methodology of a priori deductivism, by forging the connection between knowledge and certainty. The notion of certainty is parasitical on the notion of indubitability, and the notion of indubitability is held to be central to the Cartesian methodology because of his engagement with the philosophical sceptic. Indubitability comes only with certain basic propositions which cannot coherently be doubted. And indubitability can be retained only if nothing can be admitted as knowledge that is not deduced from those basic propositions, where a genuine deductive transition can be understood as one that is immune to sceptical doubt.

The traditional view, then, has two closely linked components. The radical scepticism of the First Meditation and the explicit methodology of a priori deductivism are symbiotically related. On the

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<sup>1</sup> Daniel Garber, 'Science and Certainty in Descartes' in Michael Hooker (Ed.), Descartes, Critical and Interpretive Essays (Baltimore, Johns Hopkins University Press, 1978) pp.117-121. This line of thought is defended in detail in Stephen Gaukroger, Cartesian Logic: An Essay on Descartes' Conception of Inference (Oxford, Clarendon Press, 1989). The obvious challenge for such an interpretation is giving an account of what the connection between steps is that is apprehended in acts of intuition.

<sup>2</sup> The Encyclopedia of Philosophy, edited by Paul Edwards (London, Macmillan, 1967). A recent and sophisticated version of this aspect of the deductivist interpretation will be found in Peter Schouls, 'Reason, Method and Science in the Philosophy of Descartes' in Australasian Journal of Philosophy 50 (1972), 30-39. A classic exposition of the traditional view will be found in Leon Roth, Descartes' Discourse on Method (Oxford, Clarendon Press, 1937). Earlier versions include influential histories like Kuno Fischer, Descartes and his School (London, Fisher Uniwin, 1887) and G. H. Lewes, The History of Philosophy Vol. II (3rd edition, London, Longman's Green and Co., 1867), especially pp. 145-149. See also E. A. Burtt, The Metaphysical Foundations of Modern Science (London, Routledge

one hand, the radical scepticism of the First Meditation creates epistemic demands which can only be met by a process of certainty-preserving deduction from indubitable first principles. On the other hand, Descartes' preoccupation with scepticism becomes very clear when interpreted in the light of a methodology for unified science that demands indubitable first principles from which scientific knowledge can be deduced, because the application of sceptical doubt is an obvious way of identifying those first principles.<sup>3</sup>

## 2. The Traditional View Revised

Of course, supporters of the traditional view have always had to come to terms with the fact that Descartes' actual scientific practice fails to conform to this methodological model of a priori deductivism. What characterises the traditional view, however, is the belief that Descartes' scientific practice fails to match up to his methodological ideals.<sup>4</sup> There is now something approaching a consensus among Descartes scholars, however, that this belief is mistaken, and that Descartes actual practice was importantly in harmony with his method.

An important general factor in the move away from the traditional view has been a recognition that Descartes' thought is far from a monolithic whole. Whereas the traditional view is quite happy to take passages from the Rules and interpret them as accurate descriptions of the methodology of the Principles of Philosophy, written nearly twenty years later, scholars have become increasingly aware that Descartes' thought evolved during his intellectual career, and correspondingly cautious of placing too much emphasis on the early works.<sup>5</sup> One obvious discontinuity between the Rules and the Meditations concerns the certainty of mathematics. The rigid deductivism which seems to emerge from the Rules is based on a particular conception of the certainty of mathematics. By the time of the

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and Kegan Paul, 1924) ch.4; and W. A. Merrylees, Descartes: An Examination of Some Features of his Metaphysics and Method (Melbourne, Melbourne University Press, 1934) chs. 9 and 10.

<sup>3</sup> This is not to say, of course, that there are no other reasons why Descartes should have been inclined to take scepticism seriously. The revival of Pyrrhonian scepticism was surely a contributing factor to Descartes' engagement with scepticism. See Richard Popkin, The History of Scepticism from Erasmus to Spinoza (Berkeley, University of California Press, 1979), ch. 9.

<sup>4</sup> This is the view taken in Roth, Descartes' Discourse on Method, and in Pierre Duhem, The Aim and structure of the Physical Sciences (New York, Atheneum, 1962) pp. 43-46. Norman Kemp Smith also thinks, although not for quite the same reasons, that Descartes failed to live up to his own method - New Studies in the Philosophy of Descartes (London, Macmillan, 1966) p.101.

<sup>5</sup> It should not be thought, though, that the traditional view reflects Descartes' original conception of enquiry, which he later modified. Two well known letters to Mersenne written within a few weeks of each other in 1638 will make the point. On 27 July he wrote that "all my physics are nothing but geometry" (AT II 268, CSMK 119), although in May he had claimed that demanding geometrical demonstrations in physics is demanding the impossible (AT II 142, CSMK 103). Moreover, and particularly in the case of his scientific views, there are important continuities between the early works and the later ones. Gaukroger, in Descartes: An Intellectual Biography (Oxford, Oxford University Press, 1995) has argued that The World is the key text for Cartesian physics, despite its explicitly hypothetical form. According to Gaukroger, the crucial difference between The World and the Principles is the

Meditations, however, Descartes has changed his mind. The radical doubt of the First Meditation extends to the most basic propositions of arithmetic.

In addition to this, however, the traditional view has suffered from scholarly attention to the internal complexities of the Rules themselves. A good example here is Descartes' proposal for a mathesis universalis.<sup>6</sup> In Rule Four Descartes explains that the various mathematical disciplines have in common an abstract concern with questions of order and measure, and draws an important methodological lesson:

This made me realise that there must be a general science which explains all the points that can be raised concerning order and measure irrespective of the subject-matter, and that this science should be termed mathesis universalis - a venerable term with a well-established meaning - for it covers everything that entitles these other sciences to be called branches of mathematics.<sup>7</sup>

The proposal here is for a universal mathematics, a general science of magnitude, which will underpin the specific mathematical disciplines. It has seemed to many that this universal mathematics is to be identified with the general method of discovery that Descartes is putting forward. And from here it is a short step to the traditional view, because universal mathematics certainly qualifies as rigorously a priori and deductivist.

When the Rules are read carefully, however, it emerges that the general method of discovery and the mathesis universalis are two very different things.<sup>8</sup> The Cartesian method is centred on his theory of the simple natures being the natural objects of intuition. But the simple natures are not exclusively concerned with order and measure in the way that the objects of universal mathematics are supposed to be. Two examples should make this clear. First, Descartes takes shape as a canonical example of a material simple nature, and hence as a basic notion for explaining the physical world.<sup>9</sup> In describing universal mathematics, however, he maintains that the notion of shape has no theoretical role to play, because it is a specific measure whereas universal mathematics is concerned only with measure in general. Secondly, Descartes admitted three different types of simple natures - corporeal natures (such as shape, extension and motion), intellectual natures (such as volition and knowledge) and common natures (existence and duration, for example). Even if the previous difficulty is glossed over, volition, knowledge and existence can hardly be the objects of a mathesis universalis.

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<sup>6</sup> I am indebted here to John A. Schuster's paper 'Descartes' Mathesis Universalis: 1619-1628' in Stephen Gaukroger (Ed.), Descartes: Philosophy, Mathematics, Physics (Brighton, Harvester Press, 1980).

<sup>7</sup> AT X 378, CSM I 19.

<sup>8</sup> See Schuster op. cit.. Schuster records his debt to the detailed textual study in J.-P. Weber, La Constitution du Texte des Regulae (Paris, 1964). Particularly significant is Weber's demonstration that Rule Four is in fact composed of two parts written at different times. The second part of Rule Four (which Weber terms 4B), containing the discussion of mathesis universalis, dates from 1619 and is believed to be closely related to the proposed Thesaurus mathematicus, an exclusively mathematical work. The first part (4A) seems to date from 1620 and fits much more closely with the discussions of general method that occupy the next 11 rules.

Another important factor in undermining the plausibility of the traditional view has been the recognition that, despite first appearances, the Rules can be read in a way that does not support a strictly a priori deductivist interpretation. One possible strategy here would be stress the distinction between presentation and discovery, or, in Descartes' terms, between synthesis and analysis.<sup>10</sup> So, the deductivist strands in the Rules could be interpreted as prescriptions, not for a method of acquiring certain knowledge, but rather for a method of presenting items of knowledge acquired in ways that can on occasion be a posteriori and experimental.<sup>11</sup> This would allow one to preserve the idea that Descartes is ultimately calling for an a priori science, while preserving him from the traditional claim that one might be able to deduce particular facts about the world from first principles.

A further strategy here would be to deny that Descartes is actually calling for an a priori science at all. One way of arguing this would be by stressing the way in which the Cartesian conception of analysis seems to allow a significant role for experience and experiment. Analysis is put forward as a means by which a complex problem can be simplified in stages until it can be posed in terms of the simple natures. The example which Descartes gives in Rule Eight is the search for the anaclastic (the shape of the refracting surface from which parallel rays of light will be deflected to meet at a single point). And the account of how the problem of the anaclastic is reduced to the appropriate simple nature (that of a 'natural power') does seem to contain a posteriori elements.<sup>12</sup> For example, as Sabra has pointed out, only experience can tell the investigator that the relationship between the angle of incidence and the angle of refraction is different in different media.<sup>13</sup>

This insight could be brought into line with the previous point, so that it is synthesis (or the presentation of the appropriate proof that the conclusion follows from the consideration of the simple natures) that is a priori. Alternatively, and more radically, it could be argued that the process of synthesis is also crucially dependent upon experience and experiment - as, indeed, seems to be implied by Descartes' frequent statements that synthesis just is analysis in reverse. In the case of the anaclastic, for example, Descartes seems to concede that knowledge of the nature of light does not follow straightforwardly from intuiting the simple nature of a natural potency. Rather, synthesis can proceed only by comparing light with what is (experimentally) known about other natural powers.<sup>14</sup> Even in the context of the Rules and other early works, then, there are possibilities for arguing that

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<sup>10</sup> See, for example, Gaukroger, Cartesian Logic, particularly Chs.3 and 4. Gaukroger claims: "The distinction between analysis and synthesis is, for Descartes, effectively the distinction between problem-solving and deduction, and in advocating analysis and disparaging synthesis he is advocating problem-solving techniques and rejecting the attempt to advance knowledge deductively" (p.105).

<sup>11</sup> This parallels attempts that have been made by Aristotle scholars to deal with the obvious disparity between Aristotle's methodological demands for a fully demonstrated science and his actual scientific practice. See, for example, J. Barnes, 'Aristotle's Theory of Demonstration' in J. Barnes, M. Schofield and R. Sorabji (Eds.), Articles on Aristotle Vol. 1, p.77.

<sup>12</sup> See AT X 393-395, CSM I 28-29 for the example of the anaclastic.

<sup>13</sup> A. I. Sabra, Theories of Light from Descartes to Newton (Cambridge, Cambridge University Press, 1981) p.30. Cf Clarke, Descartes' Philosophy of Science (Manchester, Manchester University Press, 1982) p. 173. It is also worth drawing attention to Descartes' explanation of the rainbow in the Meteorology, for he himself cites this as an example of the method in action.

the Cartesian methodology was not as strictly a priori and deductivist as the traditional view suggests.<sup>15</sup>

But although the Rules will always have an important role to play in discussions of the Cartesian methodology, the principal motivation for moving away from the traditional view has been a closer attention to the actual practice of Cartesian science. Particularly significant has been a recognition of the role played by crucial experiments. In a well-known and important passage from the Discourse on the Method, Descartes notes that, although the basic principles of geometry and mechanics constrain any possible explanation of natural phenomena, they are often compatible with many such explanations. So, Descartes continues, crucial experiments are required to rule out all but one of these possible explanations.<sup>16</sup>

It would be unwise to place too much weight on the discussion of crucial experiments in the Discourse, simply because Descartes rarely finds himself with two or more competing hypotheses which can be decided between by an appeal to suitable empirical evidence.<sup>17</sup> But Descartes scholars have increasingly recognised the centrality that Descartes accorded hypothetico-deduction in both science and philosophy.<sup>18</sup> The methodological point is clearly made in a passage from the Principles which anticipates the cosmology and theory of the universe developed in Principles III:

When philosophizing about such important matters, however, it would seem to be excessively arrogant for us to assert that we have discovered the exact truth; and so I should prefer to leave this claim on one side, and put forward everything that I am about to write simply as a hypothesis. And if it is thought that the hypothesis is false, I shall think I have achieved something sufficiently worthwhile if everything deduced from it agrees with our observations; for if this is so we shall see that our hypothesis

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<sup>14</sup> AT X 395, CSM I 29.

<sup>15</sup> Of course, Descartes still uses the term 'deduction' (deducere or déduire) to characterise the process, but there are reasons for thinking that his use of the term has little in common with modern usage. See Clarke, Descartes' Philosophy of Science pp.63-70, 207-210 for an interesting discussion. He concludes that ". . . Descartes uses the term 'déduire' to mean a detailed enumeration of steps in an argument in such a way that the term no longer characterises the logic of the argument but rather the step-by-step narration which is involved in its articulation" (p.209). Deduction as Descartes understood it can, he claims, subsume proof, explanation and what we would think of as induction.

<sup>16</sup> The classic example of crucial experiments in Cartesian science is Descartes' debate with William Harvey over the circulation of the blood. There is a useful discussion of the dispute in Clarke, Descartes' Philosophy of Science pp.148-155. See also Gary Hatfield, 'Descartes' physiology and its relation to his psychology' in J. Cottingham (Ed.) The Cambridge Companion to Descartes (Cambridge, Cambridge University Press, 1992) pp.342-3.

<sup>17</sup> Although, as Clarke notes (Descartes' Philosophy of Science p. 155), he remains true to his commitment to experiment when he does find himself in such a situation.

<sup>18</sup> As far as philosophy is concerned, Daniel Garber argues that Descartes' proof of the existence of God in Meditation Three, as well as his proof of the existence of material objects in Meditation Six, are examples of 'argument by enumeration' in which a range of hypotheses is postulated, and all except for one eliminated by

yields just as much practical benefit for our lives as we would have derived from knowledge of the actual truth.<sup>19</sup>

It is not just modesty that drives him here. Two sections further on he appeals to considerations like those in the Discourse. Although we can know with certainty (and by reason alone) that everything in the universe is ultimately composed of a single matter divided into innumerable parts moving in circular motions according to determinate principles such as the principle of the conservation of motion, these facts alone will not determine a cosmology:

. . . we cannot determine by reason alone how big these pieces of matter are, or how fast they move, or what kinds of circle they describe. Since there are countless different configurations which God might have instituted here, experience alone must teach us which configuration he actually selected in preference to the rest. We are thus free to make any assumption on these matters with the sole proviso that all the consequences of our assumption must agree with our experience.<sup>20</sup>

The assumptions he lists are: that God created particles of matter which are roughly equal in size; that He imparted to them an amount of motion equal to that existing now in the universe; and two more detailed assumptions about the movement of such particles that are supposed to explain the emergence of vortices.<sup>21</sup>

In the closing sections of the Principles Descartes seems to draw the obvious methodological conclusion from this and to accept that his dependence upon hypothetical reasoning means that the most he can claim for his scientific explanations is that they have moral authority, "sufficient certainty for application to ordinary life, even though they may be uncertain in relation to the absolute power of God" (Principles IV.206).<sup>22</sup> Of course, Descartes is explicit that the basic principles of metaphysics have more than moral certainty, but it is clear that he has explicitly abandoned his call for absolute certainty in science.

The weight of the textual evidence against the traditional view seems overwhelming. The only way in which it could possibly be preserved would be by significantly weakening the strength of the a

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<sup>19</sup> Principles III.44 (AT VIII A 99, CSM I 255).

<sup>20</sup> Principles III.46 (AT VIII A 100-101, CSM I 256-257).

<sup>21</sup> These sections of the Principles present exegetical problems, because Descartes seems to be explicitly denying the truth of these hypotheses. Principles III.45 begins: "I shall even make some assumptions which are agreed to be false" (AT VIII A 99, CSM I 256). This is one of the points where Cartesian science comes into conflict with the Christian faith. What Descartes is undertaking is to give some indication of how the present state of the universe might have evolved out of an original chaos. But since according to the Bible God created the universe in the state it is now, it follows that no such process of evolution could have taken place. And so Descartes describes his assumptions as false. This can hardly be taken at face value, though, and the interpretation I suggest is this. Descartes is putting the assumptions forward as hypotheses, and is convinced that they provide an adequate explanation of the real world. What we are supposed to think of as false is the suggestion that the real world evolved from a primeval chaos. Nonetheless, God could have created such a primeval chaos, and it is a further point in favour of Descartes' hypotheses that they can explain how the real world could have evolved from such a chaos.

priori deductivism being ascribed to Descartes. It could be maintained that Descartes was calling, not for certainty and a priori deductivism in science as a whole, but rather for an a priori deduction of the basic principles of metaphysics and the basic principles of physics. Such a view is taken by Sabra who refers to the realm of the 'primary truths' and their logical consequences, the principles of physics, describing it as "the domain of a priori truth, of strict demonstration and of absolute certainty".<sup>23</sup> There are reasons to think that a strict deductivist model might not be appropriate even in this limited sphere, but let us leave these aside and consider how much of the traditional view such a weakening would preserve.<sup>24</sup> Adopting this weakened version of the traditional view would certainly preserve the connection between certainty and a priori deductivism. But that is not all there is to the traditional view as originally presented. We need to ask whether it would also succeed in preserving the symbiotic relation between scepticism and certainty. The crucial issue in particular is whether it makes comprehensible Descartes' engagement with radical scepticism in the First Meditation.

A defender of the weakened version of the traditional view might argue that it explains the purpose of Descartes' examination of scepticism in the First Meditation, for the following reason. According to the weakened version, the type of certainty that brings with it a demand for a priori deductivism is required only for metaphysics and the fundamental principles of physics. But providing certainty within this limited sphere, it might be argued, is precisely what Descartes undertakes in the Meditations. In which case, the connection between scepticism and certainty is preserved. The engagement with scepticism in the First Meditation parallels the project of providing a certain, a priori, and rigorously deductive grounding for metaphysics and the basic principles of physics, which is the project that Descartes undertakes in the Meditations.

This attempt to salvage the traditional view's explanation of Descartes' discussion of scepticism in the First Meditation is attractive, but ultimately untenable. The most obvious difficulty with it is that it is committed to the thesis that the fundamental principles of physics are established deductively in the Meditations. Although there is room for doubt about precisely where the dividing line between metaphysics and physics is drawn by Descartes, it is clear that the fundamental principles of physics will include at least the three laws of motion, together with the theses that the essence of matter is extension and that physical explanation should proceed ultimately in terms of the movement and geometrical properties of material particles. Of these five fundamental principles only the thesis that the essence of matter is extension is discussed in the Meditations, and it is far from clear that this is discussed and demonstrated as a physical rather than metaphysical thesis in the Meditations. It is a long way from the famous discussion of the piece of wax to the foundations of physics. And in any case, the three laws of motion do not feature at all in the Meditations, nor do his views about particles. On this weakened version of the traditional view, then, the symbiotic relation between certainty and scepticism breaks down. The encounter with scepticism in the Meditations cannot be explained by its part in the project of providing an indubitable foundation for metaphysics and the fundamental

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<sup>23</sup> Sabra, Theories of Light p.44.

<sup>24</sup> See also Sabra, Theories of Light p.44.

principles of physics. It cannot be part of that project, because that project is not undertaken in the Meditations.

The last resort, then, for defenders of the traditional account of the role of scepticism in Descartes' thought is to maintain that Descartes restricted the realm of certainty to metaphysics, and that the encounter with scepticism must be seen as a corollary of the search for metaphysical certainty. But this imposes a highly artificial and unacceptable divide between Descartes' physics and metaphysics. Even if Descartes' metaphysical work is not intended to provide the sort of certain foundations for his work in natural philosophy that the interpretation of him as an a priori deductivist suggests, it can hardly be denied that a central aspect, perhaps the central aspect, of the metaphysical project of the Meditations is the legitimation of Cartesian science.<sup>25</sup> The introduction of the sceptical challenge in the First Meditation needs to be understood in the context of this project of legitimation. The question is how.

### 3. The revisionist account of scepticism

What I am calling the revisionist account of the role of scepticism in Descartes' thought is an attempt to explain how the scepticism of the First Meditation functions in the metaphysical legitimation of Cartesian science, in a way that accomodates the inappropriateness of the traditional view.

As a way into the revisionist position we can consider Descartes' important statement in the Synopsis to the Meditations of what he thought he had achieved in the First Meditation;

In the First Meditation reasons are provided which give us possible grounds for doubt about all things, especially material things, so long as we have no foundations for the sciences other than those which we have had up till now. Although the usefulness of such extensive doubt is not apparent at first sight, its greatest benefit lies in freeing us from all our preconceived opinions, and providing the easiest route by which the mind may be led away from the senses.<sup>26</sup>

Whereas the First Meditation begins with the famous call for a complete demolition of the edifice of knowledge, it is presented in the Synopsis as a way of counter-balancing prejudice and freeing the Meditator from excessive reliance on the senses. The passage does make reference to foundations, but it seems to be implied that we lack adequate foundations because we are in the grip of preconceived opinions and put too much faith in our senses. And one might conclude that sorting this problem out will provide the firm foundations required to remove possible grounds for doubt.

It is precisely this inference that is drawn by the revisionist conception of Cartesian scepticism. The Meditations are indeed, as Descartes wrote to Mersenne, the foundations of his physics. They

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<sup>25</sup> I borrow the reference to legitimation from Stephen Gaukroger, Descartes: An Intellectual Biography.

provide such foundations in two ways. First, they demonstrate the basic principles of the existence and immutability of God which stand at the roots of the tree of Cartesian unified science. Secondly, they provide epistemological foundations. But the epistemological foundations are not, as on the traditional view, provided by the certainty attained by refuting the various levels of sceptical doubt canvassed in the First Meditation. Rather, the process of engaging with those sceptical doubts is supposed to detach the Meditator from the baleful effects of prejudice and reliance on the senses, and reveal the proper epistemological procedure by which truth may be gained and error avoided, namely the method of clear and distinct ideas.

On the revisionist view, this attack on prejudice and the senses is intended to provide an epistemology appropriate for Cartesian science. It is the demands of science, and in particular physics, that drive the employment of scepticism as a tool. As Daniel Garber has stressed, the sceptical arguments of the First Meditation can be read as attempts to undermine the faith in the senses that underpins scholastic/Aristotelian science.<sup>27</sup> The objects of scholastic science are the objects of common sense unscientific perception, and scholastic hylomorphism is intended to 'save the appearances' of common sense. Descartes discusses how uncritical reliance on the senses is a prime cause of scientific error in the Replies to the Sixth Objections, giving the example of gravity. The sense-based temptation is to treat gravity as a 'real quality' inhering in bodies which somehow 'knows' where the centre of the earth is and impels bodies towards it.<sup>28</sup> Similarly, the testimony of the senses seems to compel belief in the existence of the vacuum, because air looks empty.<sup>29</sup> Another good example would be the nature of light, and the first paragraph of The World is particularly revealing here:

The subject I propose to deal with in this treatise is light, and the first point I want to draw to your attention is that there may be a difference between the sensation we have of light (ie the idea of light which is formed in our imagination by the mediation of our eyes) and what it is in the objects that produces this sensation within us (ie what it is in the flame or the sun that we call by the name 'light'). For although everyone is commonly convinced that the ideas that we have in our mind are wholly similar to the objects from which they proceed, nevertheless I cannot see any reason which assures us that this is so.<sup>30</sup>

As emerges clearly here, 'detachment from the senses' involves ridding oneself of the belief that objects really resemble the ideas we have of them. In all these cases faith in veridicality of the senses

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<sup>27</sup> See Daniel Garber, 'Semel in vita: The Scientific Background to Descartes' Meditations' in Rorty (Ed.), Essays on Descartes' Meditations, and Daniel Garber, Descartes' Metaphysical Physics (Chicago, University of Chicago, 1992) pp.94-103. This way of reading the First Meditation was initially pressed in Gilson, Etudes sur le role de la philosophie médiévale dans la formation de la pensée Cartésienne (Paris, Vrin) pp.168-173. See also Wilson: op. cit. pp.7-8, and Desmond Clarke, 'Descartes' philosophy of science and the scientific revolution' in Cottingham (Ed.) The Cambridge Companion to Descartes.

<sup>28</sup> AT VII 442, CSM II 298.

<sup>29</sup> See Principles II. 17-18 (AT VIII A 49-50, CSM I 230).

creates highly significant scientific errors. In attacking this faith scepticism eradicates the common source of error.

But the introduction of scepticism is not just negative . In attacking a sense-based epistemology Descartes can be seen to be providing indirect support for his own non-sense-based epistemology of clear and distinct ideas. Relevant here is Descartes' reply to Hobbes' accusation in the Third Objections that the First Meditation contains nothing original. He lists three reasons for introducing sceptical doubts. The first of these is "to prepare my readers' minds for the study of the things which are related to the intellect, and help them to distinguish those things from corporeal things".<sup>31</sup> Gary Hatfield comments on this passage that the doubt is;

. . . indispensable in this regard because it provides the means for freeing one's attention from sensory ideas in order to attend to an independent source of knowledge: the pure deliverances of the intellect. It thus serves a function in Descartes' Meditations similar to that of doubt and other "purgings of the senses" in the tradition of spiritual meditation stemming from St. Augustine.<sup>32</sup>

In addition to, but nonetheless in virtue of, 'leading the mind away from the senses', then, the sceptical doubts of the First Meditation effectively lead the mind towards the intellect as the only true source of knowledge.

And just as the attack on the senses is ultimately driven by Cartesian science (because of the dependence of scholastic physics upon the evidence of the senses), so too is the active promotion of an intellectual epistemology. Cartesian physics, with its central tenet that the essence of matter is extension and that events in the physical world can ultimately be explained in terms of the movement of particles, demands a specific epistemology which will explain how we can apprehend the relevant properties of extension in the appropriate manner.

What emerges is a picture on which the scepticism of the First Meditation should not be taken at face value. Instead, as Gaukroger puts it in an important paper;

While the problem itself may have come to look like a perennial one its source in Descartes is anything but perennial. It is, in fact, specific to a particular approach to foundational problems in seventeenth-century mathematical physics and attempts to read it, in an anachronistic fashion, as being due to purely epistemological concerns must inevitably result in a misinterpretation of Descartes' project.<sup>33</sup>

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<sup>30</sup> AT XI 3, CSM I 81.

<sup>31</sup> AT VII 172, CSM II 121.

<sup>32</sup> Gary Hatfield, 'The Senses and the Fleshless Eye: The Meditations as Cognitive Exercises' in Rorty (Ed.), Essays on Descartes' Meditations p.47.

<sup>33</sup> Stephen Gaukroger, 'Descartes' Project for a Mathematical Physics' in Gaukroger (Ed.) Descartes: Philosophy,

Epistemology is, it is being claimed, subordinate to physics, although the ostensible argument of the Meditations proceeds in the opposite direction. The hidden agenda that motivates the introduction of the various forms of sceptical doubt in the First Meditation is one set by Cartesian science. One can argue (as Gaukroger himself does) that Descartes created a monster which he could not control, but the crucial suggestion is that Descartes' introduction of the problem of scepticism in the Meditations has a purpose and a rationale quite different from that which he gives in introducing it - a purpose and a rationale that come from outside the sphere of pure philosophical enquiry.

To summarise, then, the differences between the traditional view and the revisionist view are as follows:

1). Whereas the traditional view sees the introduction of radical scepticism in the First Meditation as intimately connected with a need for indubitability in scientific knowledge that can only be satisfied by a putatively a priori deductivist methodology, the revisionist view suggests that the real purpose of introducing scepticism is to lead the mind away from the senses.

2) Unlike the traditional view, the revisionist view does not accept that Descartes was committed, either methodologically or in practice, to a priori deductivism.

3) On the traditional view, the demand for certainty and indubitability emerge naturally out of the sceptical arguments of the First Meditation. On the revisionist view, in contrast, the actual arguments are serving a hidden agenda derived ultimately from the epistemological requirements of Cartesian science. It is a mistake, according to the revisionist view, to take the sceptical arguments at face value, as concerned with the truth and warrant of beliefs.

#### **4. Reasons for dissatisfaction with the revisionist view of scepticism**

In the remainder of this paper I will argue that rejecting the traditional view does not compel acceptance of the revisionist view of the role of philosophical scepticism. In this section, however, I will simply give some powerful reasons, both philosophical and textual, for not being satisfied with the revisionist view. This will pave the way for what I take to be the correct account of the relation between Cartesian science and scepticism in the next section.

1. The first point to be stressed is that if sceptical doubt is introduced for the reasons claimed by the revisionist view, then it is self-defeating. We can begin by noting that the sceptical arguments of the First Meditation fall into three distinct stages.<sup>34</sup> The first stage develops arguments from perceptual error. The second presents the dreaming argument, based on the claim that experience contains no criterion through which one can determine whether one is awake and genuinely experiencing what one takes oneself to be experiencing, or asleep and dreaming rather than experiencing. The third level of the sceptical challenge comes with the hypothesis of the Malicious Demon

Each level of doubt is introduced to reinforce the preceding one. Thus, when the Cartesian alter ego suggests that, although instances of sensory illusion do indeed exist, there are nonetheless certain things which we know on the basis of the senses and which we cannot reasonably doubt, Descartes shifts to the dream hypothesis. And when the alter ego points out that, even if it makes sense to suppose that we might really be dreaming when we think we are awake, the contents of dreams are nonetheless not completely the products of invention but are always based upon waking experience, Descartes responds with the idea of the Malicious Demon.

Since Cartesian physics obviously revises the testimony of the senses, it is clear that the first level of doubt is appropriate. And the level of doubt posed by the dream hypothesis is equally appropriate. The brunt of the dream hypothesis is the idea that we might be systematically deceived in our common sense perceptions of the world, and, as Bernard Williams emphasises, Cartesian science holds the common sense world we inhabit to be the product of 'systematic pre-reflective error'. So, in this respect the dream hypothesis is actually well-founded. But this is not the case with the hyperbolic doubt communicated through the hypothesis of the Malicious Demon. This serves not to reinforce, but to undercut, the process of correcting the common sense conception of the world. Whereas the first two levels of doubt point out, quite justifiably, that the world might not resemble our prereflective conception of it, and point the way towards gaining a true and accurate (scientific) understanding of that reality, the Malicious Demon hypothesis casts doubt upon our reasons for thinking that that scientific understanding of reality is the last word to be said upon the matter.

The supporter of the revisionist view of scepticism, then, must explain why Descartes should have raised the hypothesis of the Malicious Demon if his purpose in discussing scepticism is simply setting the scene for his physics by 'leading the mind away from the senses and towards the intellect'. If that was all he was trying to do, then why not call a halt at the dream hypothesis? The matter becomes even more pressing for anyone who agrees with Burnyeat that it is precisely the Malicious Demon hypothesis that introduces what is distinctive and revolutionary in Cartesian scepticism, namely the problem of the existence of the external world.<sup>35</sup> It seems peculiar to suggest that what distinguishes Cartesian from Pyrrhonian and neo-Pyrrhonian scepticism is not only surplus to requirements, but actually counter-productive. On the other hand, the transition from the dream hypothesis to the Malicious Demon hypothesis is easily explained if epistemological concerns are taken to be driving the First Meditation. It is just the next step in the process of applying doubt wherever it is logically possible to do so.

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<sup>34</sup> Cf Bernard Williams, 'Descartes' Use of Scepticism' in Myles Burnyeat (Ed.), The Skeptical Tradition (Berkeley, University of California, 1983).

<sup>35</sup> Myles Burnyeat, 'Idealism and Greek Philosophy: What Descartes Saw and Berkeley Missed' in G. Vesey (Ed.), Idealism Past and Present (Cambridge, Cambridge University Press, 1984). Burnyeat states that hyperbolic doubt ". . . poses in an absolutely general way the problem of the existence of the external world" (p.47). But there are reasons for disputing this claim, however. Descartes is not doubting the existence of the external world - he is doubting the existence of the external world as we think we know it. The problem is not that there might not be an external

2. But it is not just that the introduction of sceptical doubt seems too strong to achieve what the revisionist view claims it is intended to achieve. It does not even seem to be necessary. In the Rules, for example, Descartes is actively promoting an epistemology designed to lead the mind away from the senses and towards the intellect. But there is no mention of scepticism in the Rules, which contain only a general injunction to restrict oneself to intuition and deduction, rather than ". . . the fluctuating testimony of the senses or the deceptive judgement of the imagination as it botches things together. . .".<sup>36</sup> Similarly, when Descartes presents the Meditations according to the synthetic method in the Replies to the Second Objections his first postulate is the very general request to his readers that ". . . they eventually acquire the habit of no longer placing too much trust in the senses".<sup>37</sup> If leading the mind away from the senses is all that is required, why are general injunctions like these not sufficient?

It is helpful at this point to draw a distinction between the very limited scepticism of The World and the radical scepticism of the First Meditation. In the first chapter of The World Descartes introduces a series of examples aimed at undermining common sense faith in the veridicality of perception. He ends the chapter with the cautious statement:

Now, I see no reason which compels us to believe that what it is in objects that gives rise to the sensation of light is any more like this sensation than the actions of a feather and a strap are like a tickling sensation and pain. And yet I have not brought up these examples to make you believe categorically that the light in the objects is something different from what it is in your eyes. I merely wanted you to suspect that there might be a difference, so as to keep you from assuming the opposite, and to make you better able to help me in examining the matter further.<sup>38</sup>

What Descartes is trying to achieve here is to shake faith in the uncorrected testimony of the senses in a way that will overcome resistance to the mechanistic world view that he will go on to develop. It is very plausible to describe this as precisely the sort of process of 'leading the mind away from the senses' that the revisionist view sees as the ultimate aim of Cartesian scepticism. But the scepticism that Descartes introduces here is fundamentally different from the sceptical doubts of the First Meditation. Not only are the arguments different, but so too is the upshot. In The World a productive degree of doubt is introduced with a series of examples, but without threatening completely to paralyse enquiry. Unlike the First Meditation, the first chapter of The World is obviously a prelude, or ground-clearing, before getting down to the serious business of science.

The problem for the revisionist interpretation is that the limited scepticism of The World fits the revisionist characterisation of scepticism far better than the radical doubt of the First Meditation. So, it has to explain why Descartes ever goes beyond the sort of reminders of the dubitability of the senses that he found adequate in the earlier work. It is no use responding that one needs to have a reason

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<sup>36</sup> AT X 368, CSM I 14.

<sup>37</sup> AT VII 162, CSM II 115.

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for revising the belief in the reliability of the senses as sources of knowledge - it is no good just being told not to trust them. The revisionist is arguing that the sceptical arguments of the First Meditation are not directed at the truth and warrant of beliefs in the way that they appear to. To suggest, however, that the general (and scientifically motivated) injunction to mistrust the testimony of the senses needs to be reinforced by the details of sceptical arguments is effectively to claim that scepticism gives reasons for revising any pre-reflective belief one might have in the reliability of the senses. Or, in other words, that scepticism provides a rational warrant for 'leading the mind away from the senses'. But accepting this means that we can take the First Meditation at face value after all.

So, revisionists are caught in a dilemma. If they play down the details of the sceptical arguments and argue that their presence in the First Meditation should be explained with reference to a science-driven hidden agenda, then they need to explain quite what the arguments are doing there at all. Why not just have a general warning against the testimony of the senses, and then move straight into constructing a new epistemology suitable for Cartesian science? But if, on the other hand, they grasp the nettle and claim that the sceptical arguments actually provide reasons for doubting the testimony of the senses, then they undermines their own position by conceding that the sceptical arguments are doing pretty much what they seem to be doing, and hence that the First Meditation really can be taken at face value after all.

**3.** The revisionist interpretation stresses passages in which Descartes describes the aim of the First Meditation as leading the mind away from the senses. An obvious example is the Synopsis, from which I have already quoted. But other passages in the corpus describe the aim of the First Meditation in very different ways. The Second Replies are particularly important. Responding to Mersenne's attack on the claim that the Second Meditation shows that the essence of mind is thought, he makes some highly pertinent comments on what is going on in the first two Meditations. The First Meditation is given a rather traditional-sounding interpretation:

Now the best way of achieving a firm knowledge of reality is first to accustom ourselves to doubting all things, especially corporeal things. Although I had seen many ancient writings by the Academics and Sceptics on this subject, and was reluctant to reheat and serve this precooked material, I could not avoid devoting one whole Meditation to it.<sup>39</sup>

Descartes does indeed discuss the need for the mind to be led away from the senses. He states:

All our ideas of what belongs to the mind have up till now been very confused and mixed up with the ideas of things that can be perceived by the senses. This is the first and most important reason for our inability to understand with sufficient clarity the customary assertions about the soul and God.<sup>40</sup>

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<sup>39</sup> AT VII 130, CSM II 94.

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But his remedy for this contamination by the senses is contained, he claims, in the Second Meditation, not the First:

Admittedly, many people had previously said that in order to understand metaphysical matters the mind must be drawn away from the senses; but no one, so far as I know had shown how this could be done. The correct, and in my view unique, method of achieving this is contained in my Second Meditation.<sup>41</sup>

And, of course, it is at the end of the Second Meditation that Descartes states: ". . . I now know that even bodies are not perceived by the senses or the faculty of imagination but by the intellect alone. . .".<sup>42</sup> What leads him to this conclusion is the wax argument, with its two-pronged argument that, on the one hand, the essence of matter is extension and, on the other, that extension can only apprehended by a process of intellectual intuition.

Of course, the crucial issue here is not just how Descartes describes his own procedure, since he was prone to tailor his descriptions to what he thought people would want to hear, and it might be objected here that the Second and First Meditations cannot be separated in this manner. There is a sense, after all, in which Descartes uses the sceptical annihilation of the external world as a way of clarifying his idea of the mind as something that can exist without the body, and this in turn provides an important grounding for the intellectualism of his clear and distinct ideas. There are three points to be made in response to this, however. The first is that this objection effectively concedes the point that the sceptical arguments of the First Meditation should be read at face value, as concerned with the truth and warrant of beliefs, because this is the only way in which the sceptical annihilation of the physical world will be achieved. Secondly, moreover, we can reiterate the point that sceptical doubts do not seem necessary for an intellectualist epistemology – for the reasons already discussed, as well as because it seems to entail that accepting that the body not only exists but is in 'substantial union' with the mind would threaten the deployment of clear and distinct ideas. And there is also a third, more general point. It seems to be confusing cause and effect to read the end result of the series of sceptical arguments as a hidden motivation for embarking upon those arguments.

4. The revisionist view stresses the autonomy of the intellect in Descartes' mature epistemology. Its central claim is that the mind needs to be led away from the senses and towards clear and distinct ideas. This can, of course, be read in different ways. The strongest reading available here would hold that in the enterprise of gaining knowledge the senses have no role to play at all. On such a view, clear and distinct ideas are completely independent of the senses, to be apprehended by the 'natural light of reason'. This seems to be Hatfield's view. He expressly compares Descartes' epistemology of clear and distinct ideas with Plato's 'eye of the mind': essentially, he claims, both share the following conception of understanding:

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<sup>41</sup> AT VII 131, CSM II 94.

The objects of pure geometry - points, lines, and surfaces without colour or any sensory quality - belong to the domain of invisible, unchanging objects. Hence they must be known by a faculty appropriately directed toward that domain (dianoia), which employs unitary (indivisible) ideas to grasp objects that are "separate" from from sensible things.<sup>43</sup>

Of course, the 'separateness' of the objects of understanding is not supported by anything like Plato's theory of forms. Rather, God has implanted in us an innate knowledge of the laws of geometry that define the essence of matter. But nonetheless, on this view, the intellect is completely distinct from the senses, and it alone is to be trusted.

Certainly, Descartes' position does rest upon a sharp distinction between the senses and the intellect. This can be brought out by pressing the contrast suggested earlier between Descartes' epistemology and the scholastic/Aristotelian account against which he was reacting. The general principle of scholastic epistemology, as exemplified for example by Thomas Aquinas, is the Aristotelian principle that all knowledge is ultimately dependent upon sensory evidence, and intellectual cognition depends upon a process of abstraction from sensory evidence. In cognizing a particular the intellect abstracts from what is presented by the senses (the sensible species) to apprehend the universal form of that particular (the intelligible species). So, although the apprehension of what is universal is an intellectual operation, it is an intellectual operation performed upon material supplied by the senses. This, of course, is what Descartes rejects.<sup>44</sup> On the Cartesian view, our intellectual ideas are not derived from the senses but are innate. We have innate ideas not only of God and the self, but also of extension and its modes.<sup>45</sup> The central ideas in terms of which Cartesian science is framed are all innate.

This doctrine does indeed offer a sharp distinction between the senses and the intellect. But does it support the attribution to Descartes of a neoplatonist theory of scientific understanding on which the intellect is completely independent of the senses? There are certainly passages where it looks as if it does. The following from the Sixth Replies is a case in point and often quoted:

I demonstrated in the Optics how size, distance and shape can be perceived by reasoning alone, which works out any one feature from the other features.<sup>46</sup>

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<sup>43</sup> Hatfield, 'The Senses and the Fleshless Eye. . .' p.65.

<sup>44</sup> For an interesting analysis of how the rejection of the Thomist theory of abstraction fits in with the project of the Second Meditation see John P. Carriero, 'The Second Meditation and the Essence of Mind' in Rorty (Ed.), 13Essays on Descartes' Meditations.

<sup>45</sup> The question of exactly what Descartes meant by innateness is a difficult one. In the Third Meditation an innate is 'one that derives simply from my own nature', and he contrasts them with adventitious and fictitious ideas, but there are places where he suggests that almost every idea is innate. For example, in Comments on a Certain Broadsheet (AT VIII B 357-361, CSM I 303-5) he claims that innate ideas include not just the 'common notions' but also the ideas of pains, colours and sounds.

If we look at the context, however, this hardly qualifies as a case of what Grene terms "intellection unmediated by sense".<sup>47</sup> Descartes is discussing the general issue of how sensory judgements relate to sensory experience, in response to the objection that sensory error can only be corrected by the senses. Sensory experience proper, he maintains, is confined to immediate perceptions of colour and light. Anything more than that is a judgement, and as such an act of the intellect:

But suppose that, as a result of being affected by this sensation of colour, I judge that a stick located outside me, is coloured; and suppose that on the basis of the extension of the colour and its boundaries together with its position in relation to the parts of the brain, I make a rational calculation about the size, shape and distance of the stick: although such reasoning is commonly assigned to the senses (which is why I have here referred it to the third grade of sensory response), it is clear that it depends solely on the intellect.<sup>48</sup>

There then follows the reference to the Optics already quoted. But whereas there he talks about 'perceiving by reasoning alone', the details suggest that this ought not to be read too literally. Obviously, the 'rational calculation' is carried out by reasoning alone, and the ideas of size, shape and distance which are brought to bear are innate and hence 'depend solely upon the intellect'. But this does not add up to an "intellection unmediated by sense". Rather, it is a process of reflection upon sensory experience. The intellect is operating on the data which the senses provide.<sup>49</sup> What makes this Cartesian account different from the scholastic theory is that the operations of the intellect are not abstractions of universals. Rather, they are operations which apply innate concepts and modes of explanations to sensory experience.<sup>50</sup>

A possible objection here would be that it is potentially misleading to place too much weight on the discussion in the Sixth Replies, because Descartes is not explaining proper scientific understanding of the sort associated with clear and distinct ideas, but rather judgements based upon sense perception. He explicitly says that he is discussing ". . . all the judgements which we have been

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<sup>47</sup> Marjorie Grene, Descartes (Brighton, Harvester Press, 1985) p.62 where she writes: "And it is just such a loosening of thought from experience that the Cartesian turn acknowledges - in order, more directly, *via* an intellection unmediated by sense, to approach reality in its mathematicisable and evident nature" (p.62).

<sup>48</sup> AT VII 437-438, CSM II 295.

<sup>49</sup> For a challenging interpretation of the details of Descartes' theory of perception see Nancy L. Maull, 'Cartesian Optics and the Geometrization of Nature' in Gaukroger (Ed.), Descartes: Philosophy, Mathematics, Physics.

<sup>50</sup> It is this that is potentially misleading. A commitment to innate ideas can easily be confused with a complete rejection of the senses, and many of the passages that seem to support the latter really only support the former. A case in point occurs in the Fifth Replies, where Descartes is responding to Gassendi's query about what idea he would have of God had none of his senses been operational. Descartes replies: "I do not doubt that the mind – provided we suppose that in thinking it received not just no assistance from the body but also that it received no interference from it – would have had exactly the same ideas of God and itself that it now has, with the sole difference that they would have been much purer and clearer. The senses often impede the mind in many of its operations, and in no case do they help in the perception of ideas" (AT VII 375, CSM II 258). I take it that the ideas referred to here are the innate ideas, and it is very plausible that the senses impede the mind in the perception of innate ideas. After all, one of the principal results of the Meditations is to clarify the innate idea of God. But neither Descartes' reply, nor Gassendi's original question, warrants the further thought that the senses have no part in the

accustomed to make from our earliest years - judgements which are occasioned by the movements of these bodily organs".<sup>51</sup> Since this includes all the sensory judgements that fall prey to sceptical doubt, he can hardly be talking about clear and distinct ideas. But in the passage referred to Descartes explicitly distinguishes judgements 'formed without any reflection in our early childhood' from those judgements based on reasoning which correct the errors made in the first two grades of sense perception, and states that he is discussing the latter. The judgements which 'depend solely upon the intellect' are not the untutored judgements made by children and scholastics who take the testimony of the senses as unquestionable.

Moreover, it is only some such theory of judgement that will allow Descartes to admit that we can have knowledge of particular objects at all. When in the Sixth Meditation he concedes that corporeal objects exist he makes a notoriously ambiguous comment on the sort of knowledge of corporeal objects available to us:

It follows that corporeal objects exist. They may not all exist in a way that exactly corresponds with my sensory grasp of them, for in many cases the grasp of the senses is very obscure and confused. But at least 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.<sup>52</sup>

The ambiguity is whether we can have knowledge of particular clearly and distinctly conceived (primary) properties (eg the particular size and shape of an object), or whether he is allowing simply that we can know that objects do have such properties (eg the fact that an object has a particular shape and size).<sup>53</sup> If 'all the properties which I clearly and distinctly understand' include particular determinate properties, then Descartes clearly needs to explain what such clear and distinct understanding consists in, and it is hard to see how that could be done without construing clear and distinct understanding as an operation carried out on the data provided by sensory experience in the way we have suggested. Of course, this will not be conclusive until it is shown that Descartes did allow clear and distinct ideas of particular determinate properties. But it does show at least that denying that he did is implicated in accounts of clear and distinct ideas as 'intellections unmediated by sense'.

A further point here is that Descartes' clear and distinct understanding in the Second Meditation that the essence of the wax is its extension is inextricably linked with sensory experience of the wax. As he stresses, the clear and distinct idea that the wax is essentially extended, flexible and changeable cannot actually be derived from the senses, because all the sensible properties have changed and hence cannot be essential. Nor can it be derived from the imagination, because the idea is of it being changeable in indefinitely many ways, and this cannot be represented imaginatively. His conclusion is,

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<sup>51</sup> AT VII 437, CSM II 295.

<sup>52</sup> AT VII 80, CSM II 55.

<sup>53</sup> See also the discussion in the next section.

of course, that it is "perceived by the mind alone", an instance of "purely mental scrutiny".<sup>54</sup> But nonetheless, understanding the essence of the wax in this clear and distinct manner is possible only because we perceive it through the senses. It is the fact that we have sensory experience of the wax changing in all its sensible aspects that opens the way for the thought that the wax is still the same thing after the changes, and hence for the demand for an explanation of how this could be possible - an explanation which appeals to the innate idea of extension. Here, then, we seem to have sensory experience deeply implicated in Descartes' showpiece example of a clear and distinct idea.

It is highly significant here that the revisionist view is in danger of collapsing into the strict a priori deductivism of the traditional view if this extreme Platonism is maintained. If it is denied that the senses have any role to play in the acquisition of scientific knowledge, then it is hard to see how experimental science can ever get started. In this situation the only path left open for the acquisition of knowledge would be strict deduction from first principles. As we saw in §2, however, this bears no relation to Descartes' mature thinking on scientific method.

If it is accepted that Descartes' intellectualist epistemology does not depend upon a rigid distinction between the intellect and its clear and distinct ideas, on the one hand, and obscure and confused ideas provided by the senses on the other, then the revisionist view starts to look a little simplistic in its suggestion that the mind needs to be led away from the senses and towards the intellect. On the view I have been urging Descartes' position is more that the mind needs to be led away from unreflective acceptance of untutored sensory judgements, and towards drawing the right conclusions from sensory experience, conclusions in which the innate ideas have a crucial role to play. But once the complexities of his position are recognised, then it starts to look implausible that Descartes' hidden reason for introducing sceptical arguments was to effect such a process of reeducation.

## 5. Science as a source of scepticism

The position we have reached is this. There are good reasons for rejecting the traditional view of Descartes as driven by a purely a priori deductivist methodology. This creates a problem, however. Rejecting the traditional view means that we can no longer use the symbiotic relation between scepticism and certainty to explain why Descartes introduces radical scepticism into the First Meditation. This in turn seems to leave room for the thought that if Descartes was not involved in the search for certainty as traditionally construed, then perhaps the epistemological worries which the sceptical arguments raise are not as important as their position in the Meditations might suggest. In the preceding two sections we have considered one way of substantiating this thought - with the suggestion that Descartes' real but disguised reason for introducing sceptical worries was to counteract the effects of common sense and prejudice. But this approach seems susceptible to serious objections. And so the challenge still remains of integrating the centrality of scepticism in the Meditations with the recognition that the traditional view is flawed and inaccurate. Any account of the role of

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scepticism will have to take into account the scientific context of Cartesian epistemology. But can this be done while still accepting that the First Meditation should be read at face value, as posing sceptical doubts about the truth and warrant of beliefs?

As a first step towards meeting this challenge it is important to bear in mind a distinction between two different types of general epistemological project.<sup>55</sup> The first (explanatory epistemology) is the project of explaining how it is that we have the knowledge that we have. One important form which an explanatory epistemology might take would be an analysis of knowledge and its various sources (sense perception, introspection, testimony etc), together with an account of how knowledge is related to other mental states. What guides explanatory epistemology is the view that knowledge is a central facet of human existence to be taken for granted and elucidated on the basis of its being taken for granted. In contrast, justificatory epistemology aims to provide an analysis and theory of knowledge that will explain how knowledge is possible at all. Its salient feature is a conviction that claims to knowledge need to be grounded and validated, because we cannot strictly speaking possess any knowledge at all unless we have a theory that explains how it is possible to have the sort of knowledge that we think we have. The operative idea is that without the appropriate epistemological justification we will have no good warrant for thinking that we have knowledge at all. There is a clear connection between the project of justificatory epistemology and taking epistemological scepticism seriously. This allows us to pose the question of why sceptical argument emerges in a different way - as the question of why a justificatory epistemology might be thought necessary, as opposed simply to an explanatory epistemology.

The first step in answering this is to look more closely at the optimistic conception of knowledge that might underlie the thought that the possibility of knowledge is not in doubt and that the only epistemological issues are explanatory ones. We can take Aristotle as a case in point here, both because he set the intellectual framework for scholastic epistemology and because he so clearly exemplifies such epistemic optimism. In Aristotle we do not find the modern sense of a distinction and possible radical divergence between the way things seem and the way they really are, between the world as it appears to the human mind and the world as it might be in complete independence of human epistemic limitations and idiosyncrasies. For Aristotle, thought and language are the way they are because their structure reflects the structure of the world. This is a function of the centrality he accorded teleology, both as a form of understanding the world, and as the principle whereby the world is structured. Knowledge is knowledge of the universal, of the forms which explain why things are and why they develop the way they do. And this knowledge is possible because each individual thing possesses such a form which the human sensory and cognitive apparatus is designed to apprehend. The relation between knower and known is a reciprocal one.

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<sup>55</sup> The contrast between justificatory and explanatory epistemologies is closely related to the distinction between descriptive and legitimatory accounts of cognition that Gaukroger makes in discussing Rule Twelve – Descartes: An

An essentially Aristotelian faith in the constitutive reliability of our sensory and cognitive apparatus is one of the crucial planks of scholastic natural philosophy.<sup>56</sup> Scholastic physics is underpinned by a faith in the senses, and the world of scholastic physics is very much the world of common sense unscientific perception.<sup>57</sup> Although this considerably simplifies the process of scientific enquiry, it does not mean that scholastic physics has no need of an epistemology. Quite the contrary, scholastic physics needed the support of a complex epistemology to explain how it could be possible to apprehend substantial forms, real qualities and the other paraphernalia of scholastic hylomorphism. Aquinas, for example, had a complex account of the internal faculties involved in sense perception - the sensus communis which collates the data from different sensory modalities, the vis aestimativa which apprehends forms through the senses and the vis memorativa which conserves those forms. Sense perception produces images of particulars which are the starting-points for the apprehension of what is universal (the species expressa), a process undertaken by the active and passive intellects. Scholastic physics, then, clearly requires an explanatory epistemology. But scholastic physics did not demand what we have termed a justificatory epistemology. For medieval natural philosophers the existence of knowledge was generally not in doubt.<sup>58</sup> So, holding on to the idea that Cartesian science has a vital role to play in setting the agenda for Descartes' philosophy, what we need to ask is whether the differences between scholastic science and Cartesian science are such as to determine a shift from explanatory epistemology to justificatory epistemology.

As an initial step towards explaining this one might point out that Cartesian science reveals our common sense perceptions of the world to be mistaken. It shows that there is systematic and pervasive error in our experience. Most obviously it effects this by making what is effectively a distinction between primary and secondary qualities and maintaining that the latter are ultimately reducible to

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<sup>56</sup> A good example of this in the case of Aquinas is to be found in Summa Theologica Pt 1, Q. LXXXIV art. 6, where he offers an extremely cursory reply to Augustine's argument that intellectual knowledge cannot be derived from sensible things, because what we perceive by the senses cannot be distinguished from deceptive images. Augustine had clearly been led to this view by his engagement with the arguments of classical scepticism. As far as Augustine is concerned those arguments do not establish all that they set out to establish, but they do succeed in casting doubt upon the testimony of the senses. Aquinas, however, seems impervious to them. His comment upon Augustine's argument is extremely cursory: "These words of Augustine mean that truth is not entirely from the senses. For the light of the agent intellect is needed, through which we know the truth of changeable things unchangeably, and discern things from their likenesses." See Andrew B. Schoedinger (Ed.) Readings in Medieval Philosophy (Oxford, Oxford University Press, 1996) p. 441.

<sup>57</sup> There are, of course, exceptions, such as John Buridan's impetus theory of projectile motion which is explicitly targeted at Aristotelian and commonsense conceptions of motion. See the extracts from Buridan's commentaries on Aristotle's physics translated in Andrew B. Schoedinger (Ed.) Readings in Medieval Philosophy (Oxford, Oxford University Press, 1996) pp. 830-842.

<sup>58</sup> Many historians of medieval philosophy, following the lead of Konstantin Michalski, have identified what they take to be powerful sceptical tendencies among fourteenth century followers of William of Ockham, of whom the best-known are probably Nicholas of Autrecourt and Richard Holcot. Increasingly robust interpretations of divine omnipotence following the Paris condemnations of 1277 led many of the theologians and philosophers at Oxford and Paris during the fourteenth century to entertain the possibility of divine intervention in all types of cognition and perception. Parallels with the possibility of deception by an omnipotent God which Descartes discusses in the First Meditation have been noted. The relationship between the extremely complex philosophical and theological issues surrounding the doctrine of divine omnipotence in late scholasticism and the scepticism of the First Meditation is too deep to go into here. I hope to address it in subsequent work. For the moment I will just say that, although some of the fourteenth century philosophers showed definite sceptical tendencies (in one sense of the word), they did

the differential motion of 'packets' of a continuous extended substance. Our common sense beliefs that colour and heat, say, really inhere in objects have to be revised. But so too do other common sense beliefs - the belief, for example, that bodies in motion have a tendency to come to rest (which conflicts with Descartes' first law of motion) or that apparently empty air really is empty (which conflicts with his principle that space is identical with body). The world of Cartesian physics, and indeed the world of the New Science in general, is profoundly alien, a world of orbiting planets and moving particles which act on us to produce our (ultimately mistaken) everyday phenomenal world. The turn towards a justificatory epistemology might be interpreted as a response to the discovery that error is so pervasive, on the general principle that we need to establish the possibility of knowing anything at all, given that science has revealed that so much of what we thought we knew we do not actually know. And it is easy to see how scepticism might fit in here, because scepticism is ultimately the line of thought which argues that, if we are mistaken in our common sense view of the world, then perhaps we are mistaken about absolutely everything. Once the existence of systematic error is established, it is only a short step to the idea that global error is perfectly possible.

But this suggestion is not quite right yet. The existence of systematic error in everyday experience cannot in itself be a compelling reason for embracing sceptical worries and the general project of a justificatory epistemology. There are ways in which it can be accommodated within an explanatory epistemology. If, for example, one could explain how systematic error arises by giving an appropriate (scientific) account of why we make the mistakes that we do make, together with an account of how we can correct those mistakes and arrive at a true knowledge of the nature of things, then systematic error ceases to be a source of worry. If our science is good enough, then we can account for systematic error within science, and hence resist the inference from the existence of systematic error to the possibility of global error. This would mean that there is no need for a justificatory epistemology.

This would be analogous to a line of argument canvassed most famously in our own day by Quine. In his defence of a naturalistic epistemology, and his repudiation of what he sees as a Cartesian-derived epistemology, Quine places considerable weight on the claim that sceptical doubts arise within science and can be dealt with by science. There is no need to step outside the corpus of scientific knowledge in order to validate it, according to Quine, because in the last analysis sceptical doubts are scientific doubts and the solutions to them lie within science, particularly in the empirical psychological study of our how our beliefs and theories emerge. This, in the terms I have been employing, would be an explanatory epistemology rather than a justificatory epistemology.

If, then, it is to be argued that the turn to a justificatory epistemology is driven by Cartesian science, we need to explain why Descartes cannot be satisfied in the way that Quine is with a naturalistic response to the divergence between appearance and reality created by the New Science. Why can he not just fall back on his own scientific accounts of how we are systematically mistaken in, for example, holding that secondary qualities really inhere in objects?

It is at this point that we can appeal to those very aspects of the theory and practice of Cartesian science that presented critical difficulties for the traditional interpretation of Descartes' as an a priori deductivist. The crucial point is that Cartesian science is ineliminably hypothetical. It offers explanations which can ultimately only be warranted by their predictive success and explanatory power, because ". . . the supreme craftsman of the real world could have produced all that we see in several different ways".<sup>59</sup> Such morally certain explanations cannot offer the sort of correction of systematic perceptual error that we are looking for. If we are to provide an explanation of sceptical worries from within science, in the way that a naturalistic/explanatory epistemology thinks is possible, then we need to have confidence in the scientific solutions that we are providing. It is no use claiming that our common-sense view of the world is completely mistaken, and then offering a hypothetical physics and metaphysics that will explain how that comprehensive error fits into a complete account of the world. As soon as a world of orbiting planets and moving particles is put forward as a hypothesis to explain the familiar world of everyday experience, one possible and perhaps inevitable consequence is the sceptical suggestion that perhaps another, even more counter-intuitive hypothesis will explain the phenomena just as well. And then we are plunged into the project of explaining how it is possible for us to have knowledge at all.

Cartesian science generates scepticism precisely because it is predicated on the existence of radical error in the commonsense view of the world, and yet cannot provide anything more than a hypothetical replacement for the commonsense view of the world. The morally certain hypothetical replacement for commonsense that Descartes expounds in the Principles raises the question of whether a different hypothesis might not be just as good, and thus the door is opened for scepticism.

I am not suggesting that this view of the relation between scepticism and Cartesian science is part of the sub-text, or background, to the Meditations. Descartes explicitly makes precisely the move that I am describing in the First Meditation. I am referring to the caveat that Descartes introduces just after the dream argument:

By similar reasoning, although these general kinds of things - eyes, head, hands and so on - could be imaginary, it must at least be admitted that certain other even simpler and more universal things are real.<sup>60</sup>

He goes on to say what 'these simpler and more universal' things might be:

This class appears to include corporeal nature in general, and its extension; the shape of extended things; the quantity, or size and number of these things; the place in which they may exist, the time through which they may endure, and so on.<sup>61</sup>

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<sup>59</sup> AT VIII A 327, CSM I 289.

<sup>60</sup> AT VII 20, CSM II 13-4.

<sup>61</sup>

These are precisely the object of Cartesian physics. The view that Descartes' initial response to the dreaming argument implicitly relies upon Cartesian physics has been most prominently adopted by Martial Gueroult, who suggests that these 'simpler and more universal things' are the simple natures that Descartes thinks are ontologically basic.<sup>62</sup> So, the dream argument supports the scientific realist view of the world, on which common-sense perception is systematically mistaken but can be corrected by physics.<sup>63</sup> This, of course, is perfectly compatible with an explanatory/naturalistic epistemology, and reinforces the point made earlier that the first two levels of Cartesian doubt certainly have a role to play in such an epistemology. In fact, they have a role to play in Cartesian explanatory epistemology, as the earlier discussion of the scepticism of The World made clear.

This point can be developed slightly further to bring it into line with some of the things said earlier about the crucial differences between the scepticism of The World and the scepticism of the Meditations. I suggested in §3 that the mild doubt which Descartes develops in the introductory first chapter of The World is far more appropriate to the sort of discrediting of the senses as a source of knowledge that is required by Cartesian science than are the radical doubts introduced in the First Meditation. The brand of scepticism cavassed in the first chapter of The World fits within the project of explanatory epistemology, because the explanatory project of explaining how cognition actually works in the acquisition of knowledge requires pointing out the respects in which the senses are deceptive. And, although in The World Descartes confines himself to what I referred to earlier as the first level of doubt, it seems clear that the second level of doubt (the dreaming argument as an argument that everyday perception is systematically misleading) would also fit comfortably there.

But of course the scepticism of The World is not the scepticism of the Meditations. The dream argument is only the second stage in the argument of the First Meditation. As soon as he offers the possibility of systematic error being corrigible by Cartesian science, he immediately retracts it. The account I have been developing in this section explains why Descartes should have found it so obvious that science could not stop scepticism in the manner assumed by an explanatory/naturalistic epistemology. The crucial point is that Cartesian science is hypothetical and uncertain in all the ways

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<sup>62</sup> In Descartes selon l'ordre des raisons Vol. 1 pp.34-5.

<sup>63</sup> Gueroult's interpretation has been challenged by Frankfurt (Demons, Dreamers and Madmen pp. 56-60) who claims that the list of 'simpler and more universal things' that appears in the First Meditation differs from Descartes' considered account of the simple natures in three respects. First, it includes colour which Descartes clearly thought had no role to play in physical science. Second, it makes no mention of the fact that the simple natures are supposed to be innate. Third, it includes examples of only two of the four classes of simples that he distinguished (in, for example, the letter to Elizabeth of 21 May 1643: AT III 665, CSMK 218). There is nothing corresponding to the simples that pertain to mind alone, or to mind and body considered together. None of the seems to me to be conclusive, however. First, it seems mistaken to claim that Descartes includes colour in his list of simples. This is a misconstrual of the analogy that he makes in describing the simples as 'the real colours from which we form all the images of things'. Second, even though Descartes does not say that the simples are innate, he does not say that they are not innate, and so there is no explicit tension with his final theory. Third, it is hardly surprising that Descartes does not list any of the psychological simples, since he is trying to explain the basic constituents of the physical world.

The only serious textual obstacle to reading the 'simpler and more universal things' in the way that Descartes suggests is the fact that in the very next paragraph Descartes explicitly says that the dream argument leaves mathematics certain and physics uncertain. As I read this passage, however, Descartes is referring to Aristotelian

discussed. A hypothetical science leaves the door open for other hypotheses, like that of the Malicious Demon which Descartes then introduces.

This is not to say, however, that any scientific theory which offers hypotheses or which defends the hypothetical method will inevitably have to confront scepticism. Nor does that hold true of the class of scientific theories which offer hypothetical explanations of the systematic error in the common sense perception of the world (even when allowances are made for the general unwillingness of practising scientists to pursue the epistemological implications of their results). Locke is an excellent example of a scientifically sophisticated philosopher endorsing a hypothesis that postulates massive error in everyday perception of the world. Locke's corpuscularianism is, as he freely admits, hypothetical. Yet Locke's Essay does not contain a direct confrontation with the sceptical challenge. How can this be explained?

What explains the absence of scepticism in Locke's Essay is his acceptance of a very high degree of epistemological modesty, best revealed in his distinction between real and nominal essence. What the 'Corpuscular Hypothesis' is attempting to explain is the "real Constitution of its insensible Parts, on which depend all those Properties of Colour, Weight, Fusibility, Fixedness. *etc.* which are to be found in it".<sup>64</sup> This 'real constitution' is, of course, the real essence of a given object, as opposed to the nominal essence, given by the way in which we identify and classify that object. Locke is quite happy to accept that we do not, and cannot, have knowledge of real essences. Nominal essences are all that we can know (in the case of substances).<sup>65</sup> This neatly avoids the epistemological problems raised by a scientific theory which postulates massive perceptual error and can only offer a hypothesis to replace the putative certainties of common sense. This is hardly a path that Descartes could have taken, not least because it can be read as effectively conceding the point to the sceptic. But what it does bring out is that a certain degree of realism is required to generate scepticism, and justificatory epistemology in general, out of hypothetical scientific theories – and this is a degree of realism that Descartes certainly possessed.

## Conclusion

The analysis I have proposed of the emergence of sceptical worries from the nature of Cartesian science deals with a curious and frequently noted equivocation at the end of the Principles. Just after the passages to which we have drawn attention and which stress the provisional and hypothetical nature of the conclusions that he has drawn, Descartes seems to do a volte-face:

Besides, there are some matters, even in relation to the things in nature, which we regard as absolutely, and more than just morally certain. This certainty is based on a metaphysical foundation, namely that God is supremely good and in no way a deceiver, and hence that the faculty which he gave us for distinguishing truth from

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<sup>64</sup> John Locke, Essay Concerning Human Understanding, edited by P. H. Nidditch (Oxford, Clarendon Press, 1975) III, iii, 18.

<sup>65</sup> ...

falsehood cannot lead us into error, so long as we are using it properly and are thereby perceiving something distinctly. Mathematical demonstrations have this kind of certainty, as does the knowledge that material things exist; and the same goes for all evident reasoning about material things. And perhaps even these results of mine will be allowed into the class of absolute certainties, if people consider how they have been deduced in an unbroken chain from the first and simplest principles of human knowledge.<sup>66</sup>

Here he seems to be ascribing absolute certainty to what he has just said can have only moral certainty. Is he just contradicting himself?

The key to this passage is the claim that absolute certainty is based upon a metaphysical foundation. We can claim absolute certainty, Descartes is saying, because we have proved the supreme goodness of God, and this involves eliminating the sceptic's hypothesis of a Malicious Demon. Absolute certainty comes when we have dealt with the sceptic. This does not mean that he is rejecting his previous claim that Cartesian science possesses only moral certainty. Considered in isolation Cartesian science cannot possess anything more than moral certainty, precisely because it opens the door to sceptical worries in the manner brought out in the previous section. But scepticism can be dealt with, so Descartes thinks, and once it has been dealt with we will have absolute certainty. An experimental and hypothetical science breeds scepticism, but the successful rebuttal of scepticism gives certainty back to Cartesian science.